

**Examination of Additional Benefits
of Self-Written Study Guides vs.
Handouts in Advanced Accounting**

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Abstract

This research examines whether there was an incremental improvement in Advanced Accounting student performance for students who wrote their own study guide before receiving a study guide from the professor. During the exams, all students were allowed to reference any notes and guides. After controlling for student ability, results show that there is indeed a benefit to Advanced Accounting students writing their own study guides even though all students had access to the professor's provided study guide. An 8 – 9 percentage point improvement in exam grade was calculated based on the regression models.

Keywords: Accounting Education, Note-taking, Handouts, Study Guide, Virtual Learning

Introduction

As educators, we strive to provide our students with the tools to be successful inside and outside the classroom. As Covid 19 forced significant shifts in course delivery, it facilitated pedagogical changes that could be added to educators' toolboxes even as normalcy returned to institutions of higher education. Therefore, it is critical to analyze the impact of new pedagogical implementations and decide whether it is prudent to continue utilizing those teaching methods and strategies as institutions return to more traditional operating environments.

One major change for many educators and students was the shift from in-person classes to virtual (e.g., synchronous video call) classes. The Advanced Accounting courses I taught were certainly affected by these changes. Not only was the method of course content delivery affected, but there was also a significant change to the examination environment. Contrary to my usual procedure, I allowed students to reference all study materials during their exams, while modifying the exam content. This access to reference materials served as the catalyst for this research. Specifically, I examine how to provide reference materials in a way that would be more effectively utilized by students.

In this paper I examine whether self-written study guides provide a significant performance improvement over professor provided study guides in a virtual learning, open-notes examination environment. This is tested in the second and third (final) exams of the semester with a subset of course content in Advanced Accounting courses. The subject-matter of the study guides is objective, containing content with specific correct answers that could be found with the proper usage of the study guide. All students were provided a study guide by the professor. However, prior to that study guide being disseminated students were given the option to complete an extra credit assignment which required the creation of a study guide that would mimic the handout provided later. For exam two, completion of the extra credit assignment was worth one (1) point toward the students' overall class grade. For exam three, completion of the extra credit assignment was worth one-half (0.5) point toward the students' overall class grade.

Results of this experiment shows evidence of improved student performance on exams for which they attempted the extra credit assignment. Every student had access to the same study guide and was allowed to reference that study guide during the exam. Results showed that, depending on the regression model used, students who completed their own version of the study guide added approximately 8-9 percentage points to their score on average.

Literature Review and Motivation

Rebele and St. Pierre, in their 2015 article, warned about "Stagnation in Accounting Education Research." Specifically, they were concerned about the lack of empirical research in accounting education. They write that "Experiments using both control and treatment groups are needed to support the effectiveness of recommended educational interventions, but relatively few such studies have been conducted." This call to action helped motivate this empirical study. Other related research includes examinations of accounting education, note taking, and testing

methodology. Apostolou, Dorminey, and Hassell (2021) summarize recent accounting education research in select accounting education journals.

In this paper, I add to the literature which examines the relationship between student study methods and student performance. A recent paper in this area, written by Stice, Stice, and Albrecht (2020), examined how study methods affect student exam performance. They found that, as expected, students who study more earn higher exam scores. Moreover, students who study more through text rather than videos also performed better on exams.

Aakaboune, Blix, Daigle, and Quarles (2020) tested whether special assignments provided indirect benefits to student performance on auditing exams. Their treatment group completed active learning assignments which supplemented the normal lecture and coursework that all students received. They found that the data analytics assignments improved performance even though data analytics were not a direct part of the examinations. They conclude that the skills obtained from the assignments indirectly improved performance.

Papageorgiou and Callaghan (2020) also examined how skills were associated with accounting student performance. Similar to Aakaboune et al., Papageorgiou and Callaghan found that practical and applied skills were positively associated with course grade. However, the positive association between these skills and performance varied in significance depending on the years being examined.

Dickson, Miller, and Devoley (2005) (DMD) examined whether mandatory study guides in introductory psychology affected student performance. They required one section of the course to complete the textbook's study guide, while the other section was not notified of any requirement. They found that those who completed the guide had a statistically significant 2 percentage point higher average grade. DMD showed that student effort in studying, enhanced by required work, improved exam scores.

This paper differs from DMD significantly in environment and research method. The environment is important because DMD does not state that students were allowed to use their notes during the exam. Traditionally, students are not allowed to. However, the environment created by Covid 19 influenced testing implementation. For the exams discussed in this paper, students were able to use their notes and texts during their exams. So while the benefit of studying is readily accepted, the question of interest is whether the effect of a self-created guide is strong enough to supersede the availability of a ready-made study guide when students are allowed to reference that guide during their examinations.

Stacy and Cain (2015) discuss note-taking and handouts in education. They describe the dilemma that some educators have in trying to determine the best methods to enhance student learning; How much should an educator require students to write their own notes, rather than providing fully detailed handouts? They reference Kiewra et al (1991b) as having shown enhanced performance of students that have personally taken notes during class, referred to as encoding, versus those that do not. Specifically, Kiewra et al delve into the comparative effectiveness of encoding, encoding plus storage, and external storage. Encoding plus storage

involves students writing lecture notes and subsequently reviewing them. External storage, per their definition, involves students that did not take their own notes, but instead receives them from an external source.

There are significant differences in the research setting of Kiewra et al (1991b) and the testing completed in this paper. Perhaps the most noteworthy difference is that Kiewra et al performed a controlled experiment with undergraduate volunteers with potentially different educational interests. This research paper utilizes students and treatments from advanced accounting courses where most, and likely all students, are pursuing an accounting degree. This higher overall interest in the material being examined may lead to reduced variability in outcomes when compared to Kiewra et al, and potentially reduced opportunity for experimental treatments to have significant effects. However, there is still variability in student performance even in the highest-level accounting courses. Therefore, it is still worthwhile to examine ways to enhance student learning in advanced accounting.

Research Method and Results

This research examines whether advanced accounting study guides that are filled out by students significantly improve student performance even when professor provided study guides are provided. Course lectures were delivered virtually, with synchronous video call attendance being required. Exams were scheduled on a specific day but could be started within a wider range of time than the normally scheduled classes. In general, students had an approximately 10-hour window to begin their exams. However, the exam automatically closed at the end of that window. In addition, once the exam was started it had to be completed within a given time limit. Exam one and exam two had a 100-minute time limit. Exam three had a 200-minute time limit. Therefore, for a student to utilize all the available time for an exam, they had to start the exam 100 minutes before the end of the testing window for exams one and two, and 200 minutes before the end of the testing window for exam 3.

The extended testing window was a provided after examination of certain course dynamics. I found that some students were attending class virtually while at work. While it is possible, though probably not highly effective, to listen to a lecture while at work, trying to take an exam while at work would put students at a severe disadvantage. They could have the stress of multitasking work and school and could also miss out on utilizing all the resources available to them during exams, such as video calls with the professor and study guides. This aspect of working during virtual classes in the pandemic is surely worth examining in future research.

Each of the exams were open notes. Students were notified that communicating with others was not allowed on the exam. To help mitigate cheating, most questions had four to ten versions that were randomly assigned to students via the Canvas course management system. These versions, combined with the program-enforced time limits, were the main methods used to reduce students' cheating opportunities.

There were three exams in the course. Every student was provided a study guide for exams two and three. These study guides did not cover all content included in the exams. The study guide for Exam 2 covered approximately 60% of the exam material. The study guide for Exam 3 covered about 50% of the exam material. Before those guides were disbursed, students were able to complete an optional assignment. This optional assignment tasked students to answer questions which, if answered properly, would match the study guide they would later receive from the professor. The assignment required students to fully complete it to receive credit, though students were informed that minor errors would not be penalized. Students were notified that this was to be their individual work and they would incur significant class grade reductions if they copied or shared their work. Students submitted the optional assignment in a variety of ways. These included submitting pictures of handwritten work, submissions of Microsoft Word documents, submission of Microsoft Excel spreadsheets, and submissions of Apple and Google spreadsheets and documents. Optional assignment completion counts, as well as other descriptive statistics, are shown in Table 1.

Overall, there were 58 students in two advanced accounting course sections. Exam one did not have an extra credit assignment. For exam two, 16 of the 58 students completed the extra credit assignment. For exam three, 20 of the 58 students completed the extra credit assignment. This totals to 36 of 116 extra credit assignments completed, or 31%.

| Table 1 - Descriptive Statistics* | | | |
|---|-----------------------------|------------------------------------|--------------|
| | Completed Assignment | Did Not Complete Assignment | Total |
| Students** | 36 | 80 | 116 |
| Overall Exam Grade Average (All 3 Exams) | 82.9% | 84.7% | 84.3% |
| Guide Content Grade Average | 84.6% | 78.6% | 80.5% |
| Other Content Average (All 3 exams) | 87.0% | 87.1% | 87.0% |
| Exam 1 Grade Average | n/a | 87.6% | 87.6% |
| Exam 2 Grade Average | 86.0% | 77.8% | 80.2% |
| Exam 3 Grade Average | 85.3% | 86.7% | 86.2% |
| *For select definitions, see Appendix A. | | | |
| **This represents 58 students for the 2 exams which included optional assignments. Exam 1 did not have an extra credit assignment available. | | | |

To examine the impact of the assignment, I run a multiple regression test using ordinary least squares (OLS). The dependent variable is the percentage grade for the study guide specific content, while the independent variable of interest is an indicator variable showing whether the student completed the extra credit assignment for the exam under consideration. The two slightly different models used are as follows:

- 1) **Guide Content Grade = $\beta_0 + \beta_1$ Other Content Average + β_2 Assignment Completed**
- 2) **Guide Content Grade = $\beta_0 + \beta_1$ Overall Exam Average + β_2 Assignment Completed**

The “Other Content Average” and “Overall Exam Average” variables control for student skill level. Other Content Average is the combined three exam grade average for the student. This is calculated by dividing total points scored in the three exams divided by the total available points, only for questions that did not fall into the study guide category. The Overall Exam Average variable is the combined three exam grade average for the student. Since this grade is an overall total, it also includes scores for questions that relate to the study guide material. Instead of using general demographics as utilized in some research, such as Akaaboune et al. (2020), I let the student performance within the class serve as the control variable that is likely to be associated with how well a student performs on the study guide related exam questions. Although the study guide results only exist for two exams, the aforementioned control variables utilize three exams of data. Including exam one data into the controls is in line Akaaboune et al. (2020) and Monem (2007) in that the additional exam score should better capture the “general academic ability” (Monem 2007) of each student.

Based on research which has shown the benefits of increased student exposure to the course material, such as Bromage and Meyer (1986), and Kiewra, Mayer, Christensen, Kim, and Risch (1991a)), it is expected that students who complete the optional assignment will not perform worse than those who do not complete the optional assignment. Rather, those students are more likely to outperform the students who chose not to complete the additional task.

Table 2 shows the results for the specification analyzing students’ exam performance using Other Content Grade as the control.

| Table 2 - Ordinary least squares regression estimates | | | |
|--|---------------------|----------|----------|
| Dependent Variable = Guide Content Grade | | | |
| Variable | Coefficient | t | p |
| Other Content Average | 0.9191 (0.1360) | 6.76 | 0.000 |
| Assignment Completed | 0.0886 (0.0338) | 2.63 | 0.010 |
| constant | -0.0225 (0.1211) | -0.19 | 0.853 |
| Adjusted R-squared | 0.290 | | |
| Other Content Average utilizes the three-exam average of non-guide related exam question scores. | | | |
| Assignment Completed indicates whether the student completed the optional assignment. | | | |

These results show that the students who completed the study guide assignment had significantly improved performance, even though the correct output of the assignment was the exact same as

the study guide provided by the professor to all students. The Assignment Completion indicator is significant at the .01 level, suggesting a nearly 9 percentage point increase in score compared to students that did not complete the assignment. This version of the model does not include the study guide related data in the control variable. This specification allows for a potentially more powerful association between the dependent variable and the variable of interest at the cost of a more complete control variable that may better capture the overall skill of the students.

To provide a more comprehensive look at this data, Table 3 contains results related to the second regression model specification. This specification utilizes a control variable that includes the overall exam scores for each student, irrespective of the type of content. This should provide a better understanding of student skill, but it also includes the guide content scores within it. Therefore, the Overall Exam Average control variable should naturally have a stronger association with the Guide Content Grade dependent variable, which may reduce the strength of the association between Assignment Completion and the dependent variable.

| Table 3 - Ordinary least squares regression estimates | | | |
|---|---------------------|----------|----------|
| Dependent Variable = Guide Content Grade | | | |
| Variable | Coefficient | t | p |
| Overall Exam Average | 1.1248 (0.1141) | 9.86 | 0.000 |
| Assignment Completed | 0.0836 (0.0292) | 2.87 | 0.005 |
| constant | -0.1698 (0.0983) | -1.73 | 0.087 |
| Adjusted R-squared | 0.464 | | |
| Overall Exam Average utilizes the three-exam average of each student. | | | |
| Assignment Completed indicates whether the student completed the optional assignment. | | | |

Table 3 data does show that the Overall Exam Average control variable has a stronger association with the Guide Content Grade, as expected. Meanwhile, the coefficient related to Assignment Completion now shows an approximately 8.4 percentage point increase in score. This is lower than the original model which estimated an 8.9 percentage point increase. still shows a strong association with the dependent variable with a p value of 0.005. Despite this drop in the coefficient for variable of interest, completion of the extra credit assignment is still shows strong significant with a 0.005 p-value.

Conclusion and Discussion

The results show that there is incremental value in guiding students to create their own exam notes, even if they will be provided with the same reference material. Despite all students having the same study guide available for exams two and three, those students who attempted to

complete their own version of the study guide performed better 8 to 9 percentage points better on questions related to those guides.

However, there are inherent limitations with the research that I acknowledge. For example, these results could be biased by student self-selection issues. The assignment was not mandatory, but provided extra credit, which creates a decision for each student. Some high achieving students are highly motivated to remain high achievers. So to achieve the highest possible grades they are more likely to complete the additional assignment. For other high achieving students, they may not be motivated to spend the time and effort required to complete the assignment for what they may perceive to be a minimal grade improvement. Low achieving students who desire to improve their grade may be motivated to seek every opportunity to enhance their grades outside of an examination environment. Other low achieving students may lack motivation completely and show no desire to complete extra work. These examples show that skill level alone may not dictate the completion of the optional assignment. Students that are highly motivated to improve their score would naturally be more likely to complete the assignment. Addressing motivation directly and precisely would require the type of analysis that is beyond the scope of this research. Motivation to complete the assignment is inherently part of the assignment completion variable but this research is focused on improving student outcomes, not identifying and improving student motivation and engagement.

Another limitation of this research is that it cannot address the mechanism by which student performance is improved. For the study guide to be used properly the student must 1) properly identify the situation described in the exam question, 2) match that situation to the information provided in the study guide, and 3) transfer that information to the exam. Identifying the performance on these individual aspects were not the focus of this study. Hence the data collected and analyzed for this experiment unfortunately does not allow us to determine differential performance within these categories between the test and control groups. Determining which aspects are improved by students taking their own study notes could be a fruitful research endeavor.

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Appendices

| Appendix A - Definitions and Descriptions | |
|---|--|
| Term | Definition / Description |
| Assignment Completed | Indicates if the student completed the extra credit study guide assignment. |
| Guide Content Grade | The percentage score for exam questions related to content covered in the optional study guide assignment. |
| Other Content Average | The percentage score for exam questions unrelated to the study guide assignments. |
| Overall Exam Average | The total 3 exam average calculated per student. |

Appendix B – Extra Credit Assignment 1 (Exam 2)

Optional Assignment. You must complete ALL 4 sections to get the extra credit. You will still get credit if some parts are incorrect in only minor ways. The requirements are based on **Chapter 4**.

You can upload this in various ways. You can hand-write and take pictures. Or submit via Excel. Or any other way you choose as long as everything is properly labeled.

- Name and show the Elimination entries needed when consolidating under the **Cost Method in the Year of Acquisition**. ALSO: show the calculations / formulas that are needed (one example is NCI in Income) during the consolidation process to have properly consolidated financial statements.
- Name and show the Elimination entries needed when consolidating under the **Cost Method AFTER the year of Acquisition**. ALSO: show the calculations / formulas that are needed (one example is NCI in Income) during the consolidation process to have properly consolidated financial statements.
- Name and show the Elimination entries needed when consolidating under the **Equity Method in the Year of Acquisition**. ALSO: show the calculations / formulas that are needed (one example is NCI in Income) during the consolidation process to have properly consolidated financial statements.
- Name and show the Elimination entries needed when consolidating under the **Equity Method AFTER the year of Acquisition**. ALSO: show the calculations / formulas that are needed (one example is NCI in Income) during the consolidation process to have properly consolidated financial statements.

Appendix C – Extra Credit Assignment 2 (Exam 3)

This extra credit is worth 0.5 points towards your overall class grade.

You must **handwrite** your answers on paper and **upload a picture or scan** unless you have OSS accommodations.

Your assignment is as follows (please write the number of each answer on your paper):

1a) Write the journal entry that is always needed when there is a sale of inventory between parent and subsidiary companies.

1b) Very briefly describe how you obtain the amount of the entry.

2a) Write the journal entry that is related to the ENDING inventory from an intercompany sale of inventory between parent and subsidiary.

2b) Very briefly describe how you obtain the amount of the entry.

3a) Write the journal entry that is related to the BEGINNING inventory from a prior year's intercompany sale of inventory between related parties.

3b) Very briefly describe how you obtain the amount of the entry.