

A Comparison of Student Learning Outcomes in Traditional and Online Personal Finance Courses

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Abstract

Numerous studies have compared student outcomes in online classes and traditional classes, but with mixed results. This paper adds to the existing body of evidence through an examination of students in Personal Finance courses. Primary results indicate that the delivery method made little difference in student performance. Secondary results identify pre-course GPAs, and to a lesser extent ACT scores, as predictors of student success in Personal Finance.

Keywords: online learning outcomes, online learning, distance education, personal finance

Introduction

How do student learning outcomes in an online environment compare to outcomes in a traditional classroom approach? As online classes have become more common, this question has received increasing attention from researchers. In spite of the numerous studies in this area, no definitive answer as to which is the better approach has been found. However, as the literature review will later show, online classes appear to be at least as effective as traditional classes.

This study examines learning outcomes in traditional and online personal finance classes taught by one of the authors during the spring of 2009, fall of 2009, and spring of 2010 at a small private university in Arkansas. There were a total of 94 students in the traditional classes and 91 in the online classes. Tests of the relationship between learning outcomes (as measured by the percentage of total points earned over the course of the semester) and variables such as ACT scores, pre-course GPA, gender, major, etc. were conducted for statistical significance. Scores on a pre- and post-test were also compared.

Literature Review

Over the years, an abundance of research has been done on various courses offered in both a traditional and online format. However, no research studies comparing online and traditional personal finance courses could be located by the authors. Since personal finance is normally taught by business faculty, and in an attempt to narrow the scope of the literature review, research studies concentrating on business courses will be highlighted.

Weber and Lennon (2007) compared learning outcomes in four junior level Principles of Marketing sections (two were online and two traditional with a section of each type being offered in each of two semesters) at two private southeastern universities. The study consisted of a total of 66 traditional

students and 51 online students. Students were not given advance notice of the nature of the course in which they had enrolled, but were allowed to switch sections once they were told; however, no student did so. Variables like the textbook used, the instructor, exams, projects, assignments, and course content were the same for both the traditional and online sections. The main differences in the two courses were instructor contact and delivery method. Scores on the final exam, a graded project, and end-of-semester final grades were used to assess learning outcomes. Utilizing means analysis, frequency analysis, and a *t*-test, the authors found no significant difference between learning outcomes when controlling for the following variables: pre-course GPA, gender, student academic level, and prior knowledge and experience with online courses. Regression analysis revealed that GPA and academic level were significant in explaining learning outcomes in both the traditional and online sections, but that course format was not.

Smith and Stephens (2010) compared the final exam scores of 67 students taking Marketing Principles in a traditional setting with 24 students taking the course online during the fall of 2009 at a state university in northern Minnesota. The mean score on the final exam was 61.43 for traditional students and 73.92 for online students. A *t*-test indicated that this difference was statistically significant. Smith and Stephens used the results of student evaluations to measure student satisfaction; they found no significant difference between the means on student evaluations for the two learning formats.

Learning outcomes of 58 online students and 98 traditional students enrolled in Principles of Microeconomics were compared in a study by Gratton-Lavoie and Stanley (2009) at California State University, Fullerton. The students involved took the class either in the spring semester of 2002, the fall semester of 2002, or the fall semester of 2003 and were allowed to choose the online or traditional class. Textbook, course content, problems assigned, and exam format were the same for both the traditional and online classes. The researchers found that, when controlling for GPA and age, there was no significant difference in scores on the final exam. They did discover that older working women, students with high GPAs, and non-business majors were more likely to choose the online class in microeconomics.

Bennett, Padgham, McCarty, and Carter (2007) compared learning outcomes of 406 traditional and 92 online students in principles of macroeconomics and microeconomics at Jacksonville State University in 2005. They found no difference in performance of the online and traditional classes overall; the final average of traditional students was 69.5 compared to 69.3 for online students. However, the researchers did find a significant difference at the 10 percent level in microeconomics where the traditional students had a final average of 67.1 compared to 60.2 for online students. Conversely, in the macroeconomics classes, the online students had a better final average (81.2 compared to 71.6 for traditional students) with significance at the 1 percent level. Females had significantly better final averages in the traditional classes; even though their averages were also higher in the online classes, the difference was not significant.

A study by Friday, Friday-Stroud, Green, and Hill (2006) of 380 online students and 213 traditional students enrolled in Organization and Management over an eight-semester period from the spring of 1999 to the summer of 2002 at a commuter university in the southeastern United States revealed no significant difference in performance after controlling for professor experience and time period. However, the researchers did find that women significantly outperformed men in both learning environments. A concurrent study conducted by the same authors over the eight-semester time period of 298 students enrolled in online Strategic Management and 465 students taking the same course in a traditional setting came to similar conclusions.

Daymont and Blau (2008) conducted a study of 64 online students and 181 traditional students enrolled in an undergraduate Organization and Management course during either the fall of 2006 or the spring of 2007 at a large public university in a large eastern city. They found no significant difference in the final grades of students in the two learning settings (overall, online students had slightly higher final grades); however, the online students scored higher on quiz scores (the difference in the scores of online and traditional students was statistically significant at the .05 level). Both online and traditional students took the quizzes online and were allowed to use their textbooks.

Sue (2005) compared the performance of 41 students in an introductory business statistics course to 46 students in an online section at a mid-sized California university. The same professor taught both classes. Online students were required to meet on campus three times during the term; there were two other optional meetings (exam review sessions). Students in both learning environments were given

three exams during the term, as well as a final. The online students took the first and third exam online, but were required to come to campus for the second exam and the final. The mean exam scores were higher for traditional students on all the exams, but Sue only found significant differences in the scores on the second exam and the final (the two taken on campus by the online students). She hypothesized that the online students may have been at a disadvantage due to being used to approaching the course from an online perspective.

Tucker (1999) completed a study of 23 students enrolled in a traditional business communications class, and a distance education class composed of 24 students. Variables such as instructor, course materials, assignments, course content, homework, research project, and final exam were the same for both classes. Tucker found that the post-test scores and final exam scores of the distance education students were higher and significantly different at the .05 alpha level; however, pre-test scores, homework grades, research paper grades, and final courses grades were not significantly different.

Because of the broadness of its scope, a study by SRI International commissioned by the Department of Education will conclude the literature review (even though it does not relate directly to business course research). SRI examined over 1,000 empirical studies comparing online and classroom performance in various courses conducted from 1996 to 2008. The studies were screened and only those meeting the following characteristics were utilized: "(a) contrasted an online to a face-to-face condition, (b) measured student learning outcomes, (c) used a rigorous research design, and (d) provided adequate information to calculate an effect size." Approximately 45 of the studies met these criteria; most of these studies were done in colleges and continuing education programs for adults. SRI found a small but significant difference in student outcomes on tests; online-oriented students scored in the 59th percentile while classroom-oriented students scored in the 50th percentile. A combination of online and face-to-face instruction produced the best results.

Methods

One of the authors taught a section of face-to-face personal finance and a section of online personal finance during each of the following semesters: the spring of 2009, the fall of 2009, and the spring of 2010. The learning outcomes of students in these classes are the basis for this study. There were a total of 185 students in the study, 94 in the traditional sections and 91 in the online sections. Of the 185 students, 78 (42 percent) were male and 107 (58 percent) were female. In the online classes, 33 (36 percent) were male and 58 (64 percent) were female. Forty-five (48 percent) of the students in the traditional classes were male and 49 (52 percent) were female.

The coursework in the online classes was completed online except for a pre-and post-test, a mid-term exam, and a final exam, all of which were given on campus. The same pre-and post-test was given in each of the two types of classes. The mid-term exam and the final exam for the online classes each were worth 200 points. Students were given the option of attending a face-to-face review session the day before each of these exams were administered. Approximately 70 to 80 percent of students attended these sessions. During the review sessions, the instructor worked through examples of major problems which would appear on the exams, and answered student questions.

The mid-term and final exam constituted approximately 50 percent of the total points for the online courses. The mid-term exam tested over nine to ten chapters while the final exam covered eleven to twelve chapters (the final exam was not comprehensive). Exam items were based on learning objectives made available to students.

Including the final exam, there were five exams given in the traditional sections of personal finance. Each of these exams (except the final which was comprehensive) covered from three to six chapters. Four of the exams were worth 110 points (ten points of each exam was over video clips shown in class while covering the unit); the final exam was worth 100 points. Of the total points in the traditional classes, exam scores constituted from 54 to 58 percent. Learning objectives were provided for each of the exams.

A personal finance simulation, online open-book quizzes, and a track-your-spending-for-a-month assignment were common to both the online and traditional sections. Assignments which were not the same for the two types of classes only constituted six to seven percent of the points possible.

The authors hypothesized that the greater frequency of exams in the traditional section would lead to significant higher performance by traditional students. As will be seen in the next section, this was not the case.

Results

The first method used to compare the performance of students in the online and traditional classes involved computing the average score on the pre-test and the post-test and calculating the percentage improvement. Table 1 below shows the results.

Table 1. *Relationship between ACT and Pre-Course GPA, and Percentage Improvement on Pre-Post-Test*

| Type of Class | Semester | Number of Students | Avg ACT Score | Avg Pre-Course GPA | Avg Score on Pre-Test (20 points possible) | Avg Score on Post-Test (20 points possible) | Percentage Change Post - Pre |
|--------------------|------------|--------------------|-------------------|--------------------|--|---|------------------------------|
| Traditional | Spring, 09 | 35 | 25.53 (n = 34) | 3.27 | 11.14 | 16.86 | 51.35% |
| Online | Spring, 09 | 34 | 25.84 (n = 32) | 3.24 | 10.74 | 16.50 | 53.63% |
| Traditional | Fall, 09 | 29 | 23.19 (n =27) | 3.16 | 10.97 | 15.93 | 45.21% |
| Online | Fall, 09 | 26 | 26.46 (n = 26) | 3.26 | 11.58 | 15.92 | 37.48% |
| Traditional | Spring, 10 | 30 | 23.86 (n = 29) | 2.93 | 10.07 | 14.97 | 48.66% |
| Online | Spring, 10 | 30 | 26.30 (n = 27) | 3.47 | 11.70 | 16.00 | 36.75% |
| Traditional | All | 94 | 24.29 (n = 90) | 3.13 | 10.75 | 15.97 | 48.56% |
| Online | All | 90 | 26.18 (n = 85) | 3.32 | 11.31 | 16.17 | 42.97% |

As would be expected, the classes with the higher pre-course GPA scored higher on the pre-test in all cases. This is likely one factor leading to the smaller percentage improvement for these classes. The only semester in which the class with the higher ACT score did not score higher on the pre-test was the spring of 2009, the semester in which the difference in ACT scores was very small. The table also indicates that, in two of the three semesters, the online class was taken by students with a higher pre-course GPA, significantly higher in the spring, 2010 semester. Also, it is worth noting that the online course was taken by students with a higher ACT score in all three semesters. It would be interesting to see whether these relationships would prevail in a study encompassing more semesters.

The second approach to comparing the learning outcomes in the traditional and online classes was based on the semester course average of the students in each class. The results are summarized in the Table

2 which also looks at the relationship between the semester average and the average class ACT and as the average pre-course GPA.

Table 2. *Relationship between ACT and Pre-Course GPA, and Course Semester Average*

| Type of Class | Semester | Number of Students | Average ACT Score | Average Pre-Course GPA* | Semester Average |
|---------------|-------------|--------------------|-------------------|-------------------------|------------------|
| Traditional | Spring, '09 | 35 | 25.53 (n = 34) | 3.27 | 83.94 |
| Online | Spring, '09 | 34 | 25.84 (n = 32) | 3.24 | 79.89 |
| Traditional | Fall, '09 | 29 | 23.19 (n =27) | 3.16 | 81.80 |
| Online | Fall, '09 | 27 | 26.46 (n = 26) | 3.25 | 82.72 |
| Traditional | Spring, '10 | 30 | 23.86 (n = 29) | 2.93 | 77.76 |
| Online | Spring, '10 | 30 | 26.30 (n = 27) | 3.47 | 84.30 |
| Traditional | All | 94 | 24.29 (n = 90) | 3.13 | 81.31 |
| Online | All | 91 | 26.18 (n = 85) | 3.32 | 82.18 |

*4.0 scale

The table reveals that the semester average of students in the online sections was higher in two of the three semesters with the exception of the spring semester of 2009. The much higher average ACT of students in the online classes during the fall semester of 2009 and the spring of 2010, as well as the higher pre-course GPA, likely are factors contributing to this outcome. However, it is surprising that the class average of the traditional section in the spring of 2009 was considerably higher than that of the online section in spite of the fact that the average ACT of the traditional students was only .31 lower and the average pre-course GPA was only .03 higher.

The following comparison (Table 3) of the performance of males and females in the online and traditional sections reveals several interesting differences.

Table 3. *Performance of males and females in the online and traditional sections*

Performance of Males

| Type of Class | Semester | Number of Students | Avg Score on Pre-Test | Avg Score on Post-Test | Percent Change Post - Pre | Avg ACT Score | Avg Pre-Course GPA | Course Avg |
|---------------|-------------|--------------------|-----------------------|------------------------|---------------------------|---------------|--------------------|------------|
| Traditional | Spring, '09 | 12 | 11.42 | 16.33 | 42.99% | 25.83 | 3.33 | 84.16 |
| Online | Spring, '09 | 14 | 10.71 | 16.29 | 52.10% | 26.00 | 3.01 | 77.71 |
| Traditional | Fall, '09 | 14 | 10.93 | 15.36 | 40.53% | 23.38 | 2.92 | 78.18 |
| Online | Fall, '09 | 8 | 11.50 | 15.25 | 32.61% | 25.71 | 2.75 | 79.71 |
| Traditional | Spring, '10 | 19 | 10.68 | 15.21 | 42.42% | 25.00 | 2.98 | 78.17 |
| Online | Spring, '10 | 11 | 12.18 | 15.00 | 23.15% | 26.90 | 3.27 | 81.63 |
| Traditional | All | 45 | 10.96 | 15.56 | 41.97% | 24.75 | 3.05 | 79.77 |
| Online | All | 33 | 11.39 | 15.61 | 37.05% | 26.24 | 3.03 | 79.50 |

Performance of Females

| Type of Class | Semester | Number of Students | Avg Score on Pre-Test | Avg Score on Post-Test | Percent Change Post - Pre | Avg ACT Score | Avg Pre-Course GPA | Course Avg |
|---------------|-------------|--------------------|-----------------------|------------------------|---------------------------|---------------|--------------------|------------|
| Traditional | Spring, '09 | 23 | 11.00 | 16.87 | 53.36% | 25.36 | 3.41 | 83.83 |
| Online | Spring, '09 | 20 | 10.75 | 16.65 | 54.88% | 25.75 | 3.23 | 81.41 |
| Traditional | Fall, '09 | 15 | 11.00 | 16.47 | 49.73% | 24.43 | 3.39 | 85.18 |
| Online | Fall, '09 | 19 | 11.61 | 16.22 | 39.71% | 26.74 | 3.46 | 83.99 |
| Traditional | Spring, '10 | 11 | 9.00 | 14.18 | 57.56% | 22.00 | 2.96 | 77.07 |
| Online | Spring, '10 | 19 | 11.42 | 16.26 | 42.38% | 25.94 | 3.58 | 85.84 |
| Traditional | All | 49 | 11.00 | 16.83 | 53.00% | 24.30 | 3.30 | 82.73 |
| Online | All | 58 | 11.12 | 16.38 | 47.30% | 26.14 | 3.42 | 83.71 |

Both males and females who took the online class tended to have higher ACT scores. Overall, the males in both types of classes had slightly higher ACT scores. In spite of this, the females in the traditional and online classes had higher course averages considering all three semesters, likely indicating greater devotion to their classes. The much higher percentage improvement from the pre- to post-test attained by the females strengthens this observation.

Females were more likely to take the personal finance course online than males. While 42 percent of males in the study took the course online, 54 percent of females did. Not only did the females maintain a higher course average when all three online sections were considered, but they also did when the three traditional classes were viewed in the aggregate.

Grade average proved to be a fairly good predictor of success with the exception of the fall 2009 semester when, in the case of the males and females, the section with the lower average pre-course GPA outperformed the section with the higher average pre-course GPA.

To test for the statistical significance in the relationship between course grade and grade point average (as well as other variables), the following OLS regression equation was employed as a third method.

$$\begin{aligned} \text{Grade}_s = & \beta_0 + \beta_1 \text{Gender}_s + \beta_2 \text{ACT}_s + \beta_3 \text{Prior Hours}_s + \beta_4 \text{Pre GPA}_s + \beta_5 \text{GPACHg}_s + \beta_6 \text{Ch St}_s \\ & + \beta_7 \text{Educ}_s + \beta_8 \text{Fine}_s + \beta_9 \text{Human}_s + \beta_{10} \text{NatSci}_s + \beta_{11} \text{SocSci}_s + \beta_{12} \text{Fall09}_s \\ & + \beta_{13} \text{Spr10}_s + \gamma \text{Online}_s + \epsilon \end{aligned}$$

with:

- Grade: the final course letter grade for student s
- β_0 : the intercept of the regression
- Gender: a dummy variable that equals one if the student is male and zero if female
- ACT: the student ACT score
- Prior Hours: the number of cumulative hours earned prior to the semester in which the course was taken
- Pre GPA: the cumulative grade point average earned prior to the semester in which the course was taken
- GPA Chg: the difference between the Pre GPA and the cumulative grade point average at the conclusion of the semester in which the course was taken
- Ch St: a dummy variable that equals one if a student has declared a major in the School of Christian Studies, and zero otherwise

| | |
|---------|--|
| Educ: | a dummy variable that equals one if a student has declared a major in the School of Education, and zero otherwise |
| Fine: | a dummy variable that equals one if a student has declared a major in the School of Fine Arts, and zero otherwise |
| Human: | a dummy variable that equals one if a student has declared a major in the School of Humanities, and zero otherwise |
| NatSci: | a dummy variable that equals one if a student has declared a major in the School of Natural Sciences, and zero otherwise |
| SocSci: | a dummy variable that equals one if a student has declared a major in the School of Social Sciences, and zero otherwise |
| Fall09: | a dummy variable which equals one if a student completed the course in the fall of 2009, and zero otherwise |
| Spr10: | a dummy variable which equals one if a student completed the course in the spring of 2010, and zero otherwise |
| Online: | a dummy variable that equals one if the student completed an online section of the course, and zero otherwise |

The variables *Ch St*, *Educ*, *Fine*, *Human*, *NatSci*, and *SocSci* represent six of the seven schools at the university. The seventh, the School of Business, serves as the benchmark and has therefore not been assigned a variable. Consequently, the interpretation of the coefficients for these variables will be relative to grades of students in the School of Business.

Similarly, the spring of 2009 serves as a control for the timing of the course. Fall09 and Spr10 represent alternate time periods, and the coefficients should therefore be interpreted relative to the spring, 2009 semester.

The coefficient γ measures the difference in course grades between online and traditional classes, and is therefore our primary focal point. If a difference in delivery style exists, γ should be statistically significant.

The results of the regression analysis offer interesting results. First, in support of Weber and Lennon; Friday, Friday-Stroud, Green, and Hill; and Daymont and Blau, we find the difference between online and traditional formats to not be statistically significant. In the Personal Finance classes we considered, the delivery method does not appear to have made a difference.

Other factors did make a difference, however. The student's GPA entering the course was highly significant, as was the change in GPA during the semester when the course was taken. ACT score was significant at an alpha of .05 as indicated by the t-value of 2.065. Certain majors also performed better than others: Christian studies (-0.565), Education (-0.451), Fine Arts (-0.627), and Humanities (-0.699) all had lower grades than business majors, although no statistically significant difference was found between business majors and Natural Science or Social Science majors. No difference was found on the basis of gender or the semester when the course was taken.

Finally, the fourth method considered whether the same independent variables influenced the change in percentage improvement on pre-post-test. To conduct the analysis, OLS regression analysis was performed with the same independent variables, but with *Test Chg* as the dependent variable.

$$Test\ Chg_s = \beta_0 + \beta_1 Gender_s + \beta_2 ACT_s + \beta_3 Prior\ Hours_s + \beta_4 Pre\ GPA_s + \beta_5 GPA\ Chg_s + \beta_6 Ch\ St_s + \beta_7 Educ_s + \beta_8 Fine_s + \beta_9 Human_s + \beta_{10} NatSci_s + \beta_{11} SocSci_s + \beta_{12} Fall09_s + \beta_{13} Spr10_s + \gamma Online_s + \varepsilon$$

Results show a positive relationship between change in test scores and GPA. Females also improved more than males. The only majors that exhibited a statistically significant difference were from the School of Humanities.

However, perhaps most importantly for the present study, the delivery method did make a difference in the change in pre- and post-test scores. Students in traditional courses improved by nearly one point more than students in online classes. This difference may be attributable to greater student concentration in a classroom setting, or perhaps the instructor was cognizant of the questions and stressed them more heavily in person. Whatever the cause, the result is interesting, particularly given the results of the earlier regression where course grades were not affected by the delivery method.

Table 4. Results of OLS Regression with Grade as Dependent Variable

| | Coefficient | t-statistic | p-value |
|--------------------|--------------------|--------------------|----------------|
| Constant | -1.804 | -5.289 | 0.000 |
| Gender | -0.076 | -0.777 | 0.438 |
| ACT | 0.028 | 2.065 | 0.041 |
| Prior Hours | 0.003 | 1.563 | 0.120 |
| Pre GPA | 1.258 | 11.571 | 0.000 |
| GPA Chg | 2.336 | 7.502 | 0.000 |
| Ch St | -0.565 | -3.335 | 0.001 |
| Educ | -0.451 | -2.702 | 0.008 |
| Fine | -0.627 | -3.443 | 0.001 |
| Human | -0.699 | -3.717 | 0.000 |
| NatSci | -0.058 | -0.438 | 0.662 |
| SocSci | -0.228 | -1.378 | 0.170 |
| Fall09 | -0.044 | -0.405 | 0.686 |
| Spr10 | -0.067 | -0.623 | 0.534 |
| <i>Online</i> | <i>-0.035</i> | <i>-0.353</i> | <i>0.724</i> |
| Adj R ² | | 0.698 | |
| n | | 184 | |

Conclusions

This paper considers whether learning outcomes differ between online and traditional Personal Finance classes at a small private university in Arkansas during the spring 2009, fall 2009, and spring 2010 semesters. First, descriptive statistics are analyzed to compare the primary characteristics of the students. Results reveal higher mean GPAs for students in online classes; semester course grades were also higher in two of the three online classes.

Next, OLS regression analysis was used to examine the relationship between multiple student characteristics and two separate dependent variables. The results indicate that the delivery method did not make a difference in the final course grade. However, students in traditional classes did show a greater improvement on a pre-post-test.

Even though the average ACT and average pre-course GPA of online students was 7.78 percent and 6.07 percent higher respectively than that of traditional students, the semester average of online students was only 1.07 percent higher. The greater frequency of exams in the traditional sections may account for this, even though it did not lead to significantly higher performance by traditional students as the authors had initially hypothesized. Maintaining the same exam schedule in both types of classes in a future study would likely reveal its role in influencing student outcomes.

Table 5. Results of OLS Regression with Test Change as Dependent Variable

| | Coefficient | t-statistic | p-value |
|--------------------|--------------------|--------------------|----------------|
| Constant | 0.760 | 0.442 | 0.659 |
| Gender | -0.886 | -1.788 | 0.076 |
| ACT | -0.024 | -0.355 | 0.723 |
| Prior Hours | 0.008 | 0.879 | 0.381 |
| Pre GPA | 1.728 | 3.153 | 0.002 |
| GPA Chg | 2.072 | 1.320 | 0.189 |
| Ch St | 1.189 | 1.392 | 0.166 |
| Educ | -0.759 | -0.903 | 0.368 |
| Fine | 0.149 | 0.162 | 0.871 |
| Human | -1.937 | -2.044 | 0.043 |
| NatSci | 0.000 | 0.000 | 1.000 |
| SocSci | 0.292 | 0.350 | 0.727 |
| Fall09 | -0.729 | -1.324 | 0.188 |
| Spr10 | -0.435 | -0.797 | 0.427 |
| Online | -0.963 | -1.939 | 0.054 |
| Adj R ² | | | .0137 |
| n | | | 184 |

Many educators would regard the fact that the online students tended to have a higher pre-course GPA as a positive, since there is a common perception that online courses require greater discipline and self-motivation.

Overall, as most similar studies, this study revealed that the delivery method made little difference in student performance. The study did find pre-course GPAs, and to a lesser extent ACT scores, as predictors of student success in personal finance, whether taught online or in a traditional setting.

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