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Comparison of Learning Outcomes from Online and Face-to-Face Accounting Courses

A dissertation
presented to
the faculty of the Department of Educational Leadership and Policy Analysis
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Doctor of Education in Educational Leadership

by
Joel Keith Faidley
August 2018

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Dr. William Flora
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Dr. Stephanie Tweed

Keywords: Online, Face-to-Face, Student Performance, Gender, ACT, GPA

ABSTRACT

Comparison of Learning Outcomes from Online and Face-to-Face Accounting Courses

by

Joel Keith Faidley

Online education continues to evolve and grow dramatically at colleges and universities across the globe. Today's society is comprised of people who are increasingly busy with work and family obligations and who are looking for more flexible and expedited avenues for higher education. Institutions seek to meet these new demands by offering online distance educational opportunities while increasing cash flow for their college. Unfortunately the pitfalls to this rush to meet online demand results in what some researchers assert are inadequate quality content and curriculum. Others indicate there are not significant differences in the outcomes from online learning compared with traditional face-to-face classes. Much of the research has been conducted on nonquantitative courses, quantitative courses with small sample sizes, or large sample sizes that are not controlled for quality of online content, delivery, or verification of learning.

The purpose of this quasi-experimental ex-post-facto study was to compare student outcomes from two Principles of Accounting courses both delivered in two methods of instruction: traditional face-to-face (F2F) and an online asynchronous format. The online content for both courses was developed with assistance of academic technology professionals at the participating university. Student learning was measured as final course grade where all exams were administered by a testing center in a proctored environment. The sample size included 124

students from the online sections and 433 students from the traditional face-to-face sections.

Eight research questions were examined using independent samples *t*-test for 6 of the analyses, ANOVA for 1 question, and multiple regression for predictors of mean final course grade.

The results indicated students performed significantly better in the face-to-face classes than the online sections. Female students scored significantly higher than male students in both methods of instruction. ACT composite score, ACT math score, GPA, gender, and method of instruction all were significantly related to final course grade. Age was not a significant predictor of final course grade but in the online sections nontraditional students (age 25 and older) scored significantly higher than students under the age of 25.

DEDICATION

As a child of parents of the Greatest Generation, I dedicate this study and completion of the doctorate degree to my mom and dad, Leota Broyles Faidley and Roy Lee Faidley, Jr., who encouraged and pushed me from kindergarten through every successive year of education. My parents did not have the rich opportunities of higher education that this great country of America has afforded me. Having survived the Great Depression and service in World War II, mom and dad understood a better life was available through higher education and impressed that fact on me and my older brother Brian from birth. Involvement in activities such as Boy Scouts, team sports, and church activities were all part of forming me into the person I am today. Thank you for your selfless devotion, encouragement, discipline, support, and love.

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CHAPTER 1

INTRODUCTION

The development and use of online courses for instruction have grown at an incredible pace in recent years enabling students to learn from home or business locations far removed from a brick and mortar campus. The busy lives that individuals lead justify their willingness to pay the added cost that higher education institutions require for online courses. Online learning provides the opportunity for asynchronous time frames in a low distraction, 24-hour-a-day, and 7-day-a-week environment, and many students embrace this method of instruction for the convenience.

The advent of online instruction has not been without criticism as a means of increased revenue streams and lower faculty costs at the expense of reduced effectiveness in meeting curriculum learning objectives and student performance measured as grades. The general perception is an online education is not as robust as the traditional face-to-face method of instruction (Brazina & Ugras, 2014; Verhoeven & Wakeling, 2011). Online testing for course progress is typically in a nonproctored environment and if monitored at all is within the learning platform's constraints of being time bound. Authenticity by educators is a key concern for students enrolled and completing coursework in an online environment.

According to the U.S. Department of Education (2010), a meta-analysis revealed when used by itself online learning appears to be as effective as conventional classroom instruction, but not more so. Much of the existing research has found mixed results leading to this study of a comparison of quantitative courses, Principles of Accounting I and II, delivered in a traditional face-to-face format and as an asynchronous online format designed by academic technology

instructors. The quality of the online content delivered in an asynchronous method of instruction would influence the ability for a student to master the learning objectives and final grade.

There seems to be very little disagreement that rigorous investigative research is needed on quantitative courses such as accounting to determine if a significant difference exists in learning outcomes from an online method of instruction (Schmidt, 2012). The Association to Advance Collegiate Schools of Business (AACSB) expects continuous process and quality improvements and the onus of proving exceptional accounting education rests with the college or university.

Statement of the Problem

The purpose of this quantitative research that encompassed a quasi-experimental ex-post-facto design was to compare student outcomes (measured as final grades) from two Principles of Accounting courses (ACCT 2010 and ACCT 2020 at a public university in the southeast) both delivered in two methods of instruction: face-to-face (F2F) and a completely online asynchronous format. One instructor taught ACCT 2010 in both methods of instruction at the participating university using identical testing patterns over a span of 3 years. A second instructor taught ACCT 2020 in both methods of instruction at the same university using identical testing patterns over a span of 3 years as well.

The study controlled for prior knowledge and aptitude by adjusting the student outcomes by the students' incoming grade point average (GPA) and college admission (ACT) scores. Student age and gender were also used in measuring the dependent variable final grades. The significance of the study is very little research exists on the subject of student performance in

lab-based, quantitative courses such as accounting with a sample size sufficient to project significance on whether the method of instruction impacts final grades. The existing research is primarily very small sample sizes from a single institution for one semester and two classes. The purpose of this study is to gain clarification of the effectiveness of student learning, measured as final grade, of online quantitative courses such as Principles of Accounting compared to traditional face-to-face courses.

Research Questions

The following questions were used to guide the quantitative research for a quasi-experimental ex-post-facto design.

Research Question 1: Is there a significant difference in student mean final course grade between a face-to-face method of instruction and an asynchronous online format?

Research Question 2: Is there a significant difference in student mean final course grade between males and females?

Research Question 3: Is there a significant difference in student mean final course grade in asynchronous online classes between males and females?

Research Question 4: Is there a significant difference in student mean final course grade in face-to-face classes between males and females?

Research Question 5: Is there a significant difference in the mean final course grade among the four GPA groups (below 2.50, 2.50 – 2.99, 3.00 – 3.49, 3.50 and above) for face-to-face and online classes?

Research Question 6: Is there a significant difference in mean GPAs between online and face-to-face students?

Research Question 7: Does the ACT composite score, GPA, age (grouped into 2 segments of below 25 and 25 and above), gender, and method of delivery selected by students predict mean final course grade?

Research Question 8: Is there a significant difference in student mean final course grade in asynchronous online classes between nontraditional aged students (age 25 and older) and traditionally aged students (age 24 and younger)?

Significance of the Study

This study determined whether or not there was significant difference in learning outcomes (measured as final grade) of business students in an online versus the face-to-face format of instruction. This study contributes to the body of research in colleges of business in understanding the effectiveness of online instruction compared to a traditional face-to-face method of instruction. The methodology in this study may prove beneficial to other faculty desiring to measure the student performance of online course enrollment.

The emphasis to measure and compare student performance across various methods of instruction will verify a quality online program is in place. Continuous quality improvement is essential for colleges desiring of accreditation by the Association to Advance Collegiate Schools of Business (AACSB). Maintaining program accreditations is vital for universities and seeking to measure not only final grade outcomes but also the potential influence age, gender, ACT, and GPA score have on students' success is an important aspect of this study.

Definition of Terms

To ensure the meaning and understanding of the terms used in this study, the following definitions are provided.

1. Association to Advance Collegiate Schools of Business (AACSB) is a programmatic accrediting body that provides quality assurance, business education intelligence, and professional development services to over 1,500 member organizations and more than 785 accredited business schools worldwide.
2. Desire 2 Learn (D2L) is the online educational platform that the participating university uses for student learning and communication in both online and face-to-face courses of instruction. Professors use this tool to communicate course progress, grades, and content for instruction.
3. Face-to-Face learning: In class real-time traditional learning through lecture and hands on laboratory. Students are expected to attend class and attendance sheets are tallied to ensure compliance. Online supplemental teaching aides are used including D2L content and Pearson's MyAccountingLab homework and e-text software.
4. Grade Point Average (GPA) is a numerical weighted computation of credit hours earned and grade received. The preaccounting term course GPA is used in this study.
5. Online learning: Asynchronous learning through the use of software platforms that provide course content with videos, articles, text readings, and online homework software. No real-time seminars or conferences used unless a student requests an individual face-to-face meeting.

6. Principles of Accounting I: Introductory financial accounting course required by all students majoring in a business discipline in the College of Business & Technology at the participating university. The course includes a study of accounting theory and procedures underlying financial statement preparation. Additional topics include accountability, financial auditing, financial statement analysis, and income tax accounting. Management, finance, marketing, economics, and accountancy majors must complete this course for a BBA degree from the CBAT.
7. Principles of Accounting II: Introductory financial and managerial accounting course required by all students majoring in a business discipline in the College of Business & Technology at the participating university. A continuation of ACCT 2010, this course completes financial accounting with a study of corporate funding through long-term liabilities and stockholders' equity. The remainder of the course is a study of management accounting including costing, cost-volume-profit analysis, budgeting, productivity analysis, capital investment decisions, planning and control, and managerial decision-making in advanced manufacturing environments. Additional topics include accounting information systems and quality control measurements.

Limitations and Delimitations

A primary limitation in this study is the student self-selection of the method of instruction. The reason a student selects a particular course is not known and could have skewed the results.

A second limitation is the inclusion of more than one professor's students in the sample. One professor may be more capable in a face-to-face format than another professor. The online format may differ from the face-to-face format for each instructor. One may differ significantly from the other.

A third limitation is the effectiveness of online course content. Although the department of Academic Technology Services was used to develop online content, one professor may have used a better pedagogical approach in preparation of the material for students. This limitation is associated with the second limitation described previously.

A fourth limitation is student performance was measured as overall final grade. Measurement of learning outcomes to specific objectives, such as exams and quizzes, was not performed to determine success of instructional method on various topics. Finally, satisfaction of instructors in teaching each instructional method and contentment of students participating in each class was not studied.

The population was limited to one university with a sample selection of two accounting courses (Principles I and II) over 3 years beginning with summer term 2015 through summer term 2017. Although only two instructors taught the online sections, 12 instructors taught the face-to-face sections. However, the sample was limited to only the sections taught by the two instructors teaching both the online and face-to-face sections. The two instructors delivering the online content used the university's Academic Technology Services' office of e-Learning to create a robust online course of study for students.

One delimitation is to limit the sample to students in Principles of Accounting courses taught by only two of the twelve instructors.

A second delimitation is the exclusion of intermediate and advanced accounting classes in the sample. A belief that courses comprised of solely students majoring or minoring in accounting may skew the results as fewer than 15% of Principles of Accounting students are accounting majors or minors.

A third delimitation is the use of historical archived data in place of current human subject research. Data collected prior to determination of the study's focus facilitated independence and nonbiased analysis of student learning.

Overview of the Study

The study is organized into five chapters. Chapter 1 has presented the introduction, statement of the problem, eight research questions, significance of the study, definition of terms, limitations, and delimitations of the research. Chapter 2 contains the review of pertinent literature and research related to face-to-face and online methods of instruction. The sections for Chapter 2 include quality assurance of learning, population selection and sample size, what method is superior and qualitative influence on learning success. Chapter 3 includes an introduction, research questions and null hypotheses, instrumentation, population and sample, data collection, data analysis, and a chapter summary. Chapter 4 provides results of the study, and Chapter 5 includes a summary of the findings, conclusions, and recommendations for future research and practice.

CHAPTER 2
REVIEW OF LITERATURE

Quality Assurance of Learning

Any method of course delivery should be tailored to meet the regional accreditation standards of the institution and any programmatic accreditations associated with the college or major department within the institution. This is especially the case with the American Institute of Certified Public Accountants (AICPA) and the American Accounting Association (AAA) that demand the highest integrity and quality assurance. These two accounting entities jointly issued The Pathways Commission report in July 2012 and stated “Accounting is a vibrant, rapidly changing profession. Its geographic reach is now global, and technology plays an increasingly prominent role. A new generation of students who are more at home with technology has arrived” (p. 36).

Peterson and Palmer (2011) emphasized the lack of educator’s technology competence and confidence leads to a lack of integration and teaching technology (p. 13). Technology is an important aspect of learning for both online and face-to-face instruction. Inadequate preparation in developing content has significant implications for any method of delivery. Grinder (2014) looked at 24-hour access to a learning tool that enhances traditional classes at the same university. Students with access to this online software performed significantly better than students who did not have access to it. Use of round the clock web-based software with tutorials is a primary driver of student success when using blended learning or online method of instruction. The capability to link student, web-based software tutorials, and instructor is a

powerful continuous learning technique that is revolutionizing instruction. Online interactive resources are excellent learning enhancements and offer flexibility for study and reinforcement of on-demand learning. This study has implications for effective content in any method of instruction. Use of web-based software technology in both online and face-to-face sections is essential to control variation and ensure reliable results.

Grossman and Johnson (2015) discovered accounting faculty were less willing to accept online accounting credits from other institutions but administrative staff were more accepting of transferring students' online course credit hours. There was no difference in the willingness for professors who had taught online versus instructors who taught solely using traditional methods. Faculty considered online accounting course instruction statistically inferior to traditional instruction. The dominant reason faculty questioned the effectiveness of online was the lack of integrity followed by lack of rigor. A key component of any study must be development of robust online content and proctored exams to ensure authenticity. The Association to Advance Collegiate Schools of Business (2006) expects technology to be woven into all accounting instruction and not taught separately as a course on information systems.

DiRienzo and Lilly (2014) stated "the reasons for the growth in online learning are likely multifaceted; however, it can arguably be explained in terms of student demand for online coursework and the cost-saving incentives institutions have to meet this demand" (p. 1). As states continue to defund public higher education or, at best, maintain spending at stagnant levels, institutions must be cost conscious in making decisions to employ faculty and technology to optimize revenue streams.

Cost Comparison of Two Methods of Instruction

Several literature reviews cited the lower cost as a reason to expand online education, provided a quality online course content is developed by instructors and technical staff. Sharon and Gloek (2004) observed one cost benefit is the ease of scalability because online is not hampered by requiring a brick-and-mortar location to instruct students. Sitzmann, Kraiger, Stewart, and Wisher (2006) indicated online classrooms were 13% more effective for teaching declarative knowledge and 20% more effective in teaching procedural knowledge than face-to-face instruction. The authors stated that well-controlled studies of the cost effectiveness of online to traditional instruction are rare.

Smith and Mitry (2008) revealed that the cost of online appears cheaper than face-to-face because many universities fail to consider the fixed costs of large classrooms when analyzing cost. Many universities viewed buildings and land as fixed costs and not subject to analysis. The focus was on variable costs. Online instruction did not experience economies of scale because the constraint was faculty hours spent in online education versus infrastructure for traditional instruction including buildings that may be depreciated. Quality was frequently compromised to lower costs because instructors were paid by how much time they invested into an online class, causing universities to advocate faculty not over-involving themselves in online courses. Moreover, quality was compromised because many universities have specific online instructors who do not meet the rigor of traditional instructors as many do not possess terminal degrees. Smith (2001) however found faculty members expended more time to properly plan and grade student assignments in online courses. The author cited faculty costs outweighed benefits initially but assured faculty teaching online courses are trailblazers.

Estelami and Rezvani (2011) also categorized costs as either fixed or variable and stated online education has more variable costs. This indicated traditional instruction-based colleges had a higher degree of operating leverage and were more sensitive to changes in revenue. Deming, Goldin, Katz, and Yuchtman (2015) showed that on average colleges charged lower prices for online courses.

Do Age and Gender Matter?

A variety of issues arise concerning the influence age and gender exert on learning styles and the effectiveness of the method of instruction. A key part of this study was to understand if significant differences occur in student outcomes. Was this result due to characteristics associated with gender and age? Dotterweich and Rochelle (2012) documented the average age of students in an online course (25.81) was statistically greater than the average age of a traditional course student (23.61). The differences in gender were not statistically significant but were supported by prior research that more females enrolled in an online course. As previously researched, students in online courses tended to be a semester further along in their course study compared to traditional course students. Kimmel, Gaylor, and Hayes (2016) noted adult students were more likely to be employed than younger students. In this study, 73% were employed full-time and 20% were employed part-time. Students under 24 years of age were more motivated to attend college because of parental support. Students aged 25 to 34 sought a new career, and students aged 35 and older desired a pay increase, new career, or respect from peers.

Learning Styles by Gender

McCabe (2014) discovered men desired to learn in an abstract manner; whereas, females preferred an experimental approach. Females with higher instrumental traits, defined as “traditional male characteristics” such as dominance, competitiveness, and self-confidence, preferred experimental approaches. However, for men with higher instrumental traits, there was no preference between experimental or abstract approach to learning. Males with higher expressive traits, defined as “traditional female characteristics” such as being emotive and talkative, preferred concrete or experimental approaches over abstract ideas. This could indicate that while most males preferred abstract approaches to learning and females more concrete or experimental approaches to learning, a greater determinant in the preferred learning style were the traits students displayed rather than their actual gender.

Aliakbari and Mahjub (2010) found that females tended to take action quicker and males were more contemplative in developing a solution. Females were more likely to be adventurous and consider risk-on activities because females were more intuitive than analytical. Males identified themselves as more comfortable with facts and figures and more logical in thought process than risk takers. Males preferred more methodical and analytical work compared to females, indicating a less structured online course appealed to females supported by research that more females selected an online course instructional method.

Kulturel-Konak, D’Allegro, and Dickinson (2011) observed in science, technology, engineering, and math courses (STEM) females preferred creative thinking with 40% compared to males 24%. Approximately 30% of both groups favored concrete materials for learning. Females were more likely to retain material if related to other subjects and males are more likely

to remember material that followed a logical pattern. STEM students preferred hands-on material where non-STEM students preferred creative material. This is important because accounting is generally considered a type of STEM class and would enable instructors to develop and deliver the course as a hands-on real world approach. Males were more likely to research a subject to gain information on it; whereas females were more likely to test the implications in order to learn as in a trial and error approach. Arbaugh (2000) uncovered men contributed 55% of comments in the classroom section and women contributed 65% in the online section. This indicated men tended to be more confident in traditional settings for participation and perceived the online courses as a competitive medium but women viewed online learning as a collaborative opportunity.

Learning Styles' Effects on Student Performance

Santo (2006) discovered conclusive evidence that the learning style of an individual did not affect performance in online courses. However, students with spatial learning styles performed better on computer exams but not enough to impact overall grade significantly. Kozub (2010) also determined the learning style of a student was not an influencing factor on performance in online versus traditional courses in tax and finance. Although Friday, Friday-Stroud, Green, and Hill (2006) stated there was no difference in Masters of Business Administration (MBA) student's mastery of subject material, women received higher grades than males on both methods of instruction. Specifically, men fared worse in online courses compared to traditional courses. This result may have occurred because women perceived online courses as a collaboration and men used competition as motivation. These performance outcomes were consistent with the perception that online courses lacked the competition of traditional courses.

Learning Style Influences Decision to Take Online

Beadles and Lowery (2007) examined the propensity for student's self-selection into an online MBA program. The authors stated there were no differences in the audio versus visual learner's willingness to take online or traditional courses. There was a difference in the sensing and intuition willingness to take a course via a particular delivery method. Sensors solved problems through a standard method and may have preferred a traditional instruction method. Intuitive students prefer instruction with new ideas and imagination and are more likely to choose an online course. The advanced nature of these courses may draw more mature and self-directed students than Principles of Accounting courses. Lewis (2010) also found 70% of online students identified themselves as visual learners and noted auditory learners would be more likely to need the traditional environment where they hear lectures. Kinesthetic learners accounted for 11%, tactile learners 10%, and auditory learners 8% of the learning styles for students in the online course.

Daymont, Blau, and Campbell (2011) stated flexibility enticed students to choose online over a traditional format because it enabled them to work at their own pace despite the perceived lack of an appropriate medium to communicate with instructors. Students with favorable self-discipline preferred online courses, and students who preferred traditional classrooms cited the face-to-face interactions with other students and faculty as reason for their preference. The second most common reason students preferred traditional courses was the structure of a classroom led to a perceived facilitation of learning. Meisel and Marx (1999) highlighted that online discussions are less animated than traditional discussions, and students described computer communication as more professional than face-to-face discussions because the capability to read body language was removed when communicating virtually.

Rovai, Ponton, Wighting, and Baker (2007) documented students at the undergraduate level had an average intrinsic motivation score of 17.36 for traditional courses and 20.20 for online courses indicating a greater motivation in online undergraduate students. For extrinsic motivation undergraduate students in traditional classrooms had an average score of 20.75 versus 21.95 for online. Graduate students also had greater averages for both intrinsic and extrinsic motivation for online courses. There was no significant difference in motivation based on ethnicity. Fodor (2003) also indicated students who wanted to do well in online courses must be initiators and self-motivated. There was less interaction with peers and professors and required students to take initiative to develop interactions such as posting on discussion boards.

Rogers (2015) examined the differences in personality for online students defined as locus of control (LOC). Internal LOC students performed better in online courses than external LOC students. They were more organized, detail oriented, and analytical which all assist in successful online learning. Internal LOC participants tended to seek more information. This was beneficial because instructors were not immediately available to answer questions, forcing students to seek answers on their own. Internal LOC students preferred self-paced work, a hallmark of online courses, and were self-motivated. External LOC students performed worse in online courses. They thrived in group settings and interactions with peers and professors. These latter two features were severely limited in online courses.

Students' Perceptions of Instructors' Styles and Instructional Methods

Porter, Donthu, and Baker (2012) found trust as a frequent necessity for students regarding instructor knowledge. However, instructors earned trust differently among genders.

Particularly in online courses there was a statistical difference in gender that impacted the development of trust. Females required the instructor to put forth effort to engage in student interaction to create trust but males did not expect instructor engagement. Both gender groups desired instructors to develop a sense of community or member embeddedness to develop trust. Men formed a strong attachment to the identity of the community as women attempted to form bonds with individual members.

Kimmel, Gaylor, and Hayes (2014) stated gender impacted the reasons students pursued higher education and emphasized the importance for professors to understand the motivation to properly maximize student's potential. For adult students females were more likely to pursue higher education because of a desire to pursue a new career or to be a role model for their children. Males were more likely to pursue higher education to keep their job. Females were motivated by a supporting network, indicating professors must be more accessible for females, and males perceived a financial barrier to obtaining education. Females were concerned about leaving their family and finding childcare when attending classes. Professors of male enrollees may be more inclined to promote the financial benefits of an education to motivate the students to perform at their highest potential.

Jones, Tapp, Evans, and Palumbo (2016) discovered that gender influenced how students communicated via e-mail to professors indicating an application in differences of how genders interacted in online courses. The word count of e-mails, the reason for an e-mail, and the frequency of e-mails all was statistically different among genders as females accounted for 61% of total emails compared to 39% for males. Communication with a professor influenced

student's learning and indicated that gender differences in communication frequency impacted learning outcomes.

Gratton-Lavoie and Stanley (2009) showed older students gravitated more towards online education probably due to flexibility in scheduling. Males were 12% more likely to choose online; however, the most frequent occurrence of an online student was older females. Each year of age increased the likelihood to select the online method of instruction by 2%. Business majors were less likely to select online courses compared to other majors. Females improved more in knowledge of material from an online course than any other group (males in traditional face-to-face courses, males in online classes, and females in traditional face-to-face courses).

Korte, Lavin, and Davies (2013) demonstrated statistically significant differences in how different genders perceived teacher effectiveness and indicated that professors, regardless of delivery method, must understand there are two "sets of standards" by which they must be effective, the female and male perception. Traits such as out-of-class accessibility, rank, structure, dynamic presenter, and subject matter expertise were all similar by impacting effectiveness regardless of gender. However, there were differences in the following traits: professional attire, relaxed demeanor, sense of humor, responsiveness, and class preparedness. Perceptions of effectiveness not only differ by gender of the student but also by gender of the professor. For example female students perceived it to be a better quality for a professor to be relaxed in males over female instructors and perceived class preparedness more important for female over male instructors. A sense of humor and good personality were ranked by males as being more important in male instructors than female instructors but most important for female instructors was knowledge of subject matter.

Fleming, Becker, and Newton (2017) indicated age did not affect a student's ability to be successful in an online course. Rather, the determinants in successful use and intent for future use of online programs were determined by the authenticity, as in real world application of course material, the technological support available, and low complexity of material.

Hernandez-Julian and Peters (2012) stated males tended to submit on average one more homework assignment for online courses than traditional courses. There were no differences for females between the two methods of instruction. When given the option, younger students, defined as less than 23 years-old, were more likely to submit homework online than in F2F classes. However, when given the option to submit online and not attend class, most continued to attend. Attendance demonstrated that younger students perceived online interaction as a component of class rather than a substitute. Older students were more likely to submit the homework and then take the option to miss class. Students who submitted online homework earned an average grade of 6% higher than traditional course homework submissions.

Borstorff and Lowe (2007) observed 92% of students cited convenience as one of the reasons to take an online course. Forty-three percent of students believed that the quantity of interaction between a professor and student is less in online courses; however, only 17% believed that the quality of an online class was less than traditional face-to-face instruction. Fifty-four percent of students expended more time learning material in an online classroom which alludes to less efficient use of time as it takes longer to comprehend the same amount of material. Peltier, Drago, and Schibrowsky (2003) stated marketing students identified six factors that shaped their perception of the effectiveness of online courses including course content, instructor support, course structure, and instructor-to-student interaction. The most influential

factor in the satisfaction of a course was curricular content. This indicated that the better designed online courses may be more reliable compared to traditional methods of instruction. Kulchitsky's (2008) study demonstrated student's concern regarding the quality of online instruction. Furthermore, the students believed the quality of instruction, influenced by format, affected their employment opportunities.

Understanding instructors' styles in each delivery method and students self-selection into a course must be considered in sample selection of reliable data. Student perceptions of online learning revolve around many factors including quality and instructor approach to engagement.

Students' Perceptions of Course Ease

Kuzma, Kuzma, and Thiewes (2015) stated over 50% of students perceived there is a greater ability to cheat in online courses. Fifty percent agreed and 24% disagreed that online courses resulted in less learning. However, most students continued to enroll in the course for flexibility and convenience to work at their own pace. Forty percent of students believed online courses were easier with 25% "more difficult". Forty percent preferred traditional courses while 15% desired online courses. Ucol-Ganiron (2013) also observed cheating was more prevalent in online courses. Prince, Fulton, and Garsombke (2009) documented the average score for online exams were 87% if not proctored and 79% if the tests were proctored. This indicated the potential of cheating and academic misconduct on exams that are not controlled for authenticity. Statistically significant, proctored tests may be necessary for academic integrity in online environments and to more accurately compare student learning to traditional classroom

instruction. Gaytan (2005) stated proctoring student exams ensured a higher degree of academic honesty.

Nguyen and Zhang (2011) revealed 77% of students 30 years of age and older preferred the online course whereas only 68% of 20 to 24 year-olds preferred online. Students believed there is more material to learn and expended more time on the content for online courses. However, students missed the opportunity to ask questions real-time in asynchronous online courses. Students believed they learned sufficient knowledge online to continue with other curriculum in the same discipline but not to the extent that they learned more than traditional F2F courses. Adult students enrolled in online courses were more concerned about missing the F2F interaction from traditional courses compared to the less than 25 year-old students. Adult students, defined as the age group of 25 and over, had a stronger belief that knowing relative performance to their classmates positively affected their learning progress. Students perceived instructors to be more lenient in online courses and did not believe that the grade in an online course reflected their true performance.

O'Neill and Sai (2014) found more than 58% of students enrolled in the traditional course because they believed they would learn more. Fifty percent of students cited a general dislike of online courses and 25% of students believed they could earn a better grade in traditional courses. This study controlled for performance by requiring proctored exams for all online courses included in the sample.

GPA as a Predictor of Outcomes

Dotterweich and Rochelle's (2012) study indicated GPA was a significant factor in student success regardless of delivery method. Students who repeated the course performed better in the traditional course compared to students who repeated the course online. In general, more students who needed to repeat the course selected the online option. However, students who had taken online courses before scored 4.6 points lower in the course compared to students who were experiencing online for the first time. Terry, Macy, Clark, and Sanders (2015) determined student ability, GPA, and effort are positively correlated with higher course grades. Students who were in the traditional course and had access to online lectures to review the information scored 3 points higher on the final exam. This indicated that lectures are crucial to knowledge and cannot be omitted from online courses.

Wiechowski and Washburn (2014) observed students in the online course had higher GPAs than students in traditional courses but the difference was not statistically significant. Daymont and Blau (2008) also found GPA was a significant determinant of final score. Students in the online course were farther along in their programs and may have been a reason for the greater mastery of material. Gratton-Lavoie and Stanley (2009) discovered students with a higher base GPA were more likely to select online classes than lower GPA students, and for online courses GPA was significant in determination of the overall grade in the course. However, in traditional courses the males performed better than females and prior GPA was less of a determinant in final grade. The use of GPA and ACT as covariates and predictors of outcome are an essential part of this study in comparing online success and face-to-face performance.

Population Selection and Sample Size

Peterson and Palmer (2011) used 1,512 students over 19 semesters in measuring technical competence of students. Wilson and Allen (2011) used a single historically black university with only two sections of two classes. The sample size was 58 online and 43 face-to-face students. McMillan (1996) cautioned that small sample sizes can prove inadequate in drawing a conclusion on significance but regardless a sample that is not properly drawn from the population is misleading, no matter the size. He stated “most researchers use general rules of thumb in their studies, such as having at least 30 subjects for correlational research, and at least 15 subjects in each group in an experiment” (p. 97). Most of the research using small sample sizes is based on development of instrumentation to collect new data

Brazina and Ugras (2014) performed a study of online degree programs at state colleges and universities in Pennsylvania. The authors compared 1,230 CPA exam candidates from online colleges with 3,573 students from Pennsylvania state universities. This analysis was cross sectional across geographical and demographic boundaries and was also longitudinal in nature as it incorporated the cumulative student learning over a 4-to-6-year period. In Bunn, Fischer, and Marsh’s (2014) study, the authors made a point that previous studies were conducted on urban higher education institutions, but they selected a single rural university for their research project. A relatively small sample size of 61 students was selected with 50 taking the face-to-face section and 11 participated in the online section. Although selecting a single institution or geographical area has merit, 11 is an insufficient sample size to collect data and project findings with any degree of confidence.

DiRienzo and Lilly (2014) used relatively small sample sizes with 79 for face-to-face and 42 for online. A single institution and single term was employed across five business courses to generate results and recommendations. Schmidt's (2012) dissertation used sample sizes of 31 and 20 for Principles of Accounting classes and 22 and 12 for Intermediate Accounting classes in comparing performance of face-to-face instruction with online respectively. A small sample size of 12 was used to collect data and project findings. A sample size greater than 60 is suggested to ensure reliability of results and, in the age of computer technology and database integration, is much easier than 30 years ago. Chen and Jones (2007) included a relatively small sample size for a traditional class (n = 38) and blended class (n = 58) to compare students' perceived outcomes from a Likert 5-point type scale survey. A single instructor was used to control variation in administration and evaluation. Grinder (2014) also used smaller sample sizes, 39 and 55, that were less than ideal.

Chen, Jones, and Moreland's (2010) accounting specific study focused on 18 topic areas in both a traditional classroom and online environments taught by a single professor. The instrument was a 5-point Likert type scale survey distributed to 64 traditional and 75 online students. These sample sizes were more desirable and will produce findings that are reliable in generating recommendations.

What Method of Instruction is Superior: Face-to-Face or Online?

Angiello (2010) cited the U. S. Department of Education's meta-analysis and review of online study for the K-12 age group, "students who took all or part of their classes online performed better than those taking the same course through traditional face-to-face instruction"

(p. 57). Further analysis by the author described a combination of online and face-to-face instruction resulted in greater learning than solely one approach. Time spent in either method was a predictor of success but individual learning was enhanced when students were required to journal reflections of what was read and understood online.

No Significant Difference

Wilson and Allen (2011) rejected the premise that online students performed poorly relative to face-to-face students. In addition, the authors stated withdrawal rates and failure rates were not significantly different between these two methods of course delivery. Another accounting example examined an intermediate level class across the two methods of instruction. Bunn et al. (2014) uncovered mixed results, meaning no clear indication of a method that is more efficient or effective, with no significant differences in assessments, but performance was significantly different with face-to-face grades higher than online participants. Students in the traditional classroom (Intermediate Accounting I) had a higher average GPA than online. Generally, higher GPA students chose online, but accounting is a unique subject and may have impacted that self-selection. More females chose online and supported prior research on this self-selection of instructional method. Course grades were significantly higher in the traditional course. More traditional students agreed that the instructor was an effective presenter, encouraged questions, and fairly and impartially graded assignments.

DiRienzo and Lilly (2014) compared student learning outcomes on both a complex and simple assignment given in the same course but with two delivery methods of face-to-face and online instruction. No significant differences were found in the student grade performances for

either assignment or method of content delivery. The authors stated their findings are contrary to two studies detailed in the article. The conclusion section attempted to explain, by using the Carroll Model, why the economics professors' findings are at odds with the previous two studies. Factors including maturity of the learner, motivation, financial need, and long-term memory were juxtaposed with reasons for different learning outcomes.

Schmidt (2012) demonstrated that students taking Principles and Intermediate Accounting online performed as well as the face-to-face students on the testing procedures. There were some differences on performance of specific learning objectives where online students fared better than face-to-face students and other learning objectives where face-to-face understood better than online students.

Ruth and Connors (2012) observed no difference in overall performance of students in online and traditional instruction of an introductory business course. The majority of students who selected the online management course were on average more than 1.34 semesters ahead in their course programs than traditional students. Interestingly the authors noted the implementation of higher level online instruction for courses later in a student's program of study.

In McFarland and Hamilton's (2006) study instructors were provided with scripts to ensure the same material was delivered through both online and traditional instruction. There was no significant difference in student grades or student satisfaction with the course. However, in a traditional course eight factors were significant in determining student grades where only three factors were significant in grades for online students. This indicated that traditional classrooms provide a more dynamic atmosphere that influenced student experience. The authors pointed out traditional classes are instructor-centered but a properly designed online program is

learner-centered as students referred back to online course content and proceeded at their own pace.

Anakwe (2008) examined testing procedures for both methods of instruction and found in three different accounting courses there were no differences in student test scores between the online class and the face-to-face class. The study also revealed no correlation between a student's gender or class and the student's test performance. Rich and Dereshiwsky (2011) found students in the online course achieved similar results in problem type homework, essays on professionalism, and self-reported progress compared to traditional students in the accounting course. Newkirk, Schwager, and Eakins (2013) also found no significant difference in student scores.

Dellana, Collins, and West (2000) reported an 11% dropout rate in an online management science course and 7% dropout rate in the traditional format. There were no significant differences in average course score between the two methods and GPA and absence rate were statistically significant in determining overall course score. Students had lower absence rates in traditional courses compared to online. However, the online absence rate did not negatively affect course score as much as it would have had the same absences occurred in the traditional course. Dellana et al. documented GPA as a predictor of student performance outcomes and were a key part of this study as a covariate.

Face-to-Face is More Effective

Walstrom (2014) revealed students in the traditional course were more satisfied with the course than online students, but this was not statistically significant. Students in the online

course perceived the exams were more appropriate to the course. The author noted there was a much lower response to the surveys for the online course and might indicate that the more extreme satisfied or dissatisfied students responded. According to Walstrom, students believed the most effective online course had all material online at the start of the semester.

Brazina and Ugras (2014) defined online as 80% of course content is indeed online, blended 30% to 80% online, and face-to-face less than 30% (p. 34). The author's primary focus was on CPA exam pass rates because it is a uniform method of assessment for state licensure. A comparison of five online "For Profit Universities" with public colleges and universities in Pennsylvania resulted in only one online college with a pass rate equal or greater than the public state schools. Certified Public Accountant (CPA) exam scores may be the best accounting measure of a post-graduate successful college education.

Verhoeven and Wakeling (2011) described in a study involving 373 students of a large public university, the success rate (percentage of enrolled students earning an A, B, or C) in an upper-division quantitative business core course was found to be significantly lower—by 17 percentage points—under online delivery than under face-to-face delivery, both for students with a strong (A or B) grade in the prerequisite statistics course and for students with a weak (C or D) grade in the prerequisite (p. 65).

Chen et al. (2010) evaluated the various learning objectives for cost accounting. This course in cost accounting studied by the authors is actually amped up Principles of Accounting II and had similar learning objectives. The results of this study suggested that learning outcomes, student knowledge gained, interaction among students and with the instructor, and student overall course satisfaction in online sections of this cost accounting course were at a high level.

However, where differences existed in specific aspects of these course delivery areas between online sections and traditional sections, the traditional approach more frequently was associated with a better result (p. 13-14). The authors presented an overview on using a survey to collect data and due care to be given to instrument design. A clear message is course design is as significant as course content delivery and attention to detail must be expended on the front end of any curriculum development.

Priluck (2004) analyzed students in two sections of a marketing course with an average student age of 25 years in an online course and average student age of 20 years in a traditional course. Students in the traditional course reported higher levels of subject mastery, but the final comprehensive examination did not yield a significant difference in scores. Butcher, Epps, and Cleaveland (2015) discovered students in the traditional instructed course more strongly perceived an increase in critical thinking skills and class discussion as a factor in understanding the course material than the online students. However, there was not a significant difference in overall satisfaction for either format. Anstine and Skidmore (2005) documented there was a difference as traditional scores were higher than online scores in three courses where only online MBA students' grades were compared with only traditional students' grades and one course was statistically significant. The study demonstrated the online learning format was substantially less effective than traditional courses.

Akladios, Lim, and Parsaei (2010) administered a pretest to students and analyzed knowledge of subject material before the course and a posttest that analyzed knowledge after the course completion. There was no significant difference in the grades of students. However, the traditional classroom students had a significant increase in scores on the pretest and posttest

indicating a greater understanding and mastery of material. This indicated online students may have achieved a similar grade but only through temporary memorization of material versus digesting and understanding the course content.

Rovai and Jordan (2004) concluded that students in a traditional classroom rated a higher perception of connectedness and a higher rate of learning than online courses as evidenced by posttest scores. Cater, Michel, and Varela (2012) demonstrated that students in the traditional classroom outperformed students in the online classroom on three course tests averaging two points higher and statistically significant. The researchers asserted this occurred because face-to-face interaction was the richest form of communication. Salcedo (2010) studied two instructional methods of a foreign language course and found the overall grade in the classroom and grade on quizzes, despite specific, online assistance options such as “look up the answer”, was higher in the traditional course but not statistically significant compared to the online course and lab. Lawrence and Sanghania (2004) and Kan and Cheung (2007) observed traditional course students outperformed online students on tests with the average final grade in the course higher for traditional students.

Online is More Effective

Mondal and Culp (2017) established that students in the online course scored half a letter grade higher than students in the traditional course after controlling for covariates (online students were predominantly females, older, higher GPA base, and Caucasian). GPA, method of instruction, and age all had a statistically significant impact on grade but gender did not. Sohn and Romal (2015) demonstrated students performed better in the face-to-face class of macro and

micro economics courses. Thirty percent of students dropped the online course but only 21% dropped the traditional course.

Hay, Peltier, and Drago (2004) determined reflective learning, defined as taking the course material and applying it to beliefs, is just as developed in online as traditional course instruction. In traditional classrooms the instructor was the lowest element to assist with developing reflection. However, students demonstrated higher levels of critical reflection. The authors studied MBA program course content in both online and traditional methods of instruction. Again, advanced courses draw more mature students capable of high levels of critical thinking. Smith and Rupp (2004) studied business student online courses versus a traditional format and found a statistically significant increase in online students' grades over the course of the semester compared with the traditional classes. Self-selection into the online classes may have attracted higher aptitude students. In addition, discussion posts were graded for completeness not content and may have led to a hyperinflation of grades.

Ramnarayanan, Berenson, and Oppenheim (2016) compared large, lecture style classrooms to smaller online and traditional classrooms and cited the lecture style students as learning less than either smaller classroom instruction. Students also performed poorer on exams when they were in large, lecture classrooms with online exams over smaller, traditional (paper and pencil) exams. The significance of the various articles in this section is the use of data from courses that are similar in size and style of instruction. The various sizes of traditional face-to-face lectures would have a bearing on the effectiveness of this instruction.

Students' Perceptions of Accounting Online

Evans and Haase (2001) characterized the typical online student had family, work, and social commitments that exceed the traditional student. Their learning patterns are also different as they took courses specifically to learn about a subject and apply the material to their daily lives. The authors found 60% of distance learners were women, and all students needed faculty support. The online students comprehended the delivery method would be different but underestimated the complexity and how the method affected the entire experience from homework to exams. More students were interested in online business education courses than other disciplines. Gender did not statistically influence the decision to take an online course but age did. The most interested age groups in online learning were 25 to 54 years and the least interested in online instruction were 18 to 24 and over 65.

Watters and Robertson (2009) indicated 75% of students perceived online courses to be at least as effective as a traditional method of instruction. Of students with a GPA of 3.5 or higher, 100% stated online courses were at least as effective as traditional courses, perhaps an indication those more academically talented students are self-driven and motivated to excel in the course. Only 45% of students with a GPA of 2.5 or less believed the online course to be at least as effective as a traditional course. Thirty-seven percent of students believed they accepted more responsibility for their education in an online course. LaBay and Comm (2003) documented that students began the online course with similar expectations as a traditional course with the exception of a statistically significant lower expectation of helpful presentations. At the end of the course online students actually ranked the course higher and more effective than the traditional method of instruction. Vamosi, Pierce, and Slotkin (2004) discovered students in the distance course were less satisfied with the class than students in the traditional

course because the online was considered less interesting and more difficult to learn. This caused students to believe the course was less effective towards enabling students to master material. Students in the online accounting course perceived greater flexibility but less efficient in the use of their time.

Wilkes, Simon, and Brooks (2006) revealed that females were nearly twice as likely to indicate they would not enroll in an online course; however, the number of females who answered the survey and had taken an online course was double the males' participation. This may indicate students dislike online courses as they enroll in more online courses over time.

Favorable Recruiters' Perceptions of Online Students

Metrejean and Noland (2011) indicated that there was no difference in a CPA firm's willingness to hire an online Masters of Accountancy graduate (MAcc) over a traditional program's MAcc graduate. A CPA firm's greater determinant in the willingness to hire an accounting graduate was an individual's passing parts or the entire CPA exam. This may indicate that accounting is a field where the degree is not as important as certification as certification validates the learning process and prepares one for the CPA examination.

Tabatabaei and Gardiner (2012) also documented recruiters failed to find an applicant more or less desirable based on a dominant method of instruction (online student versus traditional student); however, this was for information systems students where online is a large percentage of their job demands. Recruiters valued work experience and class performance more strongly than method to obtain degree.

Reluctance to Hire Online Students

Wright (2014) determined employers hesitated to hire online degreed candidates due to the perception of a lack of quality. The author indicated 96% of managers chose a student with a business degree from a traditional method of instruction compared to an applicant who earned a degree from an online program. Managers related the greatest concern was not the lack of prestige name of an online university but the lack of social interaction with other students and faculty, a need reflected in the workforce. Roe, Toma, and Yallapragada (2015) stated a general public perception that online degree programs lack quality and rigor.

Adams and DeFleur (2005) observed the effects of an online degree are far reaching. For individuals who sought employment as a college professor, there was a reluctance to hire candidates with online degrees. Ninety-eight percent of staff responsible for hiring reported being more inclined to hire students from traditional programs of instruction than students with online degrees. The top reasons traditional doctoral degree students were preferred were based on experience, quality, and interaction.

Adams (2009) in an updated study found that other disciplines besides the business students that Wright (2014) discussed faced a bias in favor of students with degrees from traditional programs. Of the 120 “pre-screeners” who selected medical students to come to campus for interviews, every screener selected students from traditional face-to-face instructional programs rather than students from online programs. Deming, Yuchtman, Abulafi, Goldin, and Katz (2014) also revealed students who completed their degree mostly in traditional settings received more call backs after submitting a resume than online students. Beqiri, Chase, and Bishka (2010) indicated recruiters preferred students with traditional degrees.

The significance to this study is understanding student self-selection and if higher quality students are enrolling in a traditional setting than online in marketing themselves as a new hire and in preparing for workforce expectations.

Qualitative Influences on Learning Success

The use of frequent communication from instructor to student was a key part of course design (Eastman & Cathy, 2001; Hazari, 2004). Wilson and Allen (2011) reinforced the implication that intrusive academic advising or more personal contact with the instructor, whether that is face-to-face, or through online chat, texting, or discussion boards, may be critical to the continued success of students with marginal cumulative GPAs. Jacobs (2014) encouraged collaboration through group work in light of the continued growth of online instruction. Students reported that they often feel disconnected in distance classes and formation of groups enhances communication, collaboration, working through conflict, and sharing in credit for accomplishments. There are challenges to group work and norms must be established along with development of trust among members. Meaningful assignments must be designed to require participation by all group members. Success of group work, defined as achieving learning outcomes, must be assessed using a variety of techniques such as self-assessment, reflection papers, minute papers, role play, and a questions wall. These learning techniques are transferable to the work place as team work is the essence of business today. Peer reviews and self-assessments are effective to identify the slackers and the top performers.

Bunn et al. (2014) documented that for online instruction to be effective, online support videos or other materials should be kept to no more than 10 minutes in length to retain the

student's attention. Before sharing all face-to-face material in online class content, instructors must be cognizant that participation in group activities via online postings and discussion boards is essential for online learning. Collaboration and interaction between instructors-to-students and students-to-students is considered essential to learning and positive performance.

DiRienzo and Lilly (2014) sought to reconcile reasons for the similar performance between online and face-to-face students. Using the seminal work of the Carroll learning model, the authors expounded on time spent compared to time needed as a function of motivation and opportunity to learn. Chen and Jones (2007) concluded in an MBA accounting course that a traditional class participant's believed clarity of instruction was better than a blended class. On the other hand, the blended learning was believed to have improved analytical skills of students. The Association to Advance Collegiate Schools of Business (AACSB) suggested problem-solving skills as an example of a desirable goal for undergraduate programs and explicitly called for graduate programs to further these skills in their students (AACSB, 2006). The American Institute of Certified Public Accountants (AICPA) in its core competency framework also explicitly calls for problem-solving skills as necessary for all new entrants into the accounting profession, regardless of the sector in which they work (Chen & Jones, 2007).

Angiello (2010) presented an overview of several qualitative aspects of online and face-to-face learning. Several of these explanations and approaches to online and face-to-face instruction sought to explain the whys of a quantitative research project. Verhoeven and Wakeling (2011) took another approach to the subject by preparing a literature review of nine previous key studies. This method of due diligence on previous studies proved invaluable as the authors implied twice weekly face-to-face meetings, working problems and obtaining solutions

for immediate feedback, and reinforcement were positive features of face-to-face delivery of instruction.

According to Williams and Duray (2006) engaging students to interact online has always been a challenge. The authors documented that considering the interaction among peers stimulated learning, based on prior research, online courses can alter courses to include team work despite the lack of a physical classroom. How team members perceived working in teams (e.g. beneficial, unbeneficial, waste of time, etc.) determined their learning progress and the level of trust and cooperation in their online team predicted learning outcomes. Overall team work and group cohesiveness facilitated student learning in online environments. Student engagement is important because group work assisted in development of traditional classrooms and a significant drawback of online education is the lack of group work. However, this study demonstrated group work may be effectively implemented in online courses and produce the same benefit in student learning. Fredrickson (2015) observed if student engagement positively impacted student learning, this study demonstrated how to engage students in online courses that historically lacked engagement to the extent of traditional courses. Emotional engagement, including the degree of attention, interest, curiosity, and passion, significantly impacted all six student learning outcomes: writing skills, critical thinking, work skills, team skills, understanding people, and problem solving skills. The extent that a student participated in class positively impacted work skills, team skills, problem solving, and understanding people. This lack of engagement is important because most online courses do not foster participation and, therefore, neglect the development of these four skills.

Ucol-Ganiron (2013) indicated students in the online course were given weekly readings and assignments and students in the traditional course did not have weekly assignments. Students preferred the structure of the online course because they knew what was expected every week. However, students believed the online was overwhelming with too much material content. Students were more prepared for the online course because of the structure indicating a well-designed online course provided similar structure to a traditional class room. Many students preferred structure and a drawback of online, according to prior research, is the lack of structure. Students enrolled in online courses received instant feedback on questions answered and believed this fostered enhanced learning compared to the traditional course where it required several days for the professor to grade assignments. Online students also were allowed to complete the homework multiple times further enhancing learning objectives by reinforcing material.

Woolley (2015) studied accounting students' perceptions of online homework, traditional homework, and clicker use in classrooms. These teaching aids were analyzed to evaluate the method students believe are more effective in learning. The findings were significant because clickers and online homework developed understanding. However, traditional homework was not significantly correlated with learning. A key part of the current study is use of online homework for both methods of instruction.

Summary

Chapter 2 presented a review of pertinent studies and the various issues that will impact this study of Principles of Accounting classes. The body of literature influenced the decision to

use archived data from a 3 year period at a single university and taught by two instructors that used experts in e-Learning to develop course content. The studies in the literature review were a variety of career and technical education areas, as peer reviewed studies in the area of accounting are limited. The relationship between learning outcomes and content delivery methods in a Principles of Accounting course is an area of study that has little research.

CHAPTER 3

RESEARCH METHOD

The primary focus of this paper was whether a significant difference existed in student performance as measured by end of course grades in an asynchronous online class compared to a traditional face-to-face class. The purpose of this quantitative research project that encompassed a quasi-experimental ex-post-facto design compared student outcomes (measured as final course grades) from two Principles of Accounting courses (ACCT 2010 and ACCT 2020 at one 4 year university). Both courses were delivered in traditional face-to-face (F2F) and a totally online format. The use of archived data from 2015 through 2017 ensured the validity and reliability from a sufficient sample size to determine significance. Age, gender, GPA, and composite ACT score were selected as variables to further identify nuances that impacted the findings.

Chapter 3 includes the method and procedure used to study the research topic, divided into the following sections: (1) research questions including null hypotheses, (2) instrumentation, (3) population and sample, (4) data collection, (5) data analysis, and (6) chapter summary.

Research Questions and Null Hypotheses

The following questions were used to form the null hypotheses and guide the quasi-experimental ex-post-facto quantitative research design:

Research Question 1: Is there a significant difference in student mean final course grade between a face-to-face method of instruction and an asynchronous online format?

Ho1: There is no significant difference in student mean final course grade between a face-to-face method of instruction and an asynchronous online format.

Research Question 2: Is there a significant difference in student mean final course grade between males and females?

Ho2: There is no significant difference in student mean final course grade between males and females.

Research Question 3: Is there a significant difference in student mean final course grade in asynchronous online classes between males and females?

Ho3: There is no significant difference in student mean final course grade in asynchronous online classes between males and females.

Research Question 4: Is there a significant difference in student mean final course grade in face-to-face classes between males and females?

Ho4: There is no significant difference in student mean final course grade in face-to-face classes between males and females.

Research Question 5: Is there a significant difference in the mean final course grade among the four GPA groups (below 2.50, 2.50 – 2.99, 3.00 – 3.49, 3.50 and above) for face-to-face and online classes?

Ho5: There is no significant difference in the mean final course grade and GPA grouping for face-to-face and online classes.

Research Question 6: Is there a significant difference in mean GPAs between online and face-to-face students?

Ho6: There is no significant difference in mean GPAs between online and face-to-face students.

Research Question 7: Does the ACT composite score, GPA, age (grouped into 2 segments of below 25 and 25 and above), gender, and method of delivery selected by students predict mean final course grade?

Ho7: There is no significant correlation between ACT composite score, GPA, age, gender, method of course delivery selected, and mean final course grade.

Research Question 8: Is there a significant difference in student mean final course grade in asynchronous online classes between nontraditional aged students (age 25 and older) and traditionally aged students (age 24 and younger)?

Ho8: There is no significant difference in student mean final course grade in asynchronous online classes between nontraditional aged students (age 25 and older) and traditionally aged students (age 24 and younger).

Instrumentation

Data from secure, archived databases were used in an ex-post-facto design; thereby, ensuring the validity and reliability of records. The subject students had no knowledge that secondary data analysis would be performed during a quasi-experimental study. As a result, no

surveys, interviews, or student consents for participation were required to perform the analyses for this study.

The instructors made no changes to the curriculum or content during the period of data collection. To ensure consistency exams were proctored in all classes and were designed to have the same format and degree of difficulty. Distance online students were required to travel to the primary campus at the participating university or secure arrangements at a designated testing center near their home or travel destination. The students taking off-site exams received the same instructions and time to complete the exams.

Population and Sample Size

Subjects for this study were drawn from the student body population at a public 4 year university. All major courses of study within the College of Business require completion of two introductory Principles of Accounting courses (ACCT 2010 and ACCT 2020). The study employed nonprobability convenience sampling of Principles of Accounting I (ACCT 2010) and Principles of Accounting II (ACCT 2020) students taught by two instructors, each faculty teaching 2010 or 2020 but not both courses. The courses led by two instructors were selected as the sample due to the rigor of online course development aided by the university's academic technology services department. Not all online accounting courses used this service for course content development. The two instructors selected also received above average ratings on the Student Assessment of Instruction (SAI). The students self-selected the course to enroll in with knowledge of instructor's name, meeting time, location, and method of instructional delivery.

The online sample consisted of six sections of classes from summer terms of 3 successive years (2015-2017) with a total size of 124 participants aggregate for both courses. The face-to-face sample spanned from fall term 2015 through spring term 2017 and consisted of 12 sections of classes with a total size of 433 participants aggregate for both courses.

As a quasi-experimental ex-post-facto research study, the demographics were not known but likely mirrored the greater composition of the university. The study controlled for prior knowledge and aptitude by adjusting the student outcomes by the students' incoming GPA and ACT scores. Student age (below age 25 and 25 and above as two groups) and gender (male and female) were variables in the study.

Data Collection

Official databases were used as secured repositories including course, section, student identification, final grade, age, gender, ACT composite score, ACT math score, and ETSU GPA. Individual students and instructors were de-identified prior to the researcher receipt of the data for this study. ACCT 2010 and ACCT 2020 were not identified or segregated in the use of the data for analyses as this would compromise the confidentiality of students from a potential re-identification of the data. Assistance and direction from the participating department and approval from the Institutional Review Board (IRB) was secured as well as approval from the university's compliance in releasing final grades. The final grade was converted to a numerical GPA in order to conduct statistical analysis of the data. See Table 1 for the conversion of letter grade to numeric grade based on the participating university's policy.

Table 1.

Letter Grade to Numerical Grade Conversion

Official Grade	Number Assigned
A	4
A-	3.7
B+	3.3
B	3
B-	2.7
C+	2.3
C	2
C-	1.7
D+	1.3
D	1
F	0
FN	0
W	blank

Data Analysis

The data analysis of this study was guided by the following analyses to address the eight research questions:

Research Question 1: An independent samples *t*-test was used for the grouping variable method of instruction and quantitative final course grade.

Research Question 2: An independent samples *t*-test was used for the grouping variable gender and quantitative final course grade.

Research Question 3: An independent samples *t*-test was used for the online method of instruction for the grouping variable gender and quantitative final course grade.

Research Question 4: An independent samples *t*-test was used for the face-to-face method of instruction for the grouping variable gender and quantitative final course grade.

Research Question 5: A two-way ANOVA was used for two variables GPA grouping and method of instruction with quantitative final course grade.

Research Question 6: An independent samples *t*-test was used for the grouping variable method of instruction and student mean GPA.

Research Question 7: Multiple regression analysis was used for ACT composite score, gender, GPA, age, and method of instruction to predict final course grade.

Research Question 8: An independent samples *t*-test was used for the online method of instruction for the grouping variable age and quantitative final course grade.

The .05 level of significance was used for all statistical analysis. Version 23 of IBM SPSS software (2014) and Microsoft Excel were used to complete the statistical analyses.

Summary

This research project was a quasi-experimental ex-post-facto study based on secure archived records ensuring a high degree of validity and reliability of the student outcomes measured as final grade. Much of the research found in the literature review focused on a single semester with one instructor and small sample sizes or multiple locations with various instructors and more than one course type. This study sought to control variation of instructors' delivery styles, course variations (Principles versus Intermediate Accounting as an example), and varying students' majors by limiting the scope to two Principles of Accounting courses and two

instructors over a 3 year period. All business majors in the College of Business must complete ACCT 2010 and ACCT 2020 with a grade of C or higher. Approximately 10% to 15% of the students in Principles of Accounting classes are accounting majors and tend to perform at a higher level than nonaccounting majors. Had other major level accounting courses been included in the sample, results may have been skewed. The impetus of the study was to determine performance of a typical student in a Principles of Accounting course and whether the instructional method in the class affected the student performance outcome. Additional covariates of age and gender were collected to reveal potential significance on the dependent variable student final grade under the two methods of course instruction.

CHAPTER 4

RESULTS

The purpose of this quantitative research that encompassed a quasi-experimental ex-post-facto design was to compare student outcomes (measured as final grades) from two Principles of Accounting courses (ACCT 2010 and ACCT 2020) both delivered in two instructional methods: face-to-face (F2F) and a totally online asynchronous format. The relationship of ACT score, GPA, gender, and age to mean final course grade were analyzed. The number of subjects in this study was 557 students from a public university in the Southeast United States enrolled in Principles of Accounting I and II classes. Archived data provided by the university's Office of Internal Research were obtained through the official databases. The time frame was summer term 2015 through summer term 2017. Each student was identified by an 8-digit number assigned by the system's data base administrator to protect the anonymity of the students.

Research Question 1

Research Question 1: Is there a significant difference in student mean final course grade between a face-to-face method of instruction and an asynchronous online format?

H₀1: There is no significant difference in student mean final course grade between a face-to-face method of instruction and an asynchronous online format.

An independent-samples *t*-test was conducted to evaluate whether the final mean score of Accounting Principles students were significantly different between an asynchronous online class and a face-to-face class. The overall course final mean score was the test variable and the

grouping variable was the method of instruction for the class. The test was significant, $t(524) = 2.65, p = .008$. Therefore, H_0 was rejected. The η^2 index was .01 indicating a small effect size. Students from face-to-face classes ($M = 2.52, SD = 1.21$) on average scored higher in Principles of Accounting than students from asynchronous online classes ($M = 2.17, SD = 1.29$). The 95% confidence interval for the difference in means was .09 to .60. The distributions of final grades for the two groups are displayed in Figure 1.

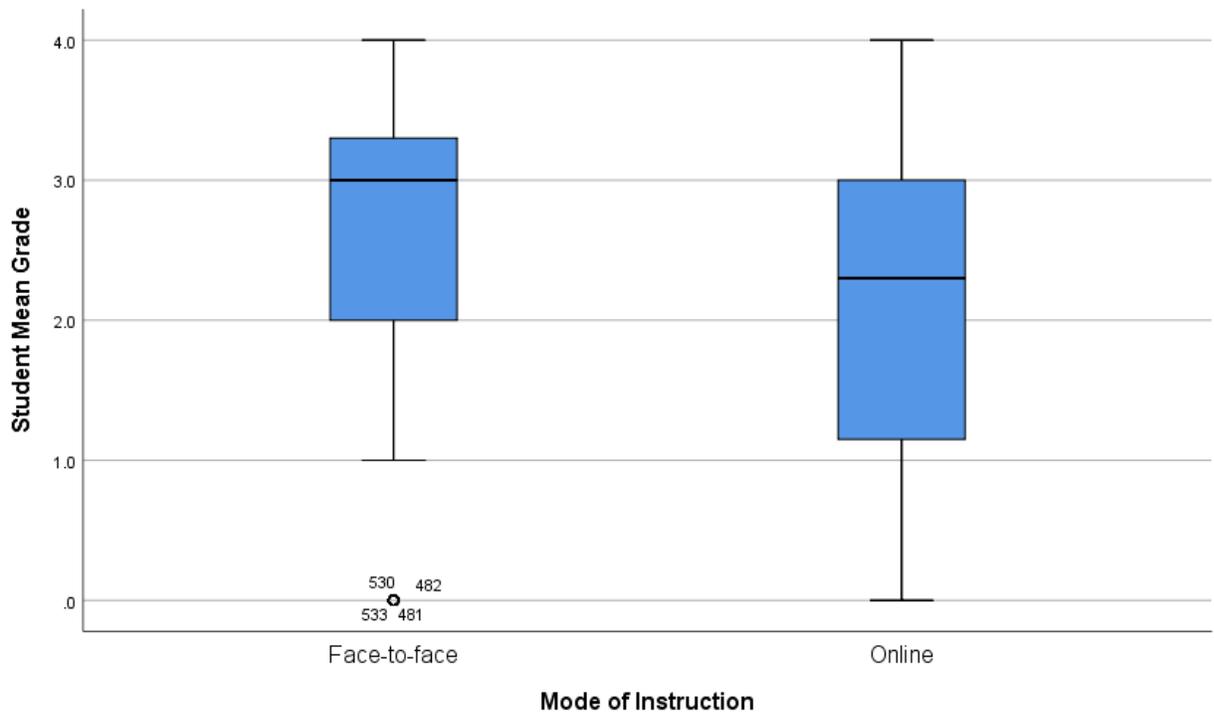


Figure 1. Distribution of Grades for Students

Research Question 2

Research Question 2: Is there a significant difference in student mean final course grade between males and females?

Ho2: There is no significant difference in student mean final course grade between males and females.

An independent-samples *t*-test was conducted to evaluate whether the final mean score of Accounting Principles students were significantly different between female and male students. The overall course final mean score was the test variable and the grouping variable was gender. The test was significant, $t(524) = -3.29$, $p = .001$. Therefore, Ho2 was rejected. The η^2 index was .02 indicating a small effect size. Female students ($M = 2.65$, $SD = 1.19$) scored significantly higher in Principles of Accounting classes than male students ($M = 2.29$, $SD = 1.25$). The 95% confidence interval for the difference in means was -.57 to -.14. The distributions of grades by gender are displayed in Figure 2.

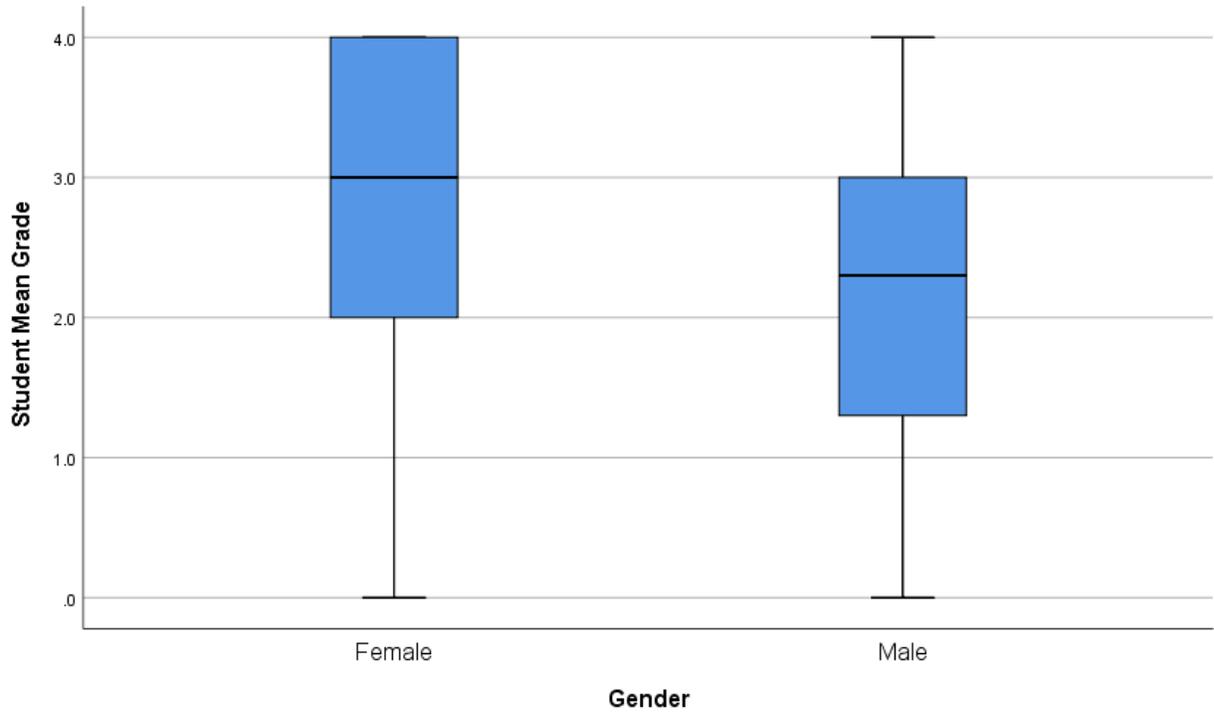


Figure 2. Distribution of Grades by Gender

Research Question 3

Research Question 3: Is there a significant difference in student mean final course grade in asynchronous online classes between males and females?

Ho3: There is no significant difference in student mean final course grade in asynchronous online classes between males and females.

An independent-samples *t*-test was conducted to evaluate whether the final course mean grade of students in asynchronous online Principles of Accounting classes were significantly different between female and male students. The overall final mean score from the online courses was the test variable and the grouping variable was gender. The test was significant,

$t(110) = -2.34, p = .021$. Therefore, H_03 was rejected. The η^2 index was .05 indicating a medium effect size. Female students ($M = 2.42, SD = 1.15$) scored significantly higher in asynchronous online Principles of Accounting classes than male students ($M = 1.85, SD = 1.39$). The 95% confidence interval for the difference in means was -1.06 to -.09. The distributions of online grades by gender are displayed in Figure 3.

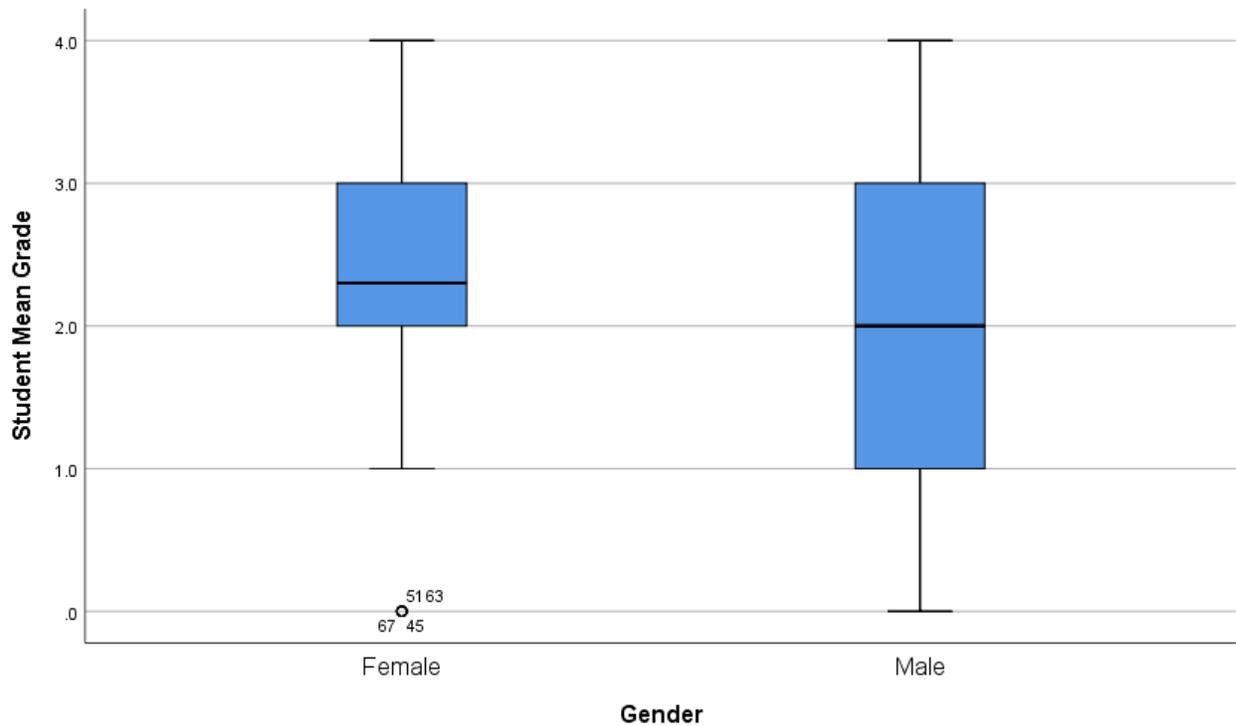


Figure 3. Distribution of Online Grades by Gender

Research Question 4

Research Question 4: Is there a significant difference in student mean final course grade in face-to-face classes between males and females?

Ho4: There is no significant difference in student mean final course grade in face-to-face classes between males and females.

An independent-samples *t*-test was conducted to evaluate whether the final mean course grade of students in face-to-face Principles of Accounting classes were significantly different between female and male students. The overall final mean course score from the face-to-face courses was the test variable and the grouping variable was gender. The test was significant, $t(412) = -2.99$, $p = .003$. Therefore, Ho4 was rejected. The η^2 index was .02 indicating a small effect size. Female students ($M = 2.74$, $SD = 1.19$) scored significantly higher in face-to-face Principles of Accounting classes than male students ($M = 2.38$, $SD = 1.20$). The 95% confidence interval for the difference in means was -.60 to -.13. The distributions of grades by gender are displayed in Figure 4.

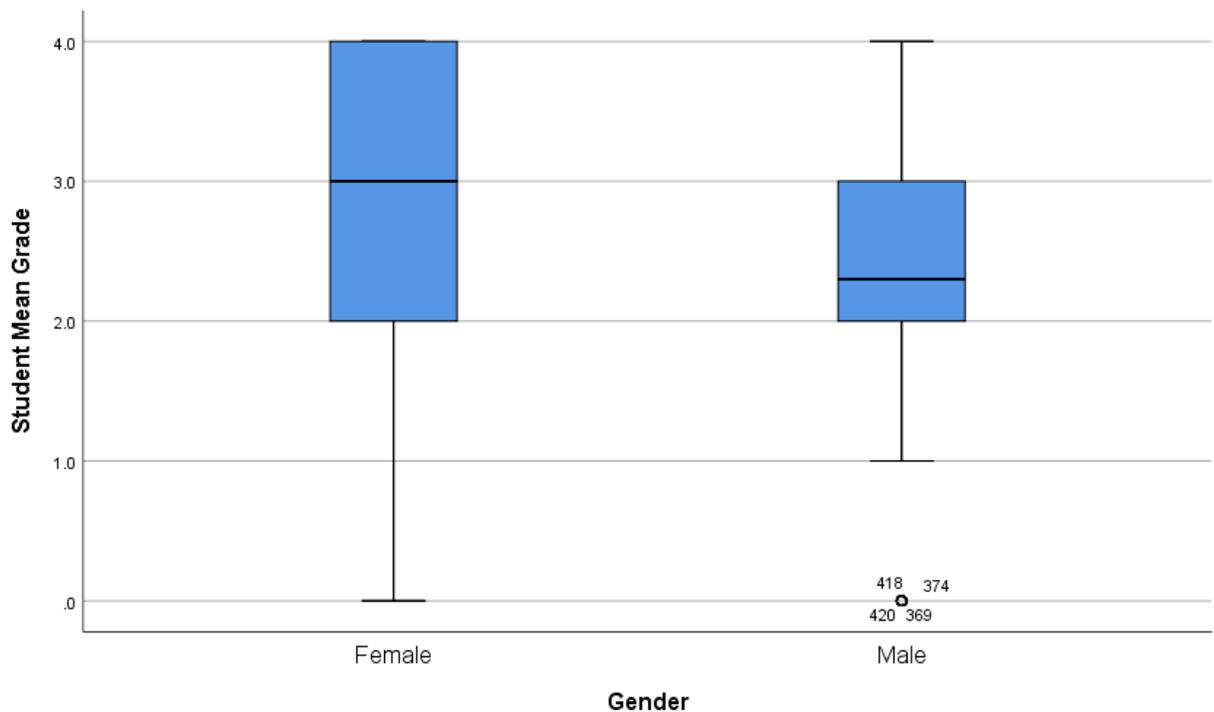


Figure 4. Distribution of Face-to-Face Grades by Gender

Research Question 5

Research Question 5: Is there a significant difference in the mean final course grade among the four GPA groups (below 2.50, 2.50 – 2.99, 3.00 – 3.49, 3.50 and above) for face-to-face and online classes?

Ho5: There is no significant difference in the mean final course grade and GPA grouping for face-to-face and online classes.

A two-by-four ANOVA was conducted to evaluate the effects of institutional GPA prior to the accounting class and the two methods of instruction on final student mean grade. The ANOVA indicated no significant interaction between instructional method and GPA group, $F(3, 498) = .67, p = .569$, partial $\eta^2 < .01$ but significant main effects for GPA, $F(3, 498) = 49.46, p < .001$, partial $\eta^2 = .23$. Instructional method, $F(1, 498) = .80, p = .373$, partial $\eta^2 < .01$ was not significant. The null hypothesis is supported. The means and standard deviations by GPA grouping within method of instruction are presented in Table 2. The distribution of student grades by GPA group for each method of instruction is displayed in Figure 5.

Table 2. Means and Standard Deviations for GPA in Each Method of Instruction.

Method of Instruction	GPA Group	M	SD
Face-to-Face	0.01 – 2.49	1.30	1.13
	2.50 – 2.99	1.91	1.06
	3.00 – 3.49	2.56	0.98
	3.50 – 4.00	3.46	0.74
Online	0.01 – 2.49	1.43	1.36
	2.50 – 2.99	1.73	1.24
	3.00 – 3.49	2.23	1.11
	3.50 – 4.00	3.42	0.58

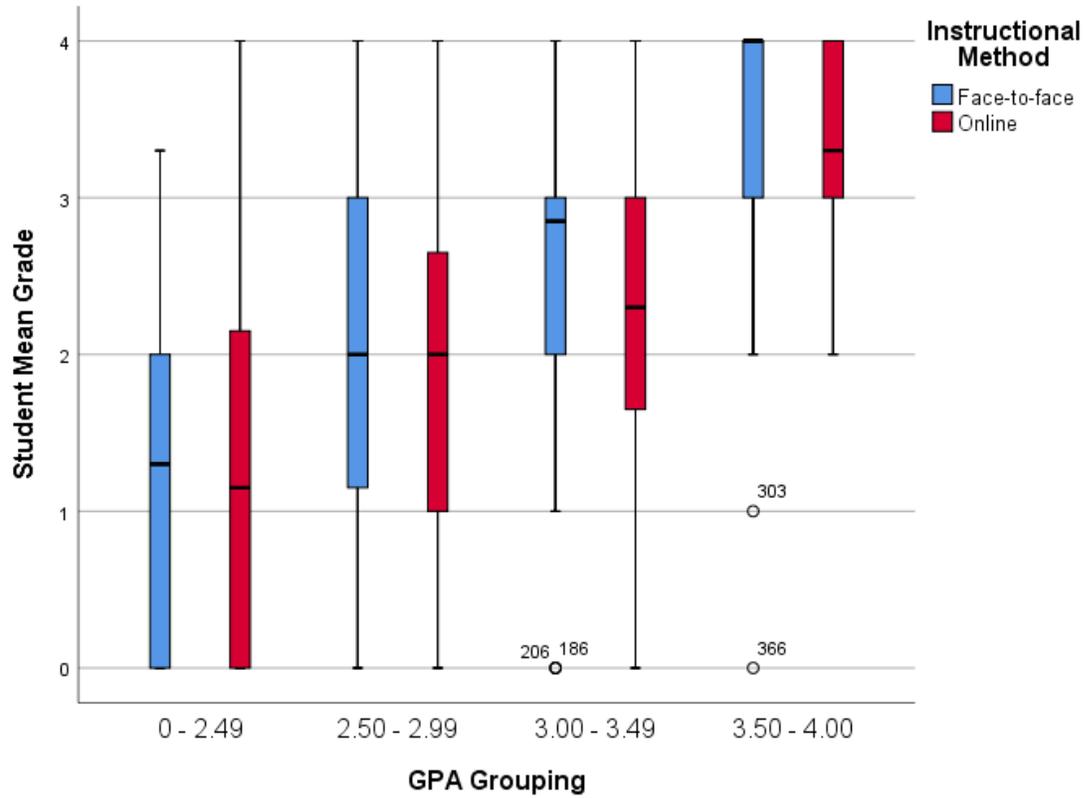


Figure 5. Distribution of Student Grades by GPA Group

Post hoc analyses were conducted on all possible pair-wise contrasts. Table 3 reveals the results of a Tukey comparison indicating all pair-wise GPA group contrasts are significant on mean final course grade regardless of instructional method.

Table 3. *Post Hoc Analyses of Pair-wise Comparisons by GPA Group*

GPA Group	GPA Group	Mean Difference	Significance
.01 – 2.49	2.50 – 2.99	-.53	.001
	3.00 – 3.49	-1.16	.000
	3.50 – 4.00	-2.13	.000
2.50 – 2.99	3.00 – 3.49	-.63	.000
	3.50 – 4.00	-1.60	.000
3.00 – 3.49	3.50 – 4.00	-.97	.000

Research Question 6

Research Question 6: Is there a significant difference in mean GPAs between online and face-to-face students?

Ho6: There is no significant difference in mean GPAs (semester prior to class) between online and face-to-face students.

An independent-samples *t*-test was conducted to evaluate whether mean student GPA prior to the class enrollment were significantly different between face-to-face and online classes. The mean GPA score immediately prior to the course was the test variable and the grouping variable was method of instruction. The test was significant, $t(555) = 2.97, p = .003$. Therefore, Ho6 was rejected. The η^2 index was .02 indicating a small effect size. The student mean GPA in face-to-face classes ($M = 3.02, SD = .78$) was significantly higher than student mean GPA enrolled in online Principles of Accounting classes ($M = 2.78, SD = .85$). The 95% confidence interval for the difference in means was .08 to .40. The distributions of GPA by method of instruction are displayed in Figure 6.

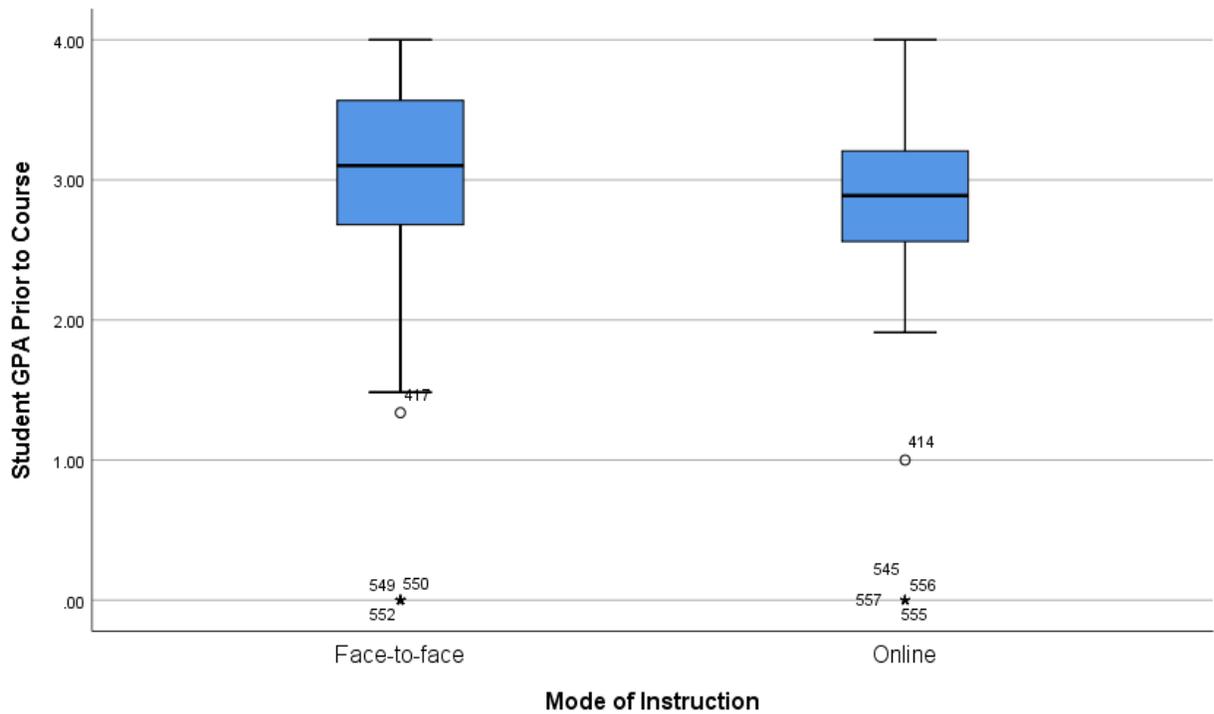


Figure 6. Distribution of GPA by Method of Instruction

Research Question 7

Research Question 7: Does the ACT composite score, GPA, age (grouped into 2 segments of below 25 and 25 and above), gender, and method of delivery selected by students predict mean final course grade?

Ho7: There is no significant correlation between ACT composite score, GPA, age, gender, method of course delivery selected, and mean final course grade.

A multiple regression analysis was conducted to evaluate how well the various factors predicted the final course grade. The predictors were five variables, while the criterion variable

was the final course grade. The linear combination of these factors was significantly related to the final course grade, $F(5, 397) = 30.56, p < .001$. The sample multiple correlation coefficient was .53, indicating that approximately 28% of the variance of the student final grade in the sample can be accounted for by the linear combination of these factors.

In Table 4 the variables indicate the relative strength of the individual predictors. Three of the five bivariate correlations were significant with ACT composite and GPA significant at ($p < .01$). Four of the five partial correlations were significant with instructional method, ACT composite score, and GPA significant at $p < .01$. Age was the only variable not significant in predicting final course grade. The prediction equation for the standardized variables was as follows:

$$Z_{\text{Predicted Student Grade}} = -.11 Z_{\text{Instructional Method}} + .31 Z_{\text{Comp ACT}} + .06 Z_{\text{Age}} + .31 Z_{\text{GPA}} + .06 Z_{\text{Gender}}$$

Table 4. *The Bivariate and Partial Correlations of the Predictors with Mean Final Grade.*

Predictor	Correlation between each predictor and final grade	Correlation between each predictor and final grade controlling for all other predictors
Instructional Method	-.13*	-.13**
ACT Composite	.41**	.32**
Gender	.11	.07*
Age	.03	.07
GPA	.42**	.33**

* $p < .05$ ** $p < .01$

Research Question 8

Research Question 8: Is there a significant difference in student mean final course grade in asynchronous online classes between nontraditional aged students (age 25 and older) and traditionally aged students (age 24 and younger)?

Ho8: There is no significant difference in student mean final course grade in asynchronous online classes between nontraditional aged students (age 25 and older) and traditionally aged students (age 24 and younger).

An independent-samples *t*-test was conducted to evaluate whether the final mean score of students in asynchronous online Principles of Accounting classes were significantly different between nontraditional aged students (age 25 and above) and traditionally aged students. The overall course final mean score from the online courses was the test variable and the grouping variable was age. The test was significant, $t(110) = -2.10, p = .038$. Therefore, Ho8 was rejected. The η^2 index was .04 indicating a medium effect size. Nontraditional aged students ($M = 2.59, SD = 1.38$) scored higher in online Principles of Accounting classes than traditionally aged students ($M = 2.02, SD = 1.23$). The 95% confidence interval for the difference in means was -1.11 to -.03. The distributions of grades by age for online classes are displayed in Figure 7.

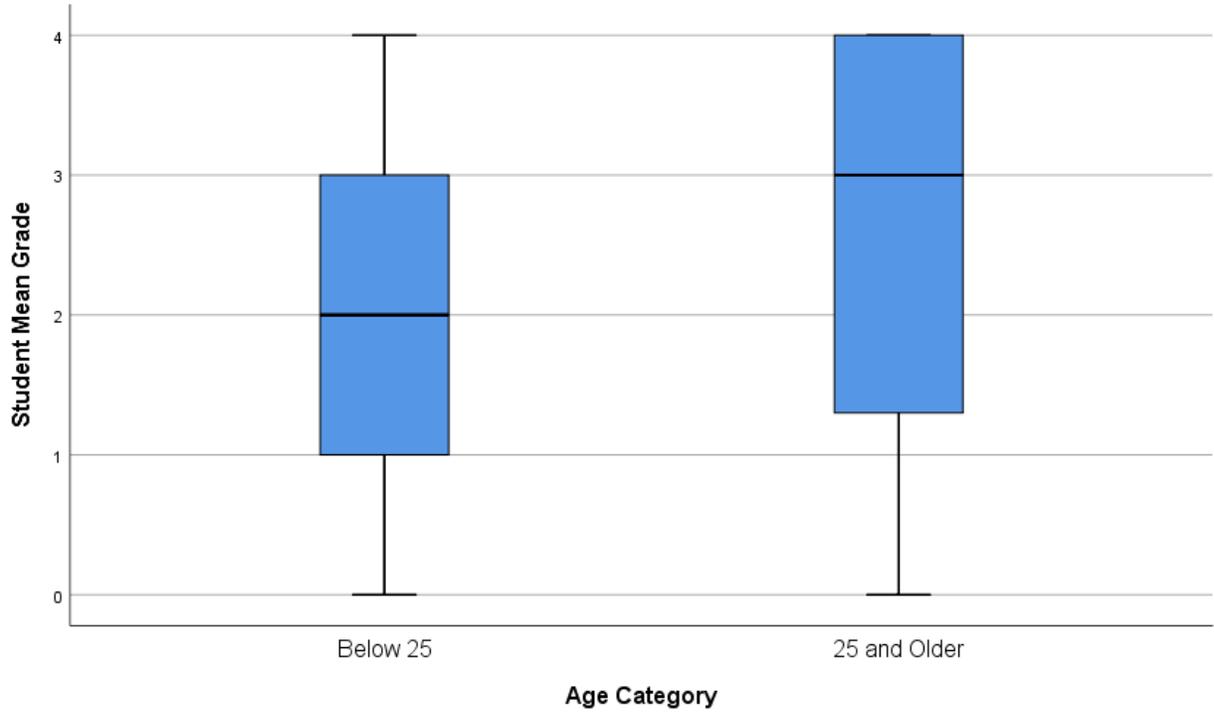


Figure 7. Distribution of Grades by Age for Online Classes

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Chapter 5 contains the findings, conclusions, and recommendations for readers interested in a comparison of online and face-to-face instruction. The purpose of this study was to examine the relationships of ACT composite score, ACT math score, GPA, gender, age, to method of course delivery on final course grade. The overriding emphasis was whether online learning measured as final course grade was significantly different from a traditional face-to-face class. The research questions and null hypotheses were crafted using the U.S. Department of Education's (2010) meta-analysis that found online learning appears to be as effective as conventional classroom instruction.

ACT math scores were used to group students into a math ready group (ACT of 22 or higher) and students with an ACT below 22. Students were grouped into nontraditional (age 25 and older) at the time the course began and as traditionally aged students with an age younger than 25. The institutional GPA score was collected immediately prior to when the course began. There were 557 students (433 face-to-face and 124 online) for the seven semesters beginning with summer term 2015 and ending in summer term 2017. A small number of students were omitted because of missing data for GPA or ACT scores. Additionally students with a grade of W (withdrawal) were excluded from the analysis. The Principles of Accounting courses used in this study were sophomore level, but students transferring in or taking the course as a freshman may result in no institutional GPA.

Eight research questions were developed with six of those questions addressed with an independent samples *t*-test. The relationship of course method of instruction and gender on final course grade was examined with gender impact on final course grade for face-to-face and online classes separately. A fifth *t*-test was conducted for method of instruction and student GPA. A sixth *t*-test was used to compare age, grouped as nontraditional aged learner or traditional aged students, in the online classes only. A 2 x 4 ANOVA was selected to examine the correlation of method of instruction and GPA grouping on mean final course grade. Finally, regression analysis was used for ACT composite score, GPA, age, gender, and method of instruction to predict final course grade.

Summary of Findings

The statistical analyses reported in this study were guided by the eight research questions presented in Chapter 1 and detailed in Chapter 3. In Chapter 3 each of the eight research questions along with the related null hypotheses were presented for this study. The dependent variable for seven of the eight research questions in each of the analyses was the final course grade. Final course grades were considered the best measure for verification of student learning effectiveness.

Students scored significantly higher ($p = .008$) on final course grades in the face-to-face sections ($M = 2.52$) of Principles of Accounting classes than in the online sections ($M = 2.17$). Males compared to males scored 29% higher in the face-to-face classes and females compared to females scored 13% higher in face-to-face classes. The mean final course grade for males was 1.85 for online students and 2.38 for face-to-face students and the mean final course grade for

females was 2.42 for online students and 2.74 for face-to-face students (on a 4.00 scale). It is noteworthy that females outperformed males by 30% in online classes but only by 15% in the face-to-face classes. Females clearly found online learning advantageous comprising 56% of the enrollment but only 41% of face-to-face class rolls. This finding was consistent with Aliakbari and Mahjub (2010) who indicated less structured online courses appealed to females resulting in higher enrollments compared to males. Arbaugh (2000) as well indicated men tended to be more confident in traditional settings.

The participating university required a letter grade of C in the course as passing so the average male in an online Principles of Accounting course would have to repeat the course. On a pass or fail basis, where students must attain a C or better score, 62.1% of the online students passed but 76.9% of face-to-face students successfully completed the course. Overall 73.6% of students earned a C or higher grade.

The precourse GPA of face-to-face classes ($M = 3.02$) was significantly higher ($p = .003$) than the online class students ($M = 2.74$). Higher achieving students may have contributed to the higher final mean course grade for face-to-face classes. The results of the ANOVA indicated that incoming GPA grouped into four achievement levels was significantly related to the mean final course grade in both methods of instruction.

The regression analysis revealed that instructional method, GPA, ACT composite score, and gender were significantly related to final grade for the course. Instructional method, incoming GPA, and ACT were significant at $p = .013$. Only age, defined as below age 25 and 25 and older, was not related to final grade for both methods of instruction combined. Although not a formal research question, an independent samples t -test was performed on whether age

influenced final grade for both methods of instruction combined. The analysis was found not significant ($p = .423$). Nontraditional students, defined as age 25 and older, ($M = 2.55$, $SD = 1.31$) were similar in final course grade compared to traditionally aged students, defined as under the age of 25 ($M = 2.42$, $SD = 1.22$).

Research question eight limited the sample to online classes and the analysis revealed nontraditional aged students ($N = 29$, $M = 2.59$, $SD = 1.38$) scored significantly higher ($p = .038$) than traditionally aged students ($N = 83$, $M = 2.02$, $SD = 1.23$). This may indicate that factors other than technological skills are important for success in online classes. Additionally, 26% of online students were age 25 or older; whereas, only 10% of face-to-face students were 25 and older. This finding supported the results from Dotterweich and Rochelle (2012) who documented the mean age of online students was greater than the mean age of a face-to-face class member.

Conclusions

In the present study both instructors of the Principles of Accounting classes required onsite campus exams or proctored exams in bona fide testing centers across the country. Controlled testing was a key part of what classes and sections were included in the present study to reduce the potential for cheating and present data that are valid and reliable. Several literature review articles indicated cheating as a concern. Kuzma et al. (2015) stated more than 50% of students perceived a greater propensity to cheat in online courses. Prince et al. (2009) documented the average score for online exams were 10% higher than face-to-face exams.

Verification of learning through proctored uniform exams is a key component of successful measurement and must be considered in robust research designs.

The use of Academic Technology Services at the participating university to create the online content of these courses should also be noted. Both instructors of these Principles of Accounting classes used the university professionals available to develop a diverse curriculum that employs various mediums to engage and motivate students. The use of qualified personnel to guide online course development reinforces the findings that face-to-face class performance is significantly better than online class learning measured as final course grade.

Males made lower grades than females in online classes compared to a face-to-face method of instruction. Females performed better than males in both methods of instruction. GPA was correlated to course performance as was ACT composite and ACT math scores. The findings of GPA as a predictor of final grade performance was consistent with Dotterweich and Rochelle (2012) who found GPA was a significant factor in student success regardless of instructional delivery method. Students with a college ready ACT math score of 22 or higher was a strong predictor with 62% of the participating university's sample designated as college ready. Nontraditional aged students performed significantly better in online Principles of Accounting classes than traditionally aged students. Nontraditional aged learners may be more motivated when taking college classes and understand the value of higher education more so than the average traditionally aged student.

Recommendations for Practice

Instructors should enlist the support and guidance of professionals in academic technology services and offices of e-Learning to develop and maintain rigorous online content. Some universities provide additional compensation to instructors who reach out to these shared services groups for assistance. Paying for development and revisions to the online content should be part of a university's policies and procedures. Beyond the visual presentation of course material, instructors should be cognizant of students' need for feedback. Frequent communication of course expectations, guidance, and student progress is essential for students to remain engaged for the course and is especially true for traditionally aged students if they are to be retained. State performance-based funding for successful major program progression and graduation of students emphasizes the need for online education to be crafted in an effective way to increase student pass rates and retention. Face-to-Face interaction may encourage real-time interaction and context to instruction.

Quantitative courses such as Principles of Accounting should provide online software for homework labs that provide 24-hour-a-day and 7-day-a-week access for students. These online labs provide tutorials and ask-your-instructor options to facilitate learning and test preparation. Exams should be delivered in a proctored environment ensuring that learning is prioritized and taken seriously by students. Instructors should take care in providing advance notice to students that proctored exams are required so expectations are known prior to enrollment. The general thought by most accounting instructors are quantitative courses aren't conducive to online discussion threads where students may interact with their peers. Collaboration in online courses

is an excellent method for students to be engaged and accounting teachers should recognize the need to incorporate some degree of peer-to-peer communication for shared learning experiences.

College ready ACT math scores and institutional GPA were strong predictors of final course grade. Administration and faculty should consider numerical thresholds for allowing enrollment in online courses such as Principles of Accounting. Potential self-assessment questionnaires for students should be developed to assist students in deciding on whether an online course is a good choice. There are many factors to consider beyond meeting the schedule a student is trying to juggle. Measurements of self-motivation, aptitude, achievement, family challenges, and personality weigh into the equation of whether a face-to-face or an online course is best suited for a student. Guidance and career counselors employed by universities seek to provide clear direction for at-risk students who are intent on enrolling in online courses that are particularly of a quantitative nature.

Accountability in online education is a goal that faculty and staff focus on to ensure quality learning. Programmatic accreditations, such as the Association to Advance Collegiate Schools of Business (AACSB), expect continual improvement in learning processes and technological innovations are a major contributor to this end. Professional development of faculty to engage the appropriate and available resources of their institutions to create effective online learning modules is essential for success especially in engaging younger traditionally aged students.

Recommendations for Further Research

Based on the findings of this study, the following recommendations for future research are suggested:

1. Expand the sample size to include additional semesters. Additional summer terms would add to the online sample of student records and provide more age diversity to understand the groupings that perform best and worst in an online environment.
2. Replicate the study in other accounting courses in the College of Business taught by other instructors to confirm or refute these findings and provide additional detail of online learning effectiveness. Principles of Accounting classes are comprised of 85% nonaccounting majors. These courses represent a diverse cross section of students, some with strong analytical skills and others with softer skills. Analysis of only accounting majors would give educators an insight into the effectiveness of advanced quantitative courses.
3. Replicate the study in other quantitative business courses taught by other instructors to confirm or refute these findings. Care must be taken to include courses that are similar in nature and instructors that provide online content and a curriculum that is relevant and understandable.
4. A qualitative study should be performed to gain more depth of insight as to why these significant differences occur between online and face-to-face Principles of Accounting classes. What role does flexibility and convenience (Borstorff & Lowe, 2007) play in

self-selection of course instructional method? Does the participating university employ guidance counselors that assist students on selection of course instructional method?

5. A more detailed analysis of age groups beyond the threshold of 25 years of age would be advisable. Kimmel, Gaylor, and Hayes (2016) identified 18 to 24, 25 to 34, and 35 and older as significant breaks in the motivation for attending college. Further segregation into above 50 years of age and 65 years of age may be necessary but a larger sample size would be needed to ascertain significance from the findings.

Online education continues to grow rapidly and is a key income generator for institutions of higher education. Care must be given to ensure the quality of online courses matches the face-to-face method of instruction. Measurement through student assessments of instruction, statistical analysis of results, and programmatic accreditation recommendations are needed to drive the continuous process improvement process.

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