

# **AN INVESTIGATION OF STUDENT, COURSE, AND EXAM CHARACTERISTICS AND THEIR IMPACT ON ACCOUNTING EXAM PERFORMANCE**

**Misty Schartz**

*Fort Hays State University*  
Hays, KS 67601  
USA

**Jessica Heronemus**

*Fort Hays State University*  
Hays, KS 67601  
USA

**Shane Schartz**

*Fort Hays State University*  
Hays, KS 67601  
USA

## **ABSTRACT**

This study investigated the impact of modifying the exam format for a principles of accounting course at a midwestern university. Historically, the exams were presented with multiple choice questions appearing first, followed by problem-based questions. The exam format was “flipped” for a sample of exams to test for possible differences in student performance. The researchers also analyzed the type of major (business/non-business) and type of course modality (campus/online). The study found that exam format did not have a significant impact on exam performance, however, major type and course type were found to be significant factors. Recommendations include considering the development of a principles of accounting course for non-business majors and exploration into cost-effective proctoring for online students.

**Keywords:** Exam Format, Introduction to Accounting, Online Education

## **INTRODUCTION**

This study was initiated based on the faculty observations that had occurred over several years teaching an introduction to accounting principles course at a midwestern university. Faculty observed a number of students struggling to complete the examinations in the course on time, typically rushing through the problem portion of the exam. Traditionally, the exams were presented to students with multiple choice format followed by problem sets that required a ‘fill in the blank’ approach. The time allotted for the exams were approximately one hour, and the time is considered to be appropriate for the length of the exam. After discussion, the idea for the study was to not only ‘flip’ the exam (present the problem sets first, and then the multiple choice) but also see if specific characteristics within the population of students could help identify student subgroups that would benefit from alternative approaches.

The introduction to accounting principles course serves multiple purposes at the university. It is part of the business core and is one of the first courses business students complete. However, it also serves as the accounting course for multiple other majors outside of the business degree. The course is also offered in two types of modality, on-campus and online. This study used student data over the Fall 2018 and Spring 2019 academic year and included all students that participated in the course and completed all six exams.

## **STATEMENT OF THE PROBLEM/PURPOSE OF THE STUDY**

The purpose of this research was to investigate if there was a statistically significant difference in the relationship between exam performance by students in sections of accounting principles courses based on the categories of exam format, course type, and major type. A better understanding of these possible differences helped identify appropriate recommendations to the course to better serve all university students.

## **RESEARCH QUESTIONS**

The following three research questions were formulated based upon the proposed research method and data that would be available to the researchers.

Research Question 1: Is there a statistically significant difference in average exam scores dependent on the exam format (standard/flipped)?

Research Question 2: Is there a statistically significant difference in average exam scores between business students and non-business students?

Research Question 3: Is there a statistically significant difference in average exam scores between campus and online students?

## **REVIEW OF THE LITERATURE**

The bodies of literature related to the subjects of campus/online course delivery and student demographics/academic performance are very extensive and cover multitudes of scenarios and situations. In the subject of changing exam format, little to no research was found. In this review, the researchers focused on relevant studies that most pertained to the structure and variables used in this study.

### **Exam Format**

Traditionally, exam format refers to the structure of the assessment activity, such as multiple-choice, short answer, matching, problem sets, essays, etc. In this study, however, exam format specifically refers to the presented order of multiple-choice questions and problem sets.

There is little to no research that could be found by the researchers regarding this specific topic. One research study, while not focusing on specific order of formats, did find that there was no significance between the exam format type (multiple choice, essay, etc.) and learner outcomes (Godson & Frederick, 2015).

### **Student Major**

It is oftentimes difficult for faculty that teach a required course that serves a more functional role to engage students that are not overall studying the topic area. Information Technology (IT), for example, is typically required in some form for a majority of degrees, even though the majority of students pursuing the degrees outside of that field are not initially interested in IT. Accounting, being another functional area, commonly finds many non-accounting and even non-business majors within its introductory courses. A student's major can be considered an indicator of their area of interest. When a student is then required to complete a course outside of their major area, the amount of interest in the course dramatically weakens (Petros, Tabouratzi, & Makrygiannakis, 2017). The chosen major, or type of major, therefore may play an influential role in a student's success when enrolled in a course that is outside of the student's major area.

However, other research indicates that a student's major, during the first year, did not have an impact on their end of first year grade point average (GPA) (Fordyce, Jepsen, & McCormick, K. (2017). Combining these results, the implication is that student interest may have no impact on academic performance. However, the implication may also be attributed to first year students completing up to a full schedule of courses that are outside of their major area. Reducing the scope to one course instead of a year's collection of courses, could show a significant impact of student major within a single course.

### **Campus and Online**

Mondal and Culp (2017) found that online students performed significantly higher than on-campus students in online principles of economics courses, as compared to blended versions. While this study utilized a blended course approach for on-campus, the course is very similar to the course used in this study. Another study found similar results for business students in their senior year (Mullens, 2017). These two studies suggest that the online environment will produce higher academic performance than models that meet face-to-face.

A different study concluded the opposite. In a principles of microeconomics course where students were randomly assigned, it was found that exam scores were significantly higher in the on-campus section (Arias, Swinton, & Anderson, 2018). Research in this area has, over time, produced conflicting results. This is likely due to a variety of factors, for example many studies use non-experimental designs and have the limitation of access to only one university.

Another area of concern in the campus and online environments is academic honesty. The lack of control faculty have over the testing environment allows more opportunities for online students to be academically dishonest (Tate, Reinstein, & Churyk, 2017). With improvements in technology, network reliability, and the continued growth of online education, proctoring services have become available for online course delivery, but at a premium cost to either the university or the student. This creates an interesting situation where faculty without university support must weigh the importance of limiting the opportunity of academic dishonesty and the overall cost of the course to the student.

## **LIMITATIONS**

Limitations of this study included:

- The scope of the study included only one midwestern university.
- The major type was coded business versus non-business students and not dissected into individual majors due to some majors having only a few participants. Additionally, as an introductory course of the business program, students are primarily freshman and sophomores and likely have little experience in their majors.
- Not all sections of the course included in this study were taught by the same instructor. The course was however delivered as a standardized format, making each section nearly identical.
- On campus students took exams in a controlled environment, while online students did not.

## **METHODOLOGY**

Data collection and data analysis occurred in two stages. Data was first collected by the researchers through the learning management system once the courses were completed, and then the data was cleaned and analyzed through SPSS 25.

## **DATA COLLECTION**

Before any data was collected, IRB approval was obtained from the university by the researchers. Ten sections of an accounting principles course that occurred over the Fall 2018 to Spring 2019 academic year were utilized. In Fall 2018 four online sections were used and two campus sections, and in Spring 2019 four additional campus sections were used, resulting in five standard (3 campus, 2 virtual) sections and five flipped (3 campus, 2 virtual) sections used for the study. The exams to be studied existed in a 'standard' format where multiple-choice questions appeared first with problem sets at the end of the exam. When 'flipped', the exam format had problem sets appear first with multiple choice problems at the end.

The exams were administered to students during the academic year and at the end of the academic year, the researchers collected the data from the learning management system (major type, course type, exam type, average exam score). Students completed six individual exams during the course, but only the average of those exams were used in the study.

Before analysis, any student that was not of 18 years of age was removed from the study, and all remaining students had any identifying fields removed from the study.

## **DATA ANALYSIS**

The data was loaded into SPSS 25 and appropriate columns were recoded for statistical analysis.

The resulting dataset contained exam score (average exam score), exam format, major type, and course type. Outliers were identified using stem and leaf plots and box plots. The four outliers were removed from the study, resulting in the descriptive statistics located in Appendix A.

Exam score: 242 total scores. Exam score (dependent variable) was examined for normality. Skewness and Kurtosis were found to be between -.5 and .5 and considered normal.

Exam format resulted in 123 students having completed flipped exams and 119 students having completed standard exams. Major type resulted in 153 business majors and 89 non-business majors. Course type resulted in 134 campus students and 108 online students.

## RESULTS/DISCUSSION

### Research Question 1: Is there a statistically significant difference in average exam scores dependent on the exam format (standard/flipped)?

Ho 1: There is no statistically significant difference in average exam scores between test formats. There was not a statistically significant difference between average exam scores for the standard (S) format exams (M=79.26, SD=11.56) and flipped (F) format exams (M=78.32, SD=10.87);  $t(240) = -.656, p = .261$ . Ho 1 was not rejected.

#### T-Test

Group Statistics					
	EF	N	Mean	Std. Deviation	Std. Error Mean
Exams Score	F	123	78.3190244	10.8736987	.980448394
	S	119	79.2648599	11.5514661	1.05892116

Independent Samples Test										
		Levene's Test for Equality of Variances			t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Exams Score	Equal variances assumed	1.271	.261	-.656	240	.512	-.94583555	1.44167340	-3.7857846	1.89411346
	Equal variances not assumed			-.655	237.919	.513	-.94583555	1.44311922	-3.7887587	1.89708760

Table 1 - Independent samples T-Test for Exam Score / Exam Format.

Discussion: The 'idea' for flipping the exam (from multiple choice first to multiple choice last) was that it was observed that students seemed to spend too much time on the multiple choice questions and then did not have enough time to completely finish the problem sections of the exam. The mean exam scores are also very close, so it appears the format of the exam had no effect on exam scores.

### Research Question 2: Is there a statistically significant difference in average exam scores between business students and non-business students?

Ho 2: There is no statistically significant difference in average exam scores between business and non-business students.

There was a statistically significant difference between average exam scores for business (B) students (M=80.11, SD=11.03) and non-business (NB) students (M=76.50, SD=11.17);  $t(240) = 2.448, p = .015$ . Ho 2 was rejected.

**T-Test**

Group Statistics					
	DegreeTypeC	N	Mean	Std. Deviation	Std. Error Mean
Exams Score	B	153	80.1147168	11.0345484	.892090366
	NB	89	76.4967041	11.1703167	1.18405120

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Exams Score	Equal variances assumed	.047	.828	2.448	240	.015	3.61801266	1.47769220	.707110285	6.52891503
	Equal variances not assumed			2.440	182.260	.016	3.61801266	1.48249872	.692946008	6.54307930

Table 2 - Independent samples T-Test for Exam Score / Business / Non-Business.

Discussion: The statistically significant difference in exam scores shows that business majors perform better on the exams than non-business majors. Although this course is typically one of the first business courses completed by business majors, the result may relate to a student’s interest in and aptitude for business.

**Research Question 3: Is there a statistically significant difference in average exam scores between campus and online students?**

Ho 3: There is no statistically significant difference between average exam scores between campus and online students.

There was a statistically significant difference in average exam scores between campus (C) students (M=77.13, SD=11.73) and online (O) students (M=80.84, SD=10.18);  $t(240) = -2.592$ ,  $p = .010$ . Ho 3 was rejected.

**T-Test**

Group Statistics					
	CourseTypeC	N	Mean	Std. Deviation	Std. Error Mean
Exams Score	C	134	77.1284204	11.7311646	1.01341827
	O	108	80.8384259	10.1842584	.979980721

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Exams Score	Equal variances assumed	2.245	.135	-2.592	240	.010	-3.7100055	1.43127160	-6.5294641	-.89054700
	Equal variances not assumed			-2.632	238.649	.009	-3.7100055	1.40974424	-6.4871370	-.93287403

Table 3 - Independent samples T-Test for Exam Score / Campus / Online.

Discussion: Currently in the accounting course online students have a slight advantage as there is no mechanism in place to keep them from using supplemental materials while completing the exam. Also, at the university the online students are typically older and therefore likely have more financial-based experience.

## **RECOMMENDATIONS**

### **Research Question 1 – Standard vs Flipped Exam Format**

Since the results were not significant, the exam format was not affecting the overall exam scores. While exam time (not a part of this study) appeared to be of concern by the researchers through observation, the overall exam mean is considered acceptable. Previous research by Godson and Frederick (2015) has shown that the format is not significant to exam performance but did lack a combination of exam formats as a possible consideration. The recommendation for this course is to continue to focus assessment activities on the learning objectives, rather than the exam format. Due to the lack of research found in this area, the researchers recommend that future studies consider combinations of exam formats as a possible new element to exams.

### **Research Question 2 – Business vs Non-business Students**

The results were significant for research question 2, which compared business student performance to non-business student performance on the exams. While it is not surprising that business students would perform significantly better in a business-oriented course, the significance needs to be considered. The accounting course in this study is part of a long sequence for accounting majors, and a shorter sequence for business majors. Non-business majors typically complete only this first course and do not continue through the sequence – not being fully exposed to the many other areas of accounting that may happen within their career industry.

A recommendation by the researchers would be for the appropriate faculty to consider offering an alternative version of the accounting course, such as “Accounting for Non-Business Majors”. This new course could provide a higher-level study of accounting, focusing more on the financial implications of a business’ activity versus the practice of how to record a business’ activity.

### **Research Question 3 – Campus vs Online Course Type**

The significance of the results for campus student performance and online student performance identified the common issue faced by institutions offering a course both on-campus and online. On-campus, students completed the exams in a proctored environment, while online students completed the exams in their own environment (without a proctor). While online proctoring is available, it is currently cost-prohibitive for online students. Another factor not included in this study that may affect the results is that online students at the university are typically older and have more life experience. Lastly, it is possible that due to the learning management system being the main source of learning, online students may have participated more in repeatable, asynchronous activities online and therefore increased their grades, as shown by another study (Archer, 2018). The recommendation for the course in this study is to continue to explore more cost-effective methods to proctor online students. It is recommended that future studies attempt to include age as a possible variable. Additionally, it is recommended that future studies continue to investigate exam performance by specific majors and other demographics.

## **CONCLUSION**

While there was no significant difference in exam scores between exam formats, there was a significant difference in exam scores based on major type and course type.

The significant difference in exams scores between business and non-business majors may be attributed to course interest, as suggested by other research (Petros, Tabouratzi, &

Makrygiannakis, 2017), and an alternative course for accounting for non-business majors should be considered.

Online students performed significantly better than campus students on the exams, and this is likely due to an uncontrolled testing environment and possibly due to an age difference between the two groups of learners (exact ages were not available to the researchers, except to exclude minors).

## REFERENCES

- Archer, K. K. (2018). Do multiple homework attempts increase student learning? A quantitative study. *American Economist*, 63(2), 260-269.
- Arias, J. J., Swinton, J., & Anderson, K. (2018). Online vs. face-to-face: A comparison of student outcomes with random assignment. *The e - Journal of Business Education & Scholarship of Teaching*, 12(2), 1-23.
- Fordyce, J., Jepsen, L. K., & McCormick, K. (2017). Predicting first-year law school performance: The influences of race, gender, and undergraduate major. *Eastern Economic Journal*, 43(1), 64-77.
- Godson, A. T., & Frederick Asafo-Adjei Sarpong. (2015). Influence of type of assessment and stress on the learning outcome. *Journal of International Education in Business*, 8(2), 125-144.
- Mondal, S., & Culp, D. (2017). Title: Academic performance in online versus blended classes in principles of economics and statistics courses. *The Journal of Applied Business and Economics*, 19(3), 117-135.
- Mullens, D. (2017). When do students learn? A comparison of face to face, online with intervention, and online student outcomes. *Academy of Business Research Journal*, 4, 29-38.
- Petros, L., Tabouratzi, E., & Makrygiannakis, G. (2017). Accounting information systems course: Perceptions of accounting and non-accounting students. *EuroMed Journal of Business*, 12(3), 258-268.
- Tate, S., Reinstein, A., & Churyk, N. T. (2017). The impact of online education on accounting recruiting: Certified public accountant. *The CPA Journal*, 87(9), 13-15.

## APPEMDIX

### Stem-and-leaf plot / box plot / Normality to identify Outliers.

Descriptive Statistics

	N Statistic	Range Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness		Kurtosis	
								Statistic	Std. Error	Statistic	Std. Error
Exams Score	242	52.0000000	48.1666667	100.166667	78.7841253	11.1987984	125.413	-.443	.156	-.327	.312
Valid N (listwise)	242										



Exams Score Stem-and-Leaf Plot for EF= F

```

Frequency  Stem & Leaf
 4.00 Extremes  (=46)
 1.00  4 .  8
 3.00  5 .  333
 2.00  5 .  56
11.00  6 .  00012222444
 8.00  6 .  56788999
18.00  7 .  000011112223344444
21.00  7 .  5555666677788899999
25.00  8 .  0000000011112223333444444
13.00  8 .  566677778888
16.00  9 .  000111122223344
 5.00  9 .  56667

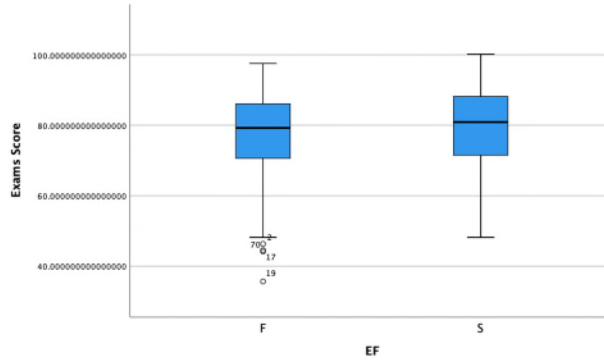
Stem width: 10.00000
Each leaf:  1 case(s)
    
```

Exams Score Stem-and-Leaf Plot for EF= S

```

Frequency  Stem & Leaf
 1.00  4 .  8
 2.00  5 .  01
 2.00  5 .  56
11.00  6 .  01222333333
10.00  6 .  5666788888
18.00  7 .  001122223333444444
12.00  7 .  555677778999
21.00  8 .  000011122223334444444
18.00  8 .  55666677778889999
17.00  9 .  001111222222234
 6.00  9 .  556788
 1.00 10 .  0

Stem width: 10.00000
Each leaf:  1 case(s)
    
```



**Major Type (Coded): B = Business Major. NB = Non-business major.**

		MajorTypeC			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	B	153	63.2	63.2	63.2
	NB	89	36.8	36.8	100.0
	Total	242	100.0	100.0	

**Course Type (Coded): C = Campus. O = Online.**

		CourseTypeC			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	C	134	55.4	55.4	55.4
	O	108	44.6	44.6	100.0
	Total	242	100.0	100.0	

**Exam Format (Coded): F = Flipped. S = Standard.**

		ExamFormatC			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	123	50.8	50.8	50.8
	S	119	49.2	49.2	100.0
	Total	242	100.0	100.0	