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Intermediate accounting and auditing: Does course delivery mode impact student performance?

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ABSTRACT

This research examines two senior-level accounting courses taught in three different delivery modes (face-to-face, hybrid, and online) by the same instructor in each course with consistent curriculum in the three delivery modes. Multiple-regression results found significant effects for delivery mode and found the interaction between delivery mode and past student achievement on student performance on examinations in both courses to be significant. Intermediate Accounting III students in the online and hybrid modes significantly outperformed students in the face-to-face mode. Auditing students in the online mode significantly outperformed students in the hybrid and face-to-face modes. The findings lend support for the legitimacy of online accounting education.

1. Introduction

In 2014, approximately 28 percent (or 5.8 million) of higher education students were enrolled in an online course with 72.7 percent of the undergraduate students taking an online course at a public institution. While online enrollment surged over the past 12 years, faculty acceptance of the value and legitimacy of online education remained relatively unchanged. In a recent report published by the Babson Survey Research Report Group (Allen, Seaman, Poulin, & Straut, 2016) only 29.1 percent of faculty accepted the rigor and quality of online education. The increasing popularity of online and hybrid course-delivery modes led to a growing number of studies of student performance outcomes by delivery mode. Most of the course-delivery mode studies that examined students' performance in business and accounting courses involved introductory level courses. The purpose of this study is to determine if there are differences in students' performance outcomes in senior-level accounting courses taught in three different delivery modes.

This research is the first to examine senior-level accounting courses taught in three different delivery modes – face-to-face, hybrid (50% in-class/50% online), and online taught by the same instructor in each course with a consistent curriculum in the three delivery modes. The data for this study comes from a large regional, comprehensive public university. The university has close to 10,000 undergraduate students with approximately 52% male students and 78% full-time students. Approximately 514 students are accounting majors with 54% male students and 46% female students. The sample size was 220 and 229 students in Intermediate Accounting III and Auditing, respectively.

We used linear regressions to compare student performance across delivery modes. Data gathered from student records was used to control for age, gender, ethnicity (minority or non-minority), student status (full-time or part-time), internship, transfer credits, earned credits, and prior academic achievement.

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Intermediate Accounting III students in the online and hybrid modes significantly outperformed students in the face-to-face mode on average exam score. Further, we found significant interaction effects between online and hybrid modes and prior academic achievement as measured by GPA. High-achieving students performed well on exams regardless of delivery mode. Auditing students in the online mode significantly outperformed students in the hybrid and face-to-face-modes on average exam score. We also found a significant interaction between online mode and prior academic achievement for Auditing students. High-achieving students performed well regardless of delivery mode. Auditing students' exam performance in the hybrid mode was lower than in the face-to-face mode, but the difference was not significant.

This research helps fill a void in the limited studies that examine the performance of students in senior-level accounting courses. The findings support the legitimacy of online accounting education. Additionally, the results may increase faculty acceptance of online- accounting education and further enlighten faculty and administrators who may be considering expanding their online and hybrid course offerings.

The remainder of the paper is organized as follows. We review the literature on course delivery modes, provide definitions and key features of the delivery modes, and review the studies of students' performance across the three delivery modes including meta-analyses research, business (non-accounting), and accounting studies. We then develop our hypotheses, describe our methodology, and report our results. The paper concludes with a discussion of the results and suggestions for future research.

2. Literature review

2.1. Delivery mode definitions

Allen et al. (2016) define four course-delivery modes: Traditional, web-facilitated, blended/hybrid, and online. A traditional, or face-to-face, delivery mode does not use online technology and the content is delivered in writing or orally. A web-facilitated course uses web-based technology to facilitate what is basically a face-to-face course. For example, the course may use a learning management system to post the syllabus and assignments. The proportion of content that is delivered online for a web-facilitated course is one to 29 percent. For purposes of this study, both the traditional and web-facilitated delivery modes are considered a face-to-face course-delivery mode. A blended/hybrid course combines both online and face-to-face-delivery. A typical blended/hybrid course meets less frequently than would a traditional, face-to-face course or web-facilitated course. The proportion of content delivered online ranges from 30 to 79 percent. An online course has greater than 80 percent of the course content delivered online, and typically students have no face-to-face meetings (Allen et al., 2016).

Online courses involve different formats and applications of technology to facilitate learning. The formats can be offered in an asynchronous or synchronous environment. The technology applications can be various including live recorded both audio or video lectures, learning management systems, adaptive learning systems, video conferencing, chat rooms, discussion boards, or electronic mail. Multiple technologies may be utilized within a single course. In today's learning environment blended/hybrid and traditional, face-to-face courses can also incorporate these technologies.

2.2. Student performance outcome studies

2.2.1. Meta-analysis research

The U.S. Department of Education (2009) performed a meta-analysis of experimental and quasi-experimental studies that evaluated learning results of courses that had at least one contrast between an online or hybrid-delivery mode and face-to-face-delivery mode. The meta-analysis study found that learning in a hybrid-delivery mode was more effective than learning in an online or face-to-face delivery-mode and that learning in an online-delivery mode appeared to be as effective as face-to-face delivery mode. However, the study cautioned that the online and face-to-face delivery mode conditions generally differed on several aspects, including the amount of time that students spent on task, as well as differences in curriculum and pedagogy. Furthermore, many of the studies suffered from weaknesses such as small sample sizes (U.S. Department of Education, 2009).

Sitzmann, Stewart, and Wisher (2006) reviewed 96 research reports from 1991 to 2005, including employee and college training courses to examine the effectiveness of online learning. They theorized that online and hybrid learning would be more effective than face-to-face learning for teaching declarative and procedural knowledge. Declarative knowledge denotes students' recollection of the facts taught while procedural knowledge concerns the material and steps related to the performance of an assignment (Kraiger, Ford, & Salas, 1993). Their research was predicated on theories related to the learning effectiveness of online versus face-to-face-delivery modes. The first theory, pro-technology theory, rationalizes that online learning is superior as it offers a collection of vehicles to deliver multi-media instruction as well as greater flexibility for the student (Dumont, 1996; Hiltz & Wellman, 1997; Salomon, 1988; Sullivan, 2001). A second theory was proposed by educational psychologist Richard Clark. Clark's view is that course delivery methods are irrelevant, and no technology used to deliver teaching material has a distinct advantage over another. Rather, his view is the teaching methods and techniques used within a course as well as student characteristics are what affects learning (Clark, 1983, 1994). The third theory, media richness theory, provides that students achieve greater learning from receiving the same content through multiple media (Daft & Lengel, 1986). Additionally, hybrid courses are perceived to be better compared to face-to-face course delivery as they benefit from both face-to-face and online delivery modes (Kerres & deWitt, 2003; Masie, 2002; Pratt, 2002).

Their results found that across all studies there were small differences on both measures of declarative and procedural knowledge. When teaching declarative knowledge, the face-to-face-course-delivery mode was marginally more effective (6%) compared to the online-delivery mode and was equally effective when teaching procedural knowledge. Furthermore, when similar teaching methods

were used within the two delivery modes, both the online and face-to-face-delivery modes were equally effective for teaching declarative knowledge (Sitzmann et al., 2006). Overall, their results supported Clark's view that unique teaching methods or learning environments drive differences in the learning effectiveness of the two delivery modes.

The hybrid study results indicated the hybrid-delivery mode was 13% more effective than the face-to-face-delivery mode when teaching declarative knowledge and 20% more effective when teaching procedural knowledge (Sitzmann et al., 2006). Thus, the hybrid-delivery mode results support the media richness theory and perception that the hybrid-delivery mode offers benefits from both face-to-face communication and online learning.

2.2.2. Business and economics/non-accounting studies

Very few studies have examined differences in student performance in business courses across course delivery modes, and fewer still have examined student performance by delivery mode in accounting courses. Several studies examined principles of microeconomics and macroeconomics courses taught in online-delivery mode versus face-to-face-delivery mode (Bennett, Padgham, McCarty, & Carter, 2007; Figlio, Rush, & Yin, 2010; Gratton-Lavoie & Stanley, 2009; McCarty, Bennett, & Carter, 2013). The results were mixed.

McCarty et al. (2013) using final grade average as the dependent variable found student performance in the online mode was slightly higher than student performance in the face-to-face-delivery mode, but the difference was not significant. Figlio, Rush, and Yin (2010) randomly assigned students to either the online mode or a face-to-face mode. They examined differences in student performance using three exam grades and overall average. Students performed nominally but did not perform significantly higher in the face-to-face mode on the first exam, final exam, and overall average. Online mode students performed moderately higher on the second exam. Gratton-Lavoie and Stanley (2009) using scores on the final exam found no significant difference in final exam scores. They also found that older working women, students with high GPAs, and non-business majors were more likely to choose the online mode.

Bennett et al. (2007) found macroeconomic online students significantly exceeded face-to-face students whereas microeconomics face-to-face students exceeded the online students.

Koch and McAdory (2012) examined students in a Managerial Economics course that provided instruction transmitted via television to higher education centers, community college sites, or recorded video. The broadcasts came from a face-to-face class. Students at the distance learning centers could see the instructor and talk to the instructor through voice and e-mail. However, the instructor could not see the students at the learning centers only the students sitting in the classroom could see and interact with the instructor. All of the students at the learning centers were engaged in synchronous distance learning while the students watching the video were engaged in asynchronous distance learning. The results were mixed. Student performance from the recorded video delivery and student performance from the higher education centers underperformed, while students at the community college sites outperformed the face-to-face students.

Thrasher, Coleman, and Atkinson (2012) used ten spreadsheet assignments to measure student performance in a Principles of Information Systems course. Students in the online mode exceeded the face-to-face mode on the first spreadsheet assignment. Spreadsheet assignments three through seven showed no significant difference. Spreadsheet assignments two and eight through ten showed significantly better performance for the students in the face-to-face mode. Therefore, they found no convincing results favoring one particular delivery mode over the other.

Ary and Brune (2011) found final course grades in a Personal Finance course were higher in the online mode, but not statistically significant. Daymont and Blau (2008) examined student's performance measured by final grade and the average of ten quizzes in an Organization and Management course. They found no significant difference in performance for either measure.

Friday, Friday-Stroud, Green, and Hill (2006) examined students' performance in two management courses: Organization and Management and Strategic Management. Their results for both courses showed no significant difference in final grade between the online and face-to-face course modes.

2.2.3. Accounting

Earlier accounting research found significantly positive student performance or satisfaction and effectiveness for hybrid courses (Dowling, Godfrey, & Gyles, 2003; Jones & Chen, 2008) while more recent accounting research shows support for no significant difference in student performance (Keller, Hassell, Webber, & Johnson, 2009). Keller et al. (2009) examined student performance in a Principles of Managerial Accounting. Using final grade as the measure of performance, they found no difference in performance between the face-to-face and hybrid mode.

Recent online studies have shown either no significant difference or face-to-face delivery mode outperformed the online delivery mode (Chen, Jones, & Moreland, 2013; Chiu, Gershberg, Sannella, & Vasarhelyi, 2014; Rich & Dereshiwsky, 2011; Schwartz, 2012). Chiu et al. (2014) examined student performance in Introduction to Financial Accounting and Introduction to Managerial Accounting courses. The students were unaware if they registered for face-to-face or online modes. Using final grades as the measure of performance, they found no significant difference between the two delivery modes.

Schwartz (2012) examined student performance in four upper-division accounting courses. The courses included Financial Accounting (Intermediate), Federal Taxation, Cost/Managerial, and Auditing. Course delivery mode was significant using standardized test scores. Student performance in the face-to-face mode exceeded student performance in the online mode. However, a review of the course level results revealed that the Federal Taxation course test scores were the primary driver. The Federal Taxation course results overall were significantly lower than the other three accounting courses examined. The test scores for the online mode classes were significantly lower than the test scores in the face-to-face mode. In the other three courses, online mode tests scores were mixed

though not significant. In Financial Accounting (Intermediate), online mode test scores were slightly higher than the face-to-face mode test scores. In the Cost/Managerial course, the online mode test scores were slightly lower than the test scores for the face-to-face mode. Lastly, the Auditing course online mode test scores were slightly lower than the test scores of the face-to-face mode.

Rich and Dereshiwsky (2011) examined student performance in an undergraduate accounting course that required six credits of introductory accounting courses, one three-credit introduction to financial accounting course and one three-credit introduction to managerial accounting course. Student performance was measured by nine homework assignments. There were no significant differences, except an evening face-to-face mode outperformed both the online mode and the daytime face-to-face mode on one assignment.

2.3. Student characteristics

Several studies examined student characteristics that may influence student success in hybrid and online delivery modes including GPA, ACT and SAT scores, age, gender, and ethnicity. ACT and SAT scores are viewed as an indication of student ability while GPA tends to measure how much effort students put into their studies. Several studies found that students in an online mode course tend to have higher ACT and/or SAT scores (Bennett et al., 2007; Brown & Liedholm, 2002; Keller et al., 2009; McCarty et al., 2013) while other studies found students enrolled in an online mode course possessed a higher GPA (McCarty et al., 2013; Navarro & Shoemaker, 2000). Several studies investigated if GPA influenced performance and found that a student's GPA had a significant influence on the grade received in the course (Bennett et al., 2007; Brown & Liedholm, 2002; Gratton-Lavoie & Stanley, 2009; Koch & McAdory, 2012; Wilson & Allen, 2011). Ary and Brune (2011) found that students in the online mode classes had higher mean GPAs, although not significantly associated with course grade.

Figlio, Rush, and Yin (2010) and McCarty et al. (2013) hypothesize that students' motivation and effort levels may be affected by delivery mode. They tested this by stratifying the students' GPAs by "high achievers" and "low achievers." Figlio et al. (2010) divided their sample into two based on the median. High achievers had prior GPAs greater than or equal to the median. Figlio et al. (2010) found low achievers performed significantly higher in the face-to-face mode compared to the online mode.

McCarty et al. (2013) divided the sample into three approximately equal groups. Low achievers with GPAs less than 2.45, medium achievers with GPAs from 2.45 to 3.01, and high achievers with GPAs greater than 3.01. Both groups performed nominally better in the face-to-face mode. The high achievers' averages compared to the low achievers' averages were significantly higher for the sample and both delivery modes.

The research on performance by gender is mixed. Previous economics studies contrasting women's performance with men's performance in online modes are mixed. Early online studies found no statistical difference in gender in principles-level economics courses (Brown & Liedholm, 2002; Navarro & Shoemaker, 2000). While a subsequent study found women outperformed men in both principles courses, however the difference was not significant (Bennett et al., 2007). The authors speculated this may be due to the instructor and student being the same gender. Further, more recent studies show men outperform women in online economic courses (Koch & McAdory, 2012; McCarty et al., 2013). In prior management studies, women outperformed men (Daymont & Blau, 2008; Friday et al., 2006). Finally, a finance study found that women were more likely to take the course online and there were no significant differences in performance (Ary & Brune, 2011). No accounting studies were found that investigated gender performance differences in an online-delivery mode.

A few studies examined ethnicity as a possible attribute influencing student performance in the online-delivery mode. Navarro and Shoemaker (2000) found no significant difference in ethnicity. While McCarty et al. (2013) found differences between minority and non-minority students; non-minorities had higher averages in both the face-to-face and online modes. Koch and McAdory (2012) found African Americans were at a disadvantage in both online and face-to-face modes while Asian Americans and Hispanic Americans performed better. McCarty et al. (2013) and Bennett et al. (2007) found that the students in the online-delivery mode were older. Both studies were conducted at the same university.

3. Hypothesis development

The research question for this study is: Does course-delivery mode matter for learning in the more complex classes in an accounting program? Prior research findings are mixed and inconclusive on the learning effectiveness of online and hybrid-delivery modes compared to the traditional face-to-face-delivery mode.

This study examines two senior-level accounting courses, where both declarative and procedural knowledge is taught, in three different course-delivery modes by the same instructor for each course. The objective of the instructors teaching the Intermediate Accounting III and Auditing courses was to ensure all students, regardless of delivery mode, received the same quality of instruction and no students were at a disadvantage. Therefore, the courses used the same assignments, exams, and instructional methods. The recorded screencasts were the same material covered by the instructors in the classroom. Recorded screencasts were available to all students in the three delivery modes.

The pro-technology theory argues that because of the collection of instructional methods, the online mode is superior for learning compared to the face-to-face mode and the media richness theory argues the hybrid mode is superior as it provides benefits from both personal interaction and self-study (Sitzmann et al., 2006). Clark (1994) position argues that course-delivery mode is inconsequential and what matters is the instructional methods used and individual differences. We base our hypotheses on Clark (1994) position as well as on the recent studies that have found no significant differences in student performance among the three delivery modes (Du, 2011; Keller et al., 2009; McCarty et al., 2013; Rich & Dereshiwsky, 2011; Wilson & Allen, 2011).

Therefore, we propose the following hypothesis:

H_1: Course-delivery mode does not affect student performance.

Prior research identified certain characteristics possessed by students that can predict positive outcomes in the classroom – self-efficacy, motivation to learn, and goal orientation (Bandura, 1997; Colquitt, LePine, & Noe, 2000; Dweck & Leggett, 1988). We posit that students with a high degree of these characteristics will have higher GPAs. Prior studies have shown that GPA is a significant predictor of future academic performance (Doran, Bouillon, & Smith, 1991; Farley & Ramsey, 1988). Online courses may require more self-discipline, motivation and organization than courses with face-to-face meetings with an instructor. Students with high GPAs are more likely to possess the self-discipline, motivation, and organization, and consequently, high GPA students should be as successful in online courses as in face-to-face courses, while lower GPA students may be less successful in online courses than in face-to-face courses. Following this reasoning, Figlio et al. (2010) and McCarty et al. (2013) hypothesized that students' motivation and effort levels may be affected by face-to-face course-delivery mode versus online course-delivery mode and that low GPA students would be less successful in online courses. We extend their hypotheses to include the effects of hybrid delivery mode as well as the face-to-face-delivery mode and online delivery mode.

We propose the following hypotheses:

H_2: Higher-achievers' performance is not affected by course-delivery mode.
H_3: Lower-achievers' performance is not affected by course-delivery mode.

4. Methodology

4.1. Course design and sample data

The sample size included nine Intermediate Accounting III classes (two face-to-face modes, two hybrid modes, and five online modes) and ten Auditing classes (three face-to-face modes, three hybrid modes, and four online modes) and the same instructor taught all the Intermediate Accounting III classes and the same instructor taught all the Auditing classes. Both instructors wanted to ensure the students were not disadvantaged in any of the delivery modes and wanted to ensure the same graded assignments were used in the three different delivery modes. The overarching objective of the two instructors was to ensure all students regardless of delivery mode received the same quality of instruction, this follows the assertion instructional methods not delivery cause learning (Clark & Mayer, 2016).

4.1.1. Intermediate accounting III

Table 1 summarizes course delivery material and assessment for the Intermediate Accounting III course. Typically, students take this course in their senior year and frequently the students are also taking an internship course or working full-time. Intermediate Accounting III topics and course competencies include applying, analyzing, and evaluating U.S. generally accepted accounting principles to the measurement and reporting of investments, leases, pensions, shares-based compensation, income taxes, and accounting changes and error corrections. Additionally, applying U.S. generally accepted accounting principles in the preparation of the Statement of Cash Flows as well as analyzing and evaluating the impact of complex accounting transactions on the Statement of Cash Flows. Assessment and evaluation of the competencies are comprised of:

Table 1
Intermediate accounting III course delivery and assessment.

Intermediate Accounting III	Face-to-Face	Hybrid	Online
Lectures	Class meets twice a week for 75 min each class. The instructor presents lectures; uses PowerPoint slides and works through exercises on the whiteboard. (Pre-recorded Learning Modules were available to students in Blackboard).	Meet once per week for 75 min. Instructor reviews key or complex topics (a subset of the PowerPoint slides) and a few exercises reviewed on the whiteboard. Students assigned a portion of the Learning Modules to review before class. (All Learning Modules were available to students).	No live lecture. Students watch and listen to Learning modules. Learning Modules contain the same PowerPoint slides and exercises presented in the Face-to-Face mode. Rather than the classroom whiteboard, exercises were recorded in Excel.
Exams (60% of course grade)	"Paper and pencil" for first semester. Four exams @ 150 points each. Students take exams online. Students have 75 min to complete between 30 and 35 multiple-choice questions. Questions are primarily computational.	Same as Face-to-Face mode.	Same as Face-to-Face mode.
Other (40% of course grade)	Each chapter includes an online multiple-choice quiz and discussion board posting. One writing assignment, One Excel assignment.	Same as the Face-to-Face mode.	Same as the Face-to-Face mode.

- four multiple choice exams (150 points each). The online exams were open book, open notes, 75 min, and contained 30–35 multiple-choice questions, primarily computational. The exams were delivered in the publisher's online homework tool and permitted the instructor to add original exam questions plus make changes to the publisher's test bank questions. A significant portion of the questions was algorithmic, computational, and presented to each student in a random order.),
- seven-chapter quizzes (15 points each, primarily theory-based sourced from the publisher as well as created by the instructor),
- seven discussion board postings (10 points each created by the instructor),
- homework (approximately 10 exercises from each of the seven chapters sourced from the publisher, 20 points per chapter),
- one Statement of Cash Flows assignment in Excel (created by the instructor, 55 points),
- one writing assignment on a FASB project (created by the instructor, 20 points), and
- completion of the student contract (10 points).

No exams nor the final course average were curved. Rather, there are typically extra credit assignments that can boost a student's final average up to three percentage points. Total points earned in the course is 1000.

The hybrid and online modes of Intermediate Accounting III course were constructed with the intent of matching the face-to-face mode as much as possible. Lectures were recorded using Camtasia software. Prior to developing the course, the instructor took a Quality Matters "Developing Your Online Course" course and met with the university's Instructional Design department to get an introduction to Camtasia (recording software). The instructor was responsible for the format and loading content into Blackboard. The same slides and exercises reviewed in class were recorded and converted to MP4 files (screencasts) using the Camtasia

software. The screencasts, or learning modules, were posted to Blackboard (learning management system). The learning modules were available to students in the face-to-face mode as well as to the students in the hybrid mode and online mode. Students in the hybrid mode met once per week for 75 min. Key points and complex exercises were reviewed and were told to watch certain learning modules. Students in the face-to-face mode met twice a week for a total of 150 min. A more thorough review of the material and additional exercises was presented. All the material in the learning modules was covered in the live classroom setting. However, for most of the material covered in the face-to-face mode, students could also review the learning modules if they missed something presented in the class or missed a class. "Paper and pencil" exams were used for all three delivery modes during the first semester the online and hybrid modes were offered. Subsequently, exams were offered in an open-book, multiple-choice format online. Multiple-choice questions were primarily computational, algorithmic, and randomized. Attendance was required in the face-to-face mode and hybrid mode. Grade reductions started after two missed classes. No students in the sample had grades reduced for missing classes.

The Intermediate Accounting III instructor holds a doctorate, CPA, and a Charter Financial Analyst (CFA) designation as well as close to 20 years in the financial services industry and ten years teaching. Prior to the study, the instructor had taught both face-to-face and online courses. This was the first-time teaching in a hybrid delivery mode that was 50% in the classroom and 50% online. The instructor held on-site office hours weekly for at least five hours plus students could e-mail or phone the instructor. Additionally, inside the Blackboard classroom the students could post questions in a discussion board forum.

4.1.2. Audit

Table 2 summarizes course delivery material and assessment for the Auditing course. Typically, students take this course in their senior year and frequently the students are taking an internship course or working full-time. Similar to the Intermediate Accounting III course, the Auditing instructor made a deliberate effort to keep the material and assignments consistent. The instructor also took a Quality Matters "Design Your Online Course" course prior to developing the online and hybrid courses. Students in the face-to-face mode met twice a week for a total of 150 min. The time was split between lecture and group work. Students in the hybrid mode met once per week for 75 min. Students were required to listen to the instructor's pre-recorded audio-visual lectures located in Blackboard prior to meeting and complete online homework before class time. The pre-recorded audio-visual lectures were created using Prezi and Adobe software. Instructional Design was used for specific questions about Blackboard and the instructor was responsible for

Table 2
Auditing course delivery and assessment.

Audit	Face-to-Face	Hybrid	Online
Lectures	Class meets twice a week for 75 min each class. The instructor presents lectures using PowerPoint slides, small group exercises, and large group discussions. Pre-recorded audio/visual lectures were provided but optional.	Meet once per week for 75 min. Instructor required students to watch pre-recorded audio/visual lectures before class. In class time instructor utilized for small and large groups discussions and review of exercises.	Pre-recorded audio/visual lectures in Blackboard. Group discussions through discussion boards and individual simulations replicated in class as small group work.
Exams (66% of course grade)	Three "paper and pencil" exams at 100 points each. Students have 75 min to complete the exam.	Three "paper and pencil" exams at 100 points each. Students have 75 min to complete the exam.	Three online exams at 100 points each. Students have 75 min to complete the exam.
Homework (34% of course grade)	Online homework completed after in-class lectures (50 points total).	Online homework completed before in-class exercises (50 points total)	Online homework 50 points total) completed after videos and supplemented with graded discussion board postings (25 points) and simulations (ungraded) for higher-order cognitive questions.

creating the format and loading the material into Blackboard. During the 75-minute in-class sessions, students worked in small groups and discussed answers to the problems with the instructor.

The content covered between the face-to-face mode, hybrid mode, and online mode was consistent. Assessment and evaluation of the competencies comprised of three multiple- choice/simulation exams (Exams use a mix of questions from the text, prior CPA exam questions that have been released, and questions from review materials. Exams were 100 points each). "Paper and pencil" exams were given in the face-to-face mode and hybrid mode. The exams were delivered in Blackboard with no re-entry into the exam, timed completion, and the exam was only available for 48 h for the online class. Exams consisted of multiple choice and simulation-type questions and were modified each semester. Exam questions and answers were randomized in the online-delivery mode only. Questions were from publisher's materials and various CPA review materials where company names and response orders were changed to prevent students easily looking up the questions. The order of exam questions was randomized and answer order differed for each student based on Blackboard options. Exam grades were not curved. Extra credit opportunities were given consistently across the sample period and delivery modes. In addition to exams, other assessments consisted of 14 homework or unit quizzes (Assignments and questions came from the textbook, 50 points in total) for all delivery modes. The face-to-face mode and hybrid mode had two projects (created by the instructor, 75 points total) and five writing assignments (created by the instructor, 25 points total). The online mode had one project (50 points), six writing assignments (30 points total) and discussion board assignments (questions taken from the textbook, 25 points total). The project in the online mode covered the same internal controls content, but the write-up was in a discussion board format for fewer points than the presentation for the face-to-face mode and hybrid mode. Attendance was required in the face-to-face mode and hybrid mode. Grade reductions started after two missed classes. No students in the sample had grades reduced for missing classes. Information was contained in Blackboard and available to all three delivery modes.

The Auditing instructor holds a doctorate and CPA, as well as 12 years auditing experience and eight years teaching. Prior to the study the instructor had taught courses in all three delivery modes. The instructor held on-site office hours weekly for at least five hours plus students could e-mail or phone the instructor. Additionally, inside the Blackboard classroom, the students could post questions in a discussion board forum. Both instructors were very conscientious to be visible on the campus as well as in the cyber-classroom.

For both courses, students self-enrolled into their preferred delivery mode or into the delivery mode that best fit their schedule. Students who withdrew from a course are not included in the data set for that course. A total of 231 students were enrolled in and completed the nine Intermediate Accounting III classes. On average, the drop rate is 7%. Four students missed more than one test, two non-matriculated students did not have a grade point average, and five students had missing values for one of our control variables, yielding a final sample of 220 Intermediate Accounting students.[1] A total of 240 students were enrolled in and completed the ten Auditing classes. On average, the drop rate is 6%. Three students missed more than one test, four non-matriculated students did not have a grade point average, two students had missing values for one of our control variables, and two students re-took the class and the re-take was dropped from the sample, yielding a final sample of 229 Auditing students.

Demographic characteristics by course-delivery mode for the Intermediate Accounting III students are presented in Table 3. Pearson Chi-Square tests showed that distribution of full-time and part-time students varied significantly across delivery modes. Not surprisingly, part-time students were more likely to enroll in the online mode and hybrid mode than in the face-to-face mode. Student distribution was not significantly different across delivery mode for gender, ethnicity (non-minority vs. minority), or having an internship. One-way ANOVAs showed no significant differences across delivery modes for the number of transfer credits, the number of earned credits, age, or grade point average.

Demographic characteristics by course mode for the Auditing students are presented in Table 4. Pearson Chi-Square tests showed that distribution of full-time and part-time students vary significantly across delivery modes. Part-time students were more likely to enroll in the online mode and hybrid mode than in the face-to-face mode. Student distribution also varies significantly across delivery modes by gender in Auditing. Female students are 45% of the Auditing sample, but they comprised 56% of the online mode enrollment and only 33% of the face-to-face mode enrollment. The Auditing results are consistent with other studies (McCarty et al., 2013; Wilson & Allen, 2011) that found more female students prefer the online-delivery mode compared to males. Student distribution was not significantly different across delivery mode for ethnicity (non-minority vs. minority) or having an internship. One-way ANOVAs showed significant differences across delivery modes for the number of transfer credits and number of earned credits, but not for age, or grade point average.

Auditing students in the face-to-face mode had fewer transfer credits (35.44), and fewer earned credits (111.37) on average than did hybrid students (52.78, 121.70) and online students (50.94, 116.01). We include full-time versus part-time status, gender, age, and minority status as control variables in our model. We used grade point average as our measure of prior academic achievement.

4.2. Hypothesis testing

Hypothesis 1 explores whether course-delivery mode influences student performance. We test the hypotheses separately for Intermediate Accounting III and Auditing using exam average as our measure of student performance, yielding two multiple-regression models to test Hypothesis 1. We include eight control variables in our models.[2]

[1] Prior to the study, approval was obtained by the university's Institutional Review Board.

[2] We also considered using SAT scores as a control variable based on the results reported by McCarty et al. (2013). Unfortunately, too few of the students in our population had recorded SAT scores, so we dropped SAT scores from our set of control variables. There were no significant differences in mean SAT scores across delivery mode for either Intermediate Accounting III or Auditing.

Table 3
Student demographic information - Intermediate accounting III.

Intermediate Accounting III																	
Course delivery mode	Face-to-Face				Hybrid				Online				Overall				Grand Total
Full time vs. Part time	FT		PT		FT		PT		FT		PT		FT		PT		
Gender	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Number of Students	29	22	4	4	19	13	8	11	44	31	12	23	92	66	24	38	220
Pct of Total Students	13%	10%	2%	2%	9%	6%	4%	5%	20%	14%	5%	10%	42%	30%	11%	17%	100%
Students w/internships	4	6	0	0	8	6	5	2	7	6	2	3	19	18	7	5	49
Pct w/ Internships	14%	27%	0%	0%	42%	46%	63%	18%	16%	19%	17%	13%	21%	27%	29%	13%	22%
Minority Students	6	6	1	3	3	3	1	3	19	8	2	6	28	17	4	12	61
Pct Minority Students	21%	27%	25%	75%	16%	23%	13%	27%	43%	26%	17%	26%	30%	26%	17%	32%	28%
Mean Transfer Credits	38.69	52.55	73.00	92.50	33.21	46.40	47.38	65.68	44.45	52.55	42.08	55.77	40.32	51.34	49.00	62.51	48.40
Median Transfer Credits	58.00	58.50	71.00	102.00	21.00	15.00	55.00	66.00	43.00	46.00	29.00	58.00	43.00	53.50	47.00	60.50	51.50
Standard deviation	36.80	34.69	19.36	21.19	30.46	47.30	41.26	25.07	35.19	38.58	43.28	45.00	34.71	38.66	39.86	39.23	37.89
Mean Earned Credits	112.93	110.32	113.00	144.75	108.00	124.21	114.13	118.68	115.00	116.26	126.08	117.03	112.90	115.84	119.92	120.43	115.85
Median Earned Credits	111.00	110.00	111.00	148.00	108.00	114.00	121.50	116.00	109.50	115.00	124.00	118.00	110.00	113.00	119.50	117.00	112.00
Standard deviation	18.10	29.28	7.12	31.66	13.60	29.09	47.88	18.19	21.53	21.21	24.43	35.96	19.07	25.79	32.09	31.81	25.23
Mean Age	24.28	23.73	26.00	27.50	24.16	23.38	28.00	35.09	23.89	25.55	25.67	28.43	24.07	24.52	26.50	30.26	25.54
Median Age	22.00	22.00	26.00	26.50	22.00	22.00	29.00	36.00	22.50	24.00	24.50	26.00	22.00	22.00	25.50	28.00	23.00
Standard deviation	4.78	4.82	1.83	4.36	6.52	3.36	5.01	10.68	3.96	5.42	4.12	7.30	4.78	4.91	4.17	8.60	6.02
Mean GPA	3.11	3.33	3.11	2.89	3.14	3.33	3.26	3.25	3.03	3.24	3.23	3.09	3.08	3.29	3.22	3.12	3.16
Median GPA	3.03	3.30	3.00	2.87	3.09	3.28	3.30	3.40	2.90	3.27	3.14	3.02	3.00	3.28	3.27	3.04	3.13
Standard deviation	0.38	0.42	0.52	0.23	0.42	0.30	0.57	0.50	0.43	0.37	0.39	0.43	0.41	0.37	0.46	0.44	0.42
Mean Exam Average	72.59	78.77	72.00	68.00	81.16	78.08	82.50	77.27	79.95	80.68	78.42	80.35	77.88	79.53	78.71	78.16	78.51
Median Exam Average	74.00	81.00	75.50	69.00	82.00	81.00	83.00	83.00	82.50	81.00	80.50	80.00	79.00	81.00	80.00	79.50	80.00
Standard deviation	11.09	11.36	11.34	6.00	6.72	5.91	8.73	12.85	11.24	9.06	15.13	10.56	10.94	9.35	12.74	11.32	10.72

Pearson Chi-Square tests showed significant differences in distribution across mode for Full time vs. Part time (9.026, p .011) but not for Gender (0.390, p .823) Internships (0.263, p .877) or Ethnicity (Minority Students, 0.828, p .661). One-way ANOVAs showed no significant difference across modes for Transfer Credits (F 0.168, p .845) Earned Credits (F 0.257, p .773) Age (F 2.426, p .091) or GPA (F 1.266, p .284).

Table 4
Student demographic information – Auditing.

Auditing																	
Course delivery mode	Face-to-Face				Hybrid				Online				Overall				Grand Total
Full time vs. Part time	FT		PT		FT		PT		FT		PT		FT		PT		
Gender	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Number of Students	39	17	4	4	31	27	19	11	26	24	8	19	96	68	31	34	229
Pct of total students	17%	7%	2%	2%	14%	12%	8%	5%	11%	10%	3%	8%	42%	30%	14%	15%	100%
Students w/internships	9	2	0	2	8	6	5	2	3	5	1	1	20	13	6	5	44
Pct w/ Internships	23%	12%	0%	50%	26%	22%	26%	18%	12%	21%	13%	5%	21%	19%	19%	15%	19%
Minority Students	7	5	0	0	6	18	2	4	12	7	3	4	25	30	5	8	68
Pct Minority Students	18%	29%	0%	0%	19%	67%	11%	36%	46%	29%	38%	21%	26%	44%	16%	24%	30%
Mean Transfer Credits	29.87	46.24	47.00	33.00	45.98	50.42	61.05	63.41	46.35	60.45	33.25	52.67	39.54	52.92	52.06	53.83	47.33
Median Transfer Credits	12.00	55.00	54.50	36.00	51.00	60.00	63.00	66.00	47.00	65.50	29.50	54.00	43.00	60.50	57.00	58.25	52.00
Standard deviation	30.46	38.94	24.15	25.81	37.40	38.57	39.17	35.73	38.05	40.55	34.64	38.29	35.47	39.22	37.52	36.48	37.40
Mean Earned Credits	105.77	119.62	133.50	108.75	116.56	118.34	131.42	127.59	118.81	124.25	96.50	109.99	112.79	120.75	122.68	115.54	116.90
Median Earned Credits	109.00	112.00	126.00	114.00	112.00	116.00	135.00	126.00	112.00	115.50	108.00	120.00	111.00	116.00	119.00	116.00	114.00
Standard deviation	20.03	22.49	25.30	11.90	21.87	20.92	22.63	28.45	21.76	25.72	39.64	40.16	21.70	22.91	31.38	34.78	25.91
Mean Age	23.38	27.35	28.00	24.75	23.23	24.41	27.00	36.36	24.77	26.00	25.25	31.37	23.71	25.71	26.68	32.21	25.97
Median Age	22.00	22.00	24.00	24.00	22.00	23.00	26.00	36.00	24.00	24.00	23.00	30.00	22.00	23.00	24.00	30.50	23.00
Standard deviation	4.03	10.67	8.68	2.22	2.59	4.59	4.68	9.80	4.04	5.70	5.31	10.25	3.65	6.92	5.30	9.99	6.77
Mean GPA	3.11	3.21	3.12	3.01	3.34	3.20	3.34	3.14	3.07	3.22	3.11	3.23	3.17	3.21	3.25	3.18	3.20
Median GPA	3.05	3.28	3.14	3.03	3.35	3.17	3.30	3.17	2.97	3.25	2.96	3.28	3.10	3.22	3.28	3.26	3.19
Standard deviation	0.36	0.52	0.27	0.51	0.43	0.49	0.45	0.52	0.45	0.36	0.45	0.39	0.42	0.45	0.44	0.44	0.43
Mean Exam Average	79.44	79.65	86.50	82.00	81.81	79.26	86.11	76.00	83.42	82.38	84.88	81.11	81.28	80.46	85.84	79.56	81.40
Median Exam Average	81.00	81.00	86.00	82.00	82.00	79.00	88.00	76.00	83.00	82.00	84.50	85.00	82.00	81.00	87.00	82.00	82.00
Standard deviation	9.40	8.64	7.00	1.63	9.49	8.37	9.48	12.47	5.58	6.43	4.26	7.59	8.65	7.83	7.96	9.22	8.56

Pearson Chi-Square tests showed significant differences in distribution across mode for Full time vs. Part time (11.044, p .004) and Gender (7.612, p .022) but not for Internships (3.199, p .202) or Ethnicity (Minority Students, 5.098, p .078). One-way ANOVAs showed significant differences across modes for Transfer Credits (F 4.648, p. 011) and Earned Credits (F 3.066, p .049) but not for Age (F 1.572, p .210) or GPA (F 2.313, p .101).

1. Gender
2. Transfer student
3. Earned credits
4. Age
5. Minority
6. Prior student achievement (measured by GPA)

These control variables were taken from prior research (Du, 2011; Figlio et al., 2010; Keller et al., 2009; McCarty et al., 2013; Wilson & Allen, 2011) and had an influencing effect on performance in one or more studies. We also explore two other control variables.

7. Student's part-time or full-time status
8. Student taking an internship course

From an external validity perspective, ideally, students would have been randomly assigned to either a face-to-face, hybrid, or an online-delivery mode class however, this was not possible given the school environment.

The model for Intermediate Accounting III is:

$$\text{H1a: Exam Average} = \alpha + \beta_1\text{FTPT} + \beta_2\text{Internship} + \beta_3\text{Xcred} + \beta_4\text{Ecred} + \beta_5\text{GPA} + \beta_6\text{Gender} + \beta_7\text{Age} + \beta_8\text{Ethnicity} + \beta_9\text{Online} + \beta_{10}\text{Hybrid}$$

The model for Auditing is:

$$\text{H1b: Exam Average} = \alpha + \beta_1\text{FTPT} + \beta_2\text{Internship} + \beta_3\text{Xcred} + \beta_4\text{Ecred} + \beta_5\text{GPA} + \beta_6\text{Gender} + \beta_7\text{Age} + \beta_8\text{Ethnicity} + \beta_9\text{Online} + \beta_{10}\text{Hybrid}$$

Where:

Exam average = the average score on midterm exams and the final exam in Intermediate Accounting III (for H1a) or Auditing (for H1b).
FTPT = full-time or part-time status (0 if full-time, 1 if part-time).
Internship = whether the student was doing an internship during the semester (0 if no, 1 if yes).
Xcred = number of transfer credits
Ecred = total earned credits
GPA = grade point average at the beginning of the semester (measuring prior student achievement)
Gender = male or female (0 if male, 1 if female).
Age = age of student
Ethnicity = whether the student declares as a member of a minority ethnic group (0 if non-minority, 1 if minority). Students who did not answer the ethnicity question were classified as non-minority. Excluding these students from the tests did not materially alter the H1 results.
Online = Online mode or not (1 if online, 0 otherwise).
Hybrid = Hybrid mode or not (1 if hybrid, 0 otherwise).

Insignificant β_9 (online), and β_{10} (hybrid), coefficients would support Hypothesis 1 and Clark (1994) argument that course-delivery mode does not significantly affect student performance.

Hypotheses 2 and 3 explore whether the effect of course-delivery mode on student performance differs for high-achieving and low-achieving students. We test hypotheses 2 and 3 by adding two interaction terms to our Hypothesis 1 models:

$$\text{H2\&3a: Exam Average} = \alpha + \beta_1\text{FTPT} + \beta_2\text{Internship} + \beta_3\text{Xcred} + \beta_4\text{Ecred} + \beta_5\text{GPA} + \beta_6\text{Gender} + \beta_7\text{Age} + \beta_8\text{Ethnicity} + \beta_9\text{Online} + \beta_{10}\text{Hybrid} + \beta_{11}\text{Online} * \text{GPA} + \beta_{12}\text{Hybrid} * \text{GPA}$$

$$\text{H2\&3b: Exam Average} = \alpha + \beta_1\text{FTPT} + \beta_2\text{Internship} + \beta_3\text{Xcred} + \beta_4\text{Ecred} + \beta_5\text{GPA} + \beta_6\text{Gender} + \beta_7\text{Age} + \beta_8\text{Ethnicity} + \beta_9\text{Online} + \beta_{10}\text{Hybrid} + \beta_{11}\text{Online} * \text{GPA} + \beta_{12}\text{Hybrid} * \text{GPA}$$

Significant β_{11} (Online * GPA), and β_{12} (Hybrid * GPA) coefficients would lead to a rejection of Hypothesis 2 or Hypothesis 3, or both. We examine the predicted values to determine the nature of any significant interactions and their implications for Hypotheses 2 and 3. Significant results for each hypothesis are discussed next. Lastly, section six a discussion of key findings, limitations, and conclusions.

Table 5
Regression results.

Intermediate accounting III					Auditing				
H1a dependent variable: Exam average					H1b dependent variable: Exam average				
Model	Sum of Squares	df	F	Sig.	Model	Sum of Squares	df	F	Sig.
Regression	8836.55	10	11.319	.000***	Regression	5471.34	10	10.622	.000***
Residual	16,316.41	209			Residual	11,229.50	218		
Total	25,152.96	219			Total	16,700.84	228		
Adjusted R squared 0.320					Adjusted R squared 0.297				
Unstandardized coefficients		Beta	t	Sig.	Unstandardized coefficients		Beta	t	Sig.
Constant		38.214	6.132	.000***	Constant		51.468	10.924	.000***
Part time?		(0.996)	(0.682)	.496	Part time?		2.469	2.119	.035*
Internship?		0.052	0.032	.975	Internship?		1.496	1.185	.237
Transfer credits		0.030	1.476	.142	Transfer credits		0.011	0.666	.506
Earned credits		(0.058)	(2.072)	.040*	Earned credits		0.024	1.126	.261
GPA (grade point average)		13.402	8.846	.000***	GPA (grade point average)		9.805	8.318	.000***
Gender (female?)		(0.986)	(0.790)	.430	Gender (female?)		(2.562)	(2.538)	.012*
Age		(0.044)	(0.375)	.708	Age		(0.207)	(2.506)	.013*
Ethnicity (minority?)		1.108	0.807	.420	Ethnicity (minority?)		0.831	0.743	.458
Online mode?		7.254	4.930	.000***	Online mode?		2.512	1.956	.052
Hybrid mode?		4.894	2.873	.004**	Hybrid mode?		(0.859)	(0.688)	.492

*** Significant at $p < .001$.
** Significant at $p < .01$.
* Significant at $p < .05$.

5. Results

5.1. Hypothesis 1

5.1.1. Intermediate accounting III

The results do not support H_1. The results suggest both the online and hybrid modes had a significant positive impact on student performance. In the Intermediate Accounting III course (H1a), the coefficients for the online mode and the hybrid mode are positive and highly significant. Online mode students outperformed hybrid mode and face-to-face mode students. GPA (measuring prior student achievement) had the strongest association with student performance. The number of earned credits had a small but significant negative effect on exam average for Intermediate Accounting III students. None of the other control variables had a significant association with student performance. The multiple-regression results for Hypothesis 1 are presented in Table 5.

5.1.2. Auditing

The results do not support H1b for the Auditing course. The coefficient for the online mode is positive and fell just short the $p < .05$ threshold for significance. The results are consistent with Intermediate Accounting III in that the online mode students outperformed hybrid and face-to-face mode students. Consistent with the results we found for Intermediate Accounting III, GPA had the strongest association with student performance in the exam average.

Highlighting Table 5 the coefficient for full-time vs. part time status was positive and significant. The mean exam average for part-time students was higher than for full-time students in the face-to-face and hybrid modes, while in the online mode full-time students had a slightly higher exam average than part-time students. Gender was a significant influence on exam average. Fifty-six percent of the Auditing students in the online mode were females, compared to 43% in the hybrid mode and 33% in the face-to-face mode. Males outperformed females in the online and hybrid modes. The online mode results are consistent with McCarty et al. (2013) findings that men had slightly higher averages in the online mode. Age had a negative effect on exam average (at $p = .013$). The mean age in the online-delivery mode was 26.8 compared to 26.1 in the hybrid and 24.8 in the face-to-face-delivery modes.

Overall, we have mixed results generally contradicting H_1. We found no significant difference for delivery mode in student performance in Auditing, but the coefficient for online mode fell just short of being significant. Our results showed a significant positive effect for both online and hybrid modes on student performance in Intermediate Accounting III. GPA had the strongest association with student performance in both Intermediate Accounting III and Auditing.

5.2. Hypotheses 2 and 3 results

5.2.1. Intermediate accounting III

Hypothesis 2, high-achievers' (GPA) performance is not impacted by delivery mode is supported. The results for Intermediate Accounting III and Auditing showed no significant differences in performance for high achievers across delivery modes. Hypothesis 3,

Table 6
Regression results with interactions between course mode and GPA.

Intermediate Accounting III					Auditing				
H1a dependent variable: Exam average					H1b dependent variable: Exam average				
Model	Sum of Squares	df	F	Sig.	Model	Sum of Squares	df	F	Sig.
Regression	9596.40	12	10.641	.000***	Regression	6,361.39	12	11.075	.000***
Residual	15,556.56	207			Residual	10,339.45	216		
Total	25,152.96	219			Total	16,700.84	228		
Adjusted R squared 0.346					Adjusted R squared 0.347				
Unstandardized coefficients		Beta	t	Sig.	Unstandardized coefficients		Beta	t	Sig.
Constant		13.087	1.294	.197	Constant		49.551	6.474	.000***
Part time?		(0.790)	(0.551)	.582	Part time?		2.183	1.940	.054
Internship?		0.202	0.125	.901	Internship?		0.913	0.745	.457
Transfer credits		0.024	1.160	.247	Transfer credits		0.009	0.601	.548
Earned credits		(0.054)	(1.966)	.051	Earned credits		0.016	0.783	.435
GPA (grade point average)		21.104	7.359	.000***	GPA (grade point average)		10.384	4.772	.000***
Gender (female?)		(1.202)	(0.980)	.328	Gender (female?)		(2.154)	(2.197)	.029*
Age		(0.019)	(0.163)	.871	Age		(0.162)	(1.772)	.046*
Ethnicity (minority?)		1.116	0.829	.408	Ethnicity (minority?)		0.592	0.548	.584
Online mode?		41.591	3.744	.000***	Online mode?		25.288	2.723	.007**
Hybrid mode?		33.592	2.697	.008**	Hybrid mode?		(13.589)	(1.566)	.119
Online * GPA		(10.871)	(3.117)	.002**	Online * GPA		(7.244)	(2.472)	.014*
Hybrid * GPA		(9.185)	(2.335)	.021*	Hybrid * GPA		3.904	1.444	.150

*** Significant at $p < .001$.
** Significant at $p < .01$.
* Significant at $p < .05$.

low achievers' (GPA) performance is not impacted by delivery mode, is not supported. In Intermediate Accounting III, low achievers had significantly higher average exam scores in both the online mode and hybrid mode than in the face-to-face mode. In Auditing, low achievers had significantly higher exam averages in the online mode than in either the hybrid or face-to-face modes. In all regressions performed for hypothesis testing discussed above, assumptions were met.

We added terms for the interactions between GPA and both the hybrid and online delivery modes to our regression models to examine whether the effect of delivery mode varied with the level of student achievement. The results are reported in Table 6. Adding the interaction terms significantly increased the explanatory power for both Intermediate Accounting III and Auditing. The model adjusted r-squared rose from 0.320 to 0.346 for Intermediate Accounting III and from 0.297 to 0.347 for Auditing (see Table 7).

For Intermediate Accounting III, the coefficients for the interactions between online and hybrid modes and GPA are both negative and significant. The coefficients for the online mode and the hybrid mode remain positive and highly significant. For Auditing, the interaction between online mode and GPA is also negative and significant. The coefficient for online mode remains positive and highly significant. The coefficient for full-time versus part-time status falls just outside the $p < .05$ threshold for significance (see Table 8).

A graph of the exam averages predicted by the multiple-regression model with interaction terms for Intermediate Accounting III is displayed in Fig. 1. The model predicts low-achieving students in the online and hybrid modes will significantly outperform low-achieving students in the face-to-face mode on exam average. The delivery mode effect diminishes as the student achievement (measured by GPA) level rises. The predicted exam averages for face-to-face and hybrid modes are equal at a 3.66 GPA, and face-to-face and online modes are equal at a 3.83 GPA. The steeper slope of the prediction line for the face-to-face mode may be why the constant in the Intermediate Accounting III model was not significant. The significant interaction terms for hybrid and online modes and GPA and the pattern of predicted values displayed in Fig. 1 supports Hypothesis 2 but contradicts Hypothesis 3. High-achieving students perform equally well regardless of course delivery mode, while low-achieving students appear to get a significant benefit from both hybrid and online modes.

5.2.2. Auditing

A graph of the exam averages predicted by the multiple-regression model with interaction terms for Auditing is displayed in Fig. 2. As shown in Fig. 2, the model predicts low-achieving students in the online delivery mode will significantly outperform low-achieving students in the face-to-face and hybrid modes on exam average. The online mode effect diminishes as the student achievement (measured by GPA) level rises. The predicted exam averages for all three delivery modes are equal at a 3.66 GPA, and face-to-face and online modes are equal at a 3.48 GPA. The significant interaction term for online modes and GPA and the pattern of predicted values displayed in Fig. 2 supports Hypothesis 2 but contradicts Hypothesis 3 for the online mode. As with Intermediate Accounting III, the high-achieving students perform equally well regardless of delivery mode. Low-achieving students appear to get a significant benefit from the online mode. There was no significant effect on the hybrid mode for Auditing students.

Table 7
Time-on-task: Intermediate accounting III.

Intermediate accounting III		Online	Hybrid	Face-to-face	Total	F	Sig.
Learning modules	N	72	31	26	129	1.439	.241
	Mean	6.13	3.13	4.31	5.04		
	St. Dev	9.24	5.34	9.80	8.63		
Reading text	N	72	31	26	129	3.479	.034*
	Mean	6.61	2.05	3.85	4.96		
	St. Dev	10.12	2.29	7.68	8.56		
PowerPoint slides	N	72	31	26	129	1.328	.269
	Mean	4.35	1.76	4.29	3.72		
	St. Dev	8.43	1.93	9.54	7.70		
Online homework	N	76	31	26	133	2.397	.095
	Mean	9.18	4.48	6.79	7.58		
	St. Dev	12.26	2.94	9.30	10.32		
Online quiz	N	73	31	26	130	2.077	.130
	Mean	6.51	2.31	4.54	5.11		
	St. Dev	11.60	2.01	9.30	10.32		
Notes	N	72	31	26	129	1.829	.165
	Mean	6.01	2.39	5.31	5.00		
	St. Dev	10.45	1.61	9.08	8.92		
Other	N	71	31	26	128	1.815	.167
	Mean	6.36	3.42	2.69	4.90		
	St. Dev	11.65	6.51	6.76	9.82		
Total	N	73	31	26	130	2.315	.103
	Mean	44.66	19.53	31.77	36.09		
	St. Dev	64.21	14.17	60.15	56.22		
Hours worked	N	73	21	36	130	1.561	.214
	Mean	27.90	22.48	26.81	26.39		
	St. Dev	14.27	12.12	16.92	14.43		

***Significant at $p < .001$.
**Significant at $p < .01$.
* Significant at $p < .05$.

Table 8
Time-on-task: Auditing.

Audit		Online	Hybrid	Face-to-face	Total	F	Sig.
Learning modules	N	76	39	37	152	2.077	.129
	Mean	3.72	4.64	1.12	3.32		
	St. Dev	8.13	10.60	1.32	7.95		
Reading text	N	76	39	37	152	2.900	.058
	Mean	6.66	8.13	2.84	6.11		
	St. Dev	10.64	12.75	2.33	10.11		
PowerPoint slides	N	76	39	37	152	1.879	.156
	Mean	4.48	6.41	2.21	4.42		
	St. Dev	9.13	13.51	1.86	9.51		
Online homework	N	76	39	37	152	2.766	.066
	Mean	5.91	7.81	2.13	5.48		
	St. Dev	10.71	14.87	2.71	10.89		
Notes	N	76	39	37	152	2.522	.084
	Mean	4.70	7.17	2.50	4.80		
	St. Dev	9.25	12.22	2.11	9.16		
Other	N	75	39	37	151	1.634	.199
	Mean	4.35	6.31	2.24	4.34		
	St. Dev	10.24	12.75	2.72	9.84		
Total	N	76	39	37	152	2.588	.079
	Mean	29.77	40.46	13.04	28.44		
	St. Dev	54.10	71.71	10.18	53.56		
Hours worked	N	76	39	35	150	7.227	.001*
	Mean	29.7	31.26	19.20	28.44		
	St. Dev	13.89	17.01	15.70	15.79		

***Significant at $p < .001$.
**Significant at $p < .01$.
* Significant at $p < .05$.

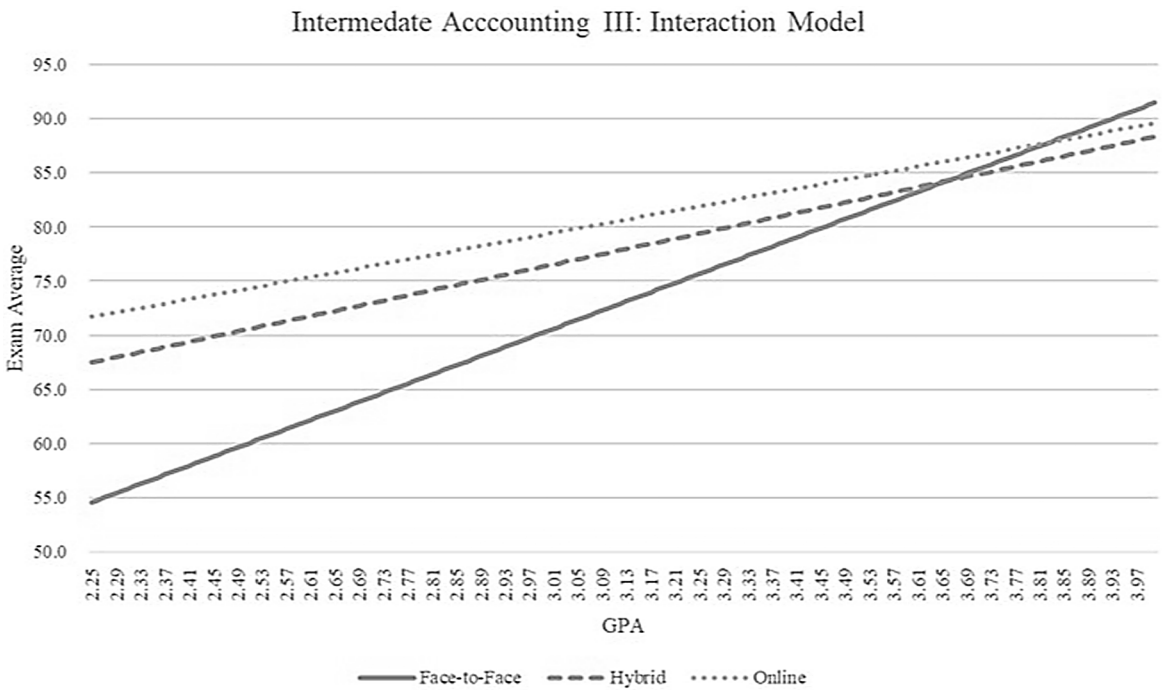

Fig. 1. Predicted exam averages by course mode: Intermediate accounting III.

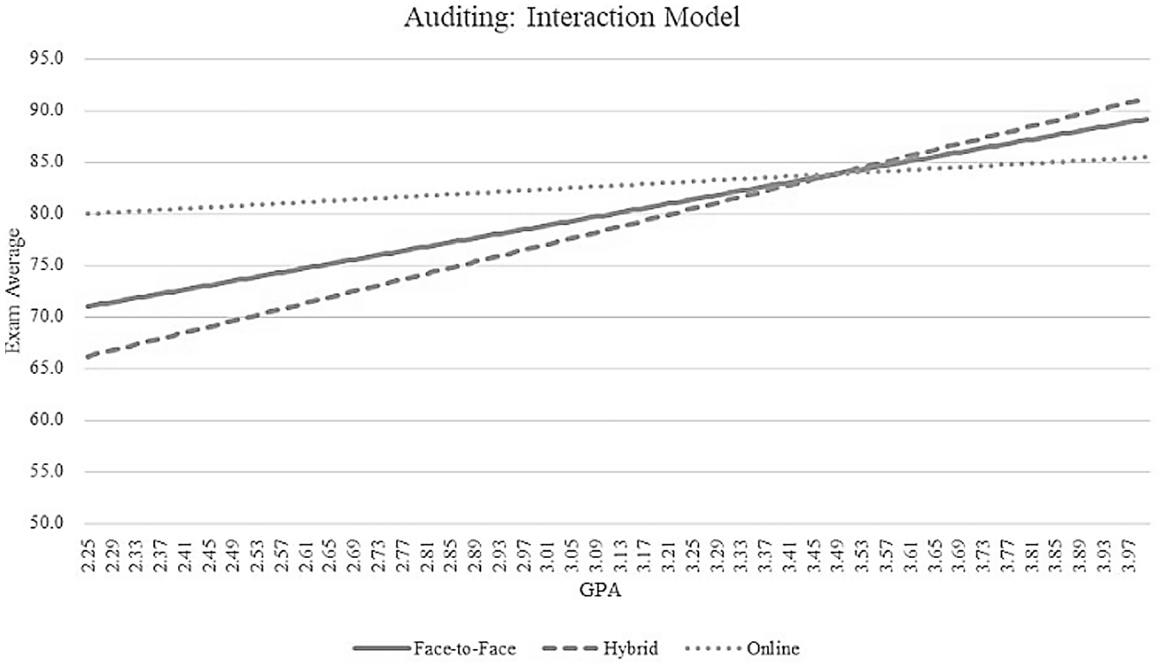

Fig. 2. Predicted exam averages by course mode: Auditing.

6. Discussion, limitations, and conclusion

6.1. Discussion

Key findings are that while no one delivery mode is superior, high-achieving students have learner characteristics to perform well irrespective of course delivery format. On the other hand, low-achieving students learning was higher in online and hybrid delivery

modes suggesting delivery medium can help lower-achieving students. Low-achieving students lack superior learning characteristics that contradict prior research so explaining results is a challenge. These results extend the narrative focusing on teaching method over delivery mode (Clark & Mayer, 2016). A course that uses effective instructional methods supports learning regardless of delivery mode. The narrative that follows will look at various implications of these findings.

Our results are surprising and at odds with results reported in prior research of Figlio et al. (2010) and McCarty et al. (2013). McCarty et al. (2013) found low achievers and high achievers performed nominally better in the face-to-face mode than in online mode. Figlio et al. (2010) found both low and high achievers performed better in the face-to-face mode, although only the performance difference for low-achiever males was statistically significant.

To segregate high- and low-performing students the first measure was to look at GPA (measuring prior student achievement) as it had the strongest association with student performance for both Intermediate Accounting III and Auditing. The GPA results are consistent with other recent research (Du, 2011; McCarty et al., 2013; Wilson & Allen, 2011) that found a significant positive effect for GPA regardless of delivery mode (face-to-face compared to online-delivery mode). We find a significant positive effect on online and hybrid modes in Intermediate Accounting III, and on the online mode in Auditing. High-achieving students performed equally well regardless of delivery mode. Exam averages for low-achieving students were significantly higher in the online mode than in face-to-face mode in both Intermediate Accounting III and Auditing. Exam averages for low-achieving students were also higher in the hybrid mode than in face-to-face mode in Intermediate Accounting III, but in Auditing, predicted exam averages are nominally lower for low-achieving students in the hybrid mode than in face-to-face mode after adjusting for the effect of control variables, suggesting alternative delivery modes allow for lower-performing students to increase grades.

We conjecture that due to the popularity of the online and hybrid courses the more self-disciplined, motivated, and organized students will register as soon as they are permitted and select into their preferred course, as course selection was at the option of the student. The online and hybrid courses get filled well before the face-to-face courses. Self-discipline, motivated, and organized are all qualities needed to succeed in the online environments. Additionally, we considered that low-achieving students in the online courses did not have access to the face-to-face instruction and depended heavily on screencasts. In fact, some feedback received was they could listen to the screencasts when they were ready to focus on the material and could replay multiple times for a full understanding. Hybrid and face-to-face students also had access to the screencasts, but we are speculating they did not take advantage of this opportunity, particularly the face-to-face low achievers. We believe the low-achiever students in the face-to-face courses did not take ownership of the learning process and were passive receivers of the instruction, based on verbal feedback. This is also supported with those online students who took advantage of office hours for both courses. Only the high-achieving students made themselves known to the instructors outside of class and took advantage of office hours. Also, worth noting is that the Auditing face-to-face and hybrid classes took their exams online in the classroom whereby student test anxiety could have affected the low-achieving students' performance.

To further dive into other characteristics that help in the instructional method, additional time spent on task data was collected from students in 19 class sections (nine in Intermediate Accounting III and ten in Auditing). Students were surveyed for their total time spent viewing the learning modules, reading the textbook, reviewing publisher and instructor PowerPoint slides, doing online homework, taking online quizzes, taking and reviewing notes, spending time on other tasks, and working average hours at an employer, as a significant portion of our students have part-time or full-time employment. The results of Time-on-Tasks for the Intermediate Accounting III classes are shown in Table 5 and results of Time-on-Tasks for the Auditing classes are shown in Table 6. In Intermediate Accounting III students enrolled in the online mode reported nominally more average hours spent on each type of course preparation and preparation overall.[3] This result agrees with Chiu et al. (2014) finding that students in the online mode put significantly more time into the course. Moreover, it is consistent with anecdotal feedback from online mode students that they did not know what to expect from the online format, so they spent an extraordinary amount of time in preparation including the low achievers. This was the first online course for 36% of the students. Fifty-three percent of the students responding to the survey indicated that they had taken either one online course or no online courses in the past. On the other hand, hybrid mode students reported nominally fewer average hours in preparation overall and on every activity except spending time on other tasks (Other) and there was also a smaller but significant positive effect on exam average for the hybrid mode. Perhaps one suggestion is that not knowing what to expect from the delivery modes was different from knowing the material consistent with the idea that the quality of instruction leads to learning. Students who self-selected into the online mode might have been more mature and taken stronger ownership of the learning process. Notable is that the hybrid mode students spent less time on the tasks than the face-to-face yet somehow outperformed the face-to-face students. The responses from the face-to-face students may have been exaggerated especially since they were not required at all to watch the learning modules.

Interestingly, time spent on tasks in the Auditing course was much different compared to Intermediate Accounting III. Auditing students enrolled in the hybrid mode reported nominally more average hours spent on each type of course preparation and preparation overall. High-achieving students had the highest exam average in hybrid-delivery mode, but low- achieving students had the lowest exam average in hybrid-delivery mode even with more preparation than other delivery modes. Auditing students taking the course in the face-to-face mode reported working significantly fewer hours than students taking the hybrid or online modes, but there are also a higher proportion of full-time students taking the course in face-to-face mode. While reading the text was significant in Intermediate Accounting III, it only approached significance in Auditing. Mean differences between face-to-face and online/hybrid are that face-to-face spent less than half the time reading the text and overall Time on Task than other delivery modes. Unfortunately,

[3] Time spent on activities varied significantly by delivery mode only for time spent reading the text.

we do not have reported course preparation time for the entire student population, nor are we able to identify responses from high- and low-achieving students.

6.2. Limitations

This study is subject to limitations. First, students were not randomly assigned to the delivery modes (face-to-face, hybrid, online) therefore, self-selection bias exists. We have tried to address this limitation by incorporating several control variables in our study. Second, technology is a limitation. The transformation of technologies including instructional technology and design used today in all three delivery modes is vastly different than the technology used in past studies. The instructors could record and edit video improving the quality of the instructional delivery and design. So, comparison of older studies that did not use the same type of technology is a limitation.

Additionally, there is no consistent definition of a hybrid-delivery mode, which makes comparing results to other studies involving hybrid-delivery mode courses difficult. Also, there is no consistency in comparing performance as some studies reviewed final grade,[4] exam averages, homework assignments, Excel worksheets, etc. Exam average is different from other course assignments which impact final grades. Final grades incorporate skills other than content knowledge. Perhaps the most serious limitation of our study is the lack of supported theory for why performance should differ across delivery mode. As with prior research on contrasting delivery modes, our results are exploratory.

Despite its limitations, we feel our study makes a significant contribution to the research on delivery mode. This study is the first study to examine senior-level accounting courses taught in three different delivery modes – face-to-face, hybrid (50% in-class/50% online), and online. Also, the same instructors were used for the Intermediate Accounting III courses and the Auditing courses. Further, the instructors attempted to provide the same curriculum material in all three course-delivery modes. The study found that high-achieving students were largely unaffected by course-delivery mode, but low-achieving students performed significantly better in an online-delivery mode. Future research is needed to determine whether our findings hold more broadly for advanced courses and what individual differences could account for the results particularly low-achieving students performing better in the online mode. Future research is also needed to develop a theory and/or to explain the online-delivery mode performance effect we found, especially if that performance effect proves to be robust. Future research could explore which instructional technologies and designs are more effective in aiding the learning process.

Future studies could also more carefully explore performance differences on assignments where delivery is necessarily different by mode of instruction (e.g., exams, class participation through discussion boards versus in-class speaking) versus assignments where delivery is unchanged regardless of course-delivery mode (e.g., homework, essays, projects, and reports completed outside of class). Research in this area would help determine whether observed differences in student performance across delivery modes reflect differences in overall comprehension of course content. Additionally, future research could examine the acquisition of skills or differences in ability to perform within a specific assignment context. Future research can look further into gender and cultural differences as well as learning- style differences. Another area to consider is the relationship between student course evaluations and their performance in the classroom. Also, there was no guarantee that students were listening to the screencasts. Future studies could monitor student's time spent on watching the screencasts and if that impacted performance.

6.3. Conclusions

In this study we attempted to look at what helps accounting students learn the material focusing on the intersection between content and teaching method and-or delivery mode. We conclude that both instructional methods and media attributes effect learning consistent with prior research. While technology continues to develop exponentially it is not the delivery medium that should be focused upon but rather the instructional method. Accounting educators can offer quality instruction in various course-delivery modes to accommodate student needs and enhance the learning experience. A course that uses ineffective instructional methods will not support learning regardless of delivery mode. We agree with Reiser (1994), that both instructional methods and media attributes effect learning. As technology continues to develop and be available for integration into the course delivery, accounting educators can offer quality instruction in various course-delivery modes to accommodate student needs and enhance the learning experience. At the very least, the results of our study suggest that the online-delivery mode courses and hybrid-delivery mode courses can offer quality instruction for accounting students, and students spend a significant amount of preparation time in alternative delivery modes.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaccedu.2018.12.001.

[4]. We found no significant difference for course delivery mode in student performance on final course averages in either Intermediate Accounting III or Auditing. Although in Intermediate Accounting III the online mode fell just short of significance, $p = .051$.

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