

Comparison of Student Success in Hybrid and Traditional Introductory Finance Classes

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Finance courses are being taught in a face-to-face setting, distance education setting, and combinations of these which are referred to as hybrid courses. Given the immense amount of time, effort, and money spent developing these courses, it is necessary to assess the benefits of using technology to make online education available. We propose the comparison of students in a Business Finance taught in a purely face-to-face delivery mode with one taught using a hybrid platform. Our proposed research employs a pre-test/ post-test method and studies performance.

INTRODUCTION

Technological evolution as an innovation is having a profound impact on business education. Time and space constraints are being removed by online delivery. Though some remain skeptical of the educational value of these changes, few faculty can deny that technology is changing the way instructors teach and student learn. Thanks to advances in technology, and especially expanded bandwidth, online technologies have become a common tool for both online and face-to-face courses. Over the 2010 to 2013 period alone, online college course enrollment grew by 29 percent, rising to 6.7 million students, or roughly one third of all college students (CCRC, 2013). Despite the growth, a recent Chronicle of Higher Education article by Jenkins (2012) noted that completion rates were lower for those taking online courses and especially so if the online courses were taken early in their university career.

Across the continuum from purely face-to-face instruction to purely online teaching, there are a variety of ways in which technology may be used by faculty. At the turn of the century, Harasim (2000) identified three levels of online delivery: Adjunct Mode, Mixed Mode, and Totally Online Mode. At the Adjunct Mode level, the traditional face-to-face course uses online utilities such as the gradebook and placement of lecture notes to enhance learning. The difference between Adjunct mode and Mixed mode is the degree to which networking is integrated into the course. Whereas adjunct includes a few networking utilities that are added as conveniences to the regular course, mixed mode courses include networking utilities as significant and well-integrated components of the overall course (e.g., online quizzes). The Totally Online Mode of instruction does not have any face-to-face interaction between student and instructor. The classification by Harasim (2000) is just one way of categorizing the different

configurations of online technologies; other scholars do not make the distinction between the first two modes, instead labeling any course that blends online components with more traditional face-to-face instructional techniques "hybrid courses" (Swenson and Evans (2003)). Consistent with Swenson and Evans (2003)'s classification, our institution designates all the courses that incorporates any type of online component as "hybrid courses", and our study uses this classification to evaluate the pedagogical effectiveness between two different types of modes.

Regardless of whether a course is taught in a hybrid or fully online mode there has been considerable debate about the effectiveness of online technologies versus traditional face-to-face courses. There is no doubt that instructors are facing a paradigm shift, for which the pedagogic value must be assessed. Despite the widespread use of online technologies in the finance classroom, relatively little rigorous research has examined the relative impact of different pedagogical modes on student learning with concrete statistical technique such as Difference in Difference (hereafter DID). Due to the compounding effect of different pedagogical approaches on student learning, we propose adoption of the DID concept, which shows a differential effect of a treatment on a "treatment group" and a "control group". This paper provides insight to the determination of technology's enhancement of education by examining the ability of students to answer questions related to several key finance concepts using a pre-test/post-test procedure.

LITERATURE REVIEW

Measuring Impacts beyond Learning Management Systems

Measuring the impact of various student demographics has been an ongoing issue for many years. Schmidt (1983) finds that total study time is unrelated to course achievement. Such results may be unexpected given that human development and the acquisition of knowledge take place over time. However, time itself may be a necessary, but not a sufficient condition for learning to occur. Helping explain this is the "motivation effect" and "substitution effect" phenomenon found by Krueger (1993). The "motivation effect" term was applied to students employed for nine or fewer hours per week, who did better than unemployed students. When students worked ten hours or more, a "substitution effect" reduced study time and class grades.

Measuring Impacts of Learning Management Systems

An integrated review of the literature regarding online business education was authored by Grandzol and Grandzol (2006). Much of the early research related to online education focused only on students' self-reported perceptions of distance learning (see for example, Richardson and Swan (2003) and Wu and Hiltz (2004)). Research focused on objective performance measures has found less than stellar results for courses employing online technology. For example, Davies and Graff (2005) examined the relationship between student participation in online courses and grades and found no significant relationship between the two. Many others have compared online and/or blended classes to traditional classes and found mixed results. For a comprehensive review of this research see Fjermestad, Hiltz, and Zhang (2005).

One of the first studies to evaluate the connection of online course components and student success is DeNeui and Dodge (2006) examination of the relationship between exam scores and the frequency of usage of various Blackboard platform components. They correlated the frequency of Blackboard usage by 80 students during a ten-week general psychology class with their overall grade while controlling for a variety of student characteristics. Results revealed a significant positive partial correlation, at the 0.05 level, between overall usage and their exam scores. DeNeui and Dodge (2006) also report that male students benefited the most from active employment of Blackboard components, which echo's the earlier findings of Van Scyoc and Gleason (1993) that adult male students remember more than females. Baker, Lusk, and Neuhauser (2012) find male students to be more accepting of in-class use of technology than were female students. Also, graduate students were more disturbed by off-task use of laptop computers in class than their undergraduate counterparts. The relevance of this research for the current article is that we

control for several of the same factors and the hybrid course also used a Blackboard learning management system.

Several studies have made a direct comparison of online and traditional classroom settings. A synthesis of 34 studies by Jaggars (2011), found that student differences impact their ability to benefit from online learning. There have been studies comparing the online and traditional learning (see for instance, Mills and Raju (2011, York (2008)), hybrid and online (see for instance, Arbaugh et al. (2010)) and all three (see for instance, Ashby, Sadera, and McNary (2011)). The results of these studies range from some showing poorer performance of students in traditional classrooms (Ashby, Sadera, and McNary (2011)) no significance across the mode of content delivery (Harrington (1999), Summers, Waigandt, and Whittaker (2005) and York (2008)), and poorer performance in the online classroom (Simmons (2014)). Dowling, Godfrey, and Gyles (2003) found that travel time was replaced by increase student contact hours however grades did not rise, when an accounting program in Australia switched to a hybrid mode. Regardless of the finding, all researchers recommend further study. Our research attempts to fill in this void.

Beyond simply examining the specific learning mode utilized, Knight (2010) reports that use of the online learning facility throughout the course is better than intense use at the end of the course. In the case of our study, students in the hybrid course had the opportunity to access the hybrid components throughout the course. Hence, a timing of availability issue did not adversely impact the ability of the hybrid course students to perform as well as the traditional course students.

Cummings, Chaffin, and Cockerham (2015) compared educational outcomes of the University of Tennessee's College of Social Work's online and traditional programs. They found that the better, "advanced standing" students did better in traditional classroom settings, but that online students were better in their field competency performance and were more satisfied with faculty accessibility. For the more typical students, no differences were observed in terms of student grades, field competency, and satisfaction.

Studies of Hybrid Finance Courses

Finance is a unique area for the study of various modes of instruction, because technology is frequently used in the classroom. In a study of 8,374 logins by graduate students taking a financial management class, Krueger and Carney (2005) find that logins were almost as frequent during the work day as they were during the evening. About half of all of the logins occurred on Monday, Tuesday, and Wednesday, instead of over the weekend. Students earning an A in the course had more logins, postings, reading activity, and topic coverage than student earning a C. However, students with AB and A- grades had even higher login and topic coverage levels. Students in their Desire2Learn-base class felt that it was critical to be proficient at expressing ideas in writing and that online learning required more time and commitment. Successful students tended to view the course as a more convenient way to learn the fundamentals of financial management, but not necessarily an easier way.

Looking at different technologies to enhance finance learning, Phillips and Loch (2012) document the value of using handheld tablets in both face-to-face and online classrooms. Regardless of the delivery system, the addition of tablet technology increased both student retention rates and final exam scores in the introductory finance course. Our research also examines performance in the introductory finance course, with attention paid to the differences in success across the hybrid and traditional modes.

Following the research focus of DeNeui and Dodge (2006), and Biktimirov and Klassen (2008) contrast the relationship between student online activity and performance, using the traditional face-to-face course as a benchmark. Biktimirov and Klassen (2008) found that access to homework solutions and hit consistency were both positively related to student performance. Student performance however is measured using course grade, which does not correctly measure what was learned in the class. Differences in student abilities upon enrollment may be confounding the results. We avoid this shortcoming with DID such as a pre-test/post-test research method.

The Principles of Finance course is frequently identified as the most difficult course for students regardless of the delivery mode, resulting in multiple efforts to improve its pedagogy. For instance, when

Letterman (2011) redesigned his hybrid course by adding a weekly progress report, the quiz scores and student retention improved. Unfortunately, weekly progress reports were not distributed in the face-to-face courses, making direct comparison of the hybrid and face-to-face courses impossible. We overcome this issue by requiring the same assignments and providing the same feedback to both groups of students.

PROPOSED METHODOLOGY

This research improves proposes the usage of a gap closure statistic. This measure identifies the improvement in student understanding from the first day of the course to the last day. Gap closure is more important than final grade because some students may have a firm understanding of key concepts when beginning a course as a result of successful training or relevant professional experience. The true test of hybrid course value is a comparison of improvement in understanding of key finance concepts. Gap closure has commonly been used in the education literature (see for example, Warnack (2003); Wolf (2015); Rains, (2016)) and is defined algebraically as follows:

$$\text{Gap Closure} = \frac{(CA_{eoc} - CA_{boc})}{(TQ_{boc} - CA_{boc})} \quad (1)$$

Where:

CA_{eoc} = Correct answers at end of class

CA_{boc} = Correct Answers at Beginning of class

TQ_{boc} = Total Questions beginning of class

Students would be asked twenty-three multiple-choice questions based on different finance concepts before and after instruction. Questions should be based on the topics covered and not on what either students think is important (see for instance, Graham and Krueger (1996)) or what CFOs believe is important (see, for instance Collier and Wilson (1994)). A copy of a proposed pre-and post-course assessment instrument is provided in the appendix. A student with ten correct answers before the course, and eighteen correct answers after instruction would have a gap closure value of 0.62 (i.e., $(18-10) \div (23-10)$). The maximum gap closure rating is 1.0, representing correctly answering all questions previously erroneously answered on the pre-test (without getting any prior correct answers wrong). A negative gap closure value would indicate that after instruction a student performed worse, perhaps as a result of guessing correctly on the pre-test. Of course, some student may exhibit no difference after instruction.

In addition to *Gap Closure*, we propose the computation of a difference in scores of pre-and post-tests and use it as our dependent variable. The following models were used to estimate the effect of different class types on student learning:

$$\text{Gap Closure} = \beta_0 + \beta_1 \text{ClassType} + \sum \beta_i \text{Control Variables} + \varepsilon_i \quad (2)$$

$$\text{Difference in Score} = \beta_0 + \beta_1 \text{ClassType} + \sum \beta_i \text{Control Variables} + \varepsilon_i \quad (3)$$

Control variables in the OLS regression are students' gender, major area of their study, the total number of credit hours taken during the fall 2015 semester, and their attendance rate. Detailed definitions of control variables are in the tables.

Data and Analysis

Pre-and post-test scores of students taking the Business Finance class, which is the "principles" finance class offered at our institution is proposed. One would need at least two classes and be aware of the time when the classes are scheduled and other course characteristic differences that may confound

findings. For instance, both Business Finance classes (hybrid and traditional) should be scheduled to meet at the same class time. Additional student demographic data such as gender, major, the number of credit hours, and the number of working hours should be obtained by surveying the students. Any difference in the number of students enrolled in either the traditional section or hybrid class may be an indirect indication of student preference for the hybrid format.

Instructors should also track the number of students dropping out of the traditional course versus the number of students dropping out of the hybrid offering. There has been a wide disparity in results regarding the impact of online education and student retention. For instance, Ward (2004) finds no significant difference in an introductory statistics course though 14 percent of the students dropped out of the hybrid course and only 2 percent of the students dropped out of the traditional face-to-face course. Carmel and Gold (2007) do not find no statistical difference between retention in the online and hybrid course. Concern is expressed by Flanagan (2015), who reports that retention in online courses tends to lag by 10-20 percent behind that of traditional courses at Borough of Manhattan Community College. However, Amaral and Shank (2010) found that use of a hybrid mode enhanced retention in an introductory chemistry course.

CONCLUSION

Hybrid courses, where a portion of the course is taught online, provides greater flexibility in schedules while retaining the benefit of face-to-face lectures on key topics. However, several have noted the need to be committed to “attend” class in whatever format it is being held and requires students to develop skills beyond those needed for either a face-to-face or purely-online course, according to Reynolds (2001). Simultaneously, moving course material online using a hybrid system can be difficult and learning how to convey information effectively in a different medium can also pose a challenge for instructors.

We plan to run this study in future semesters and urge others to conduct a similar analysis at their institutions, in order to ascertain the robustness of these results. Another means to expand this research is to study the success of students in subsequent courses, following the approach of Graham and Krueger (2008) who found a correlation between subsequent performance in finance classes and how well concepts were learned in the Principles course.

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APPENDIX

Proposed Pre- and Post- Test Questions

- 1) The primary goal of a publicly-owned firm interested in serving its stockholders should be to
 - a) Minimize the debt used by a firm.
 - b) Maximize expected EPS.
 - c) Minimize the chances of losses.
 - d) Maximize the stock price per share.

- 2) Which of the following financial statements shows a firm's financing activities (how funds were generated) and investment activities (how funds were used) over a particular period of time?
 - a) balance sheet
 - b) income statement
 - c) statement of retained earnings
 - d) statement of cash flows

- 3) When examining the asset management ratios, the primary emphasis is the:
 - a) firm's ability to effectively employ its resources.
 - b) firm's overall debt position.
 - c) firm's ability to pay short term obligations on time.
 - d) investors preference for a firm's stock instead of its bond issues.

- 4) In a(n) _____ cash flow stream, payments occur at the beginning of each period.
 - a) annuity due
 - b) deferred annuity
 - c) lump sum
 - d) ordinary annuity

- 5) Jose will be saving \$1,000 annually for retirement in 40 years. What time value of money technique would he utilize to calculate the amount of money he will have available at retirement?
 - a) Present value of an annuity
 - b) Present value of a lump sum
 - c) Future value of an annuity
 - d) Future value of a lump sum

- 6) The rate of interest that is actually paid or earned (expressed as if it were compounded once per year) is called the _____ interest rate.
 - a) effective
 - b) nominal
 - c) quoted
 - d) stated

- 7) Time value of money techniques (i.e., compounding, discounting) can be applied to:
- lump-sum amounts.
 - cash flows of varying amounts.
 - streams of similar cash flows.
 - all of the above.
- 8) The present value of an annuity will decrease when either the:
- interest rate increases or the number of periods increases.
 - interest rate declines or the amount of the annuity payment increases.
 - number of periods increases or the interest rate decreases.
 - amount of the annuity payment decreases or the interest rate increases.
- 9) The inflation premium:
- increases the real return.
 - remains constant over time.
 - rewards investors for accepting interest rate risk.
 - compensates investors for expected price increases.
- 10) Your uncle would like to restrict his maturity rate risk (i.e., interest rate risk) and his default risk, but he still would like to invest in corporate bonds. Which of the possible bonds listed below best satisfies your uncle's criteria?
- AAA bond with 5 years to maturity.
 - BBB perpetual bond.
 - AAA bond with 10 years to maturity.
 - BBB bond with 10 years to maturity.
- 11) When a bond trades at its par value, the required return is _____ the coupon rate.
- equal to
 - less than
 - more than
- 12) When interest rates rise bond prices _____.
- fall.
 - stay the same.
 - Rise
- 13) Preferred stock:
- generally has a fixed dividend.
 - generally has a dividend that increases annually.
 - receives preference in bankruptcy over bonds.
 - receives preference in bankruptcy over common stock.
- I and III only
 - I and IV only
 - II and III only
 - II and IV only

- 14) The dividend yield is defined as:
- the dividend paid in the past year divided by the expected price of the stock one year from now.
 - next year's expected dividend divided by the current market value per share.
 - next year's expected dividend divided by the current book value per share.
 - next year's expected dividend divided by next year's expected market value per share.
- 15) The firm's weighted average cost of capital (WACC) is
- set by the board of directors of the firm because it is the benchmark they use to evaluate upper management.
 - set by the federal government so as to minimize the cost of funds used in a business.
 - determined by the financial markets because investors provide the funds used by firms and these funds have costs, which are the returns demanded by investors.
 - the same across firms.
- 16) Alice Stewart, who is the CFO of Meyers Foods. Meyers Foods uses debt and common stock (no preferred stock) to finance its investments. What is the typical relationship between the after-tax cost of debt, rd_T , the cost of retained earnings (i.e., internal equity), rs , and the cost of new, or external, equity, re ?
- $rd_T < rs < re$
 - $rs < rd_T < re$
 - $re < rs < rd_T$
 - $rs < re < rd_T$
- 17) The target capital structure of a firm is the capital structure that
- maximizes the tax shield created by debt.
 - minimizes the default risk of long-term debt.
 - maximizes the price of the firm's stock.
 - number of shares of common held by shareholders.
- 18) Which of the following capital budgeting methods might not consider the salvage value of a machine being considered for purchase?
- Internal rate of return.
 - Net present value.
 - Payback.
- 19) Choose the correct answer for the following: (1) Which is the best measure of risk for choosing an asset which is to be held in isolation? (2) Which is the best measure for choosing an asset to be held as part of a diversified portfolio?
- Variance; correlation coefficient.
 - Standard deviation; correlation coefficient.
 - Beta; variance.
 - Coefficient of variation; beta.
 - Beta; beta.

- 20) All else equal, risk- averse investors generally require _____ returns to purchase investments with _____ risks.
- a) higher; lower
 - b) lower; higher
 - c) higher; higher
 - d) None of the above is correct.
- 21) In a portfolio of three different stocks, which of the following could not be true?
- a) The riskiness of the portfolio is less than the riskiness of each of the stocks if they were held in isolation.
 - b) The riskiness of the portfolio is greater than the riskiness of one or two of the stocks.
 - c) The beta of the portfolio is less than the beta of each of the individual stocks.
 - d) The beta of the portfolio is greater than the beta of one or two of the individual stock's betas.
 - e) None of the above (i.e., they all could be true, but not necessarily at the same time).
- 22) Which of the following is not one of the four fundamental factors that affect the cost of money?
- a) production opportunities
 - b) time preferences for consumption
 - c) party affiliation of the U.S. President
 - d) Inflation
- 23) Which of the following is not considered a capital component for the purpose of calculating the weighted average cost of capital as it applies to capital budgeting?
- a) Long-term debt
 - b) Accounts payable.
 - c) Preferred stock
 - d) Common stock