

## **Students' Effort and Performance: Online Versus Traditional Classroom Testing**

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### **ABSTRACT**

This paper examines if student effort and performance in a finance course was affected by the testing procedure utilized - online versus in the classroom. Our results indicate that neither study efforts nor course performance is influenced by the testing procedure. We do find a strong positive relationship between students' effort and their performance in the course.

### **STUDENTS' EFFORT AND PERFORMANCE USING ONLINE VERSUS TRADITIONAL CLASSROOM TESTING PROCEDURES**

Web-based assessment may provide several benefits not afforded by conventional paper-and-pencil testing. First, online assessment allows the offering of flexible testing times and the periods of time in which the test may be worked on. Second, on-line resources can be set to automatically randomize the order of questions and randomize the set of answers provided for multiple-choice and matching questions. Third, online tools allow instructors to offer students the opportunity to rework the same or equivalent questions multiple times. Fourth, varying degrees of feedback such as test score, test score with correct answers or test score with detailed solutions may be provided. In addition, instructors have control of when feedback is given (e.g., immediately, after all questions are completed, or set to a

specific date and time). Fifth, desired online testing systems can be set to provide hints or prompts as to where help to answer a question can be found in the text or course notes.

Various measures have been used to proxy student effort in past studies that have investigated the effects of students' efforts on their academic performance. Some were somewhat objective but most were highly subjective. Many of the measures also utilized self-reported data or required researcher classification judgments. In this study, the measures of student effort are based on objective observations recorded by Blackboard's statistics tracking feature. This tracking feature can be activated by instructors at their option on any or all study resources they place out on the system. When selected to operate, the system records a "hit" every time a student accesses an educational resource placed out on the system. Thus, utilizing this feature, we were able to view the number of hits by date over the entire course of the semester for each student.

This study tests for differences in students' effort and performance in different sections of a financial markets course where the content and instructional methodology were the same but the testing procedure differed. For some students, testing was done online. Students could take the test from anywhere in the world and were not proctored enabling open access to their text and notes. For others, testing was traditional paper-and-pencil exams proctored in the classroom, and was closed-book.<sup>1</sup> Regardless of the testing procedure they were under, the Blackboard course management system was used as the primary method to deliver course content and to measure students' effort.

A logical research question that comes to mind is whether different testing procedures affect the level of study effort students put forth during a semester as well as the grades they earn. One might hypothesize that students who knew they would not be proctored when being tested online would rely on open book and notes and would not put forth as much study effort as students who knew they would be tested in a proctored, closed-book environment. Alternatively, one might hypothesize that students who could rely on open book and notes when being tested may have an advantage and should

do better than students who are being tested in a proctored, closed-book situation. Accordingly, the major purpose of this study is to investigate whether students study efforts and course performance were affected by whether they took the tests online or if they took traditional paper-and-pencil classroom tests.

### **INSTRUCTIONAL DELIVERY AND DATA**

We collected data on a sample of 174 students enrolled in different sections of an upper level financial markets course delivered at a major university in the Southeast. The syllabi provided a detailed outline of the concepts and materials that were to be covered for each of the four tests given during the semester. The tests were equally-weighted and were administered on an evenly spaced schedule throughout the semester. Course content and study resources were delivered primarily online in the same manner to all sections. Through the Blackboard system, we were able to observe when and how often students viewed each of the recorded materials over the course of the semester. We tracked the number of times each of these study resources that were relevant for the upcoming test was viewed by each student. We used two different study period measures. First, we tracked how many times each student viewed the resources for each test from the day following the previous test (or start of semester with test 1) and the date of the test. This time period was roughly 25 to 30 days for each of the four tests. We also used the number of views the ten days prior to each test as a second measure of the study period. Ten days prior might be viewed as a more realistic study period. Although the Blackboard tracking feature does not provide information concerning how long a resource was observed with each viewing, we believe keeping track of the number of times students access these resources does provide useful information concerning students' study habits.

As control variables, we included information available on each student that reflected common characteristics and that have been utilized in prior investigations of student effort and performance. Characteristics available for our study included cumulative grade point average (GPA), academic class

and major, gender and the current semester course load. Contradictory results have been reported for the effect of gender on academic performance for students in business classes. While investigating performance in introductory business classes, Terry (2002) and Borde, Byrd, and Modani (1988) found that male students significantly outperformed the female students in the class. However, when Johnson, Joyce, and Sen (2002) took effort into account, there was no significant difference between male and female performance. Cumulative GPA has been found to have a highly significant positive relationship with course performance in most previous studies while academic class (a possible proxy for maturity of the student), semester course load and academic major have not shown a consistent pattern in regard to their relationship with course performance.

### **FINDINGS**

We found the Course Grade is significantly positively correlated ( $p=.001$ ) with the Total Views of the online study resources. We also see a significantly positive correlation ( $p=.001$ ) between the Course Grade and the number of Views the 10 Days prior to each test. There is a strong positive correlation ( $p=.001$ ) between the course grade and the students' cumulative grade point average (GPA). In addition, both Total Views ( $p=.001$ ) and the number of views the 10 Days prior to each test ( $p=.001$ ) are significantly positively correlated with the student's cumulative grade point average (GPA). Thus, on average, students who did well in other courses did well in the class and students with higher GPAs put forth more study effort. Neither course grade nor study effort show any significant correlation with the student's academic class, major, gender or current semester load.

Focusing on the testing procedure, the online testing dummy is not significantly correlated with either the students' course grade or the student's study efforts (as measured by the three viewing measures). This finding provides evidence that neither study efforts nor course performance was influenced by the testing procedure. Students taking the exam online do not demonstrate significantly less study effort (i.e., less views) or better performance (i.e., higher grades) because they may have access to their text

and notes during testing than students taking traditional closed-book paper-and-pencil exams.

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We compared the means of the variables used in our study for online versus traditional classroom testing. The mean Course Grade for those taking the tests online was 73.91 and the mean for those taking the tests in the classroom was 74.54. The online test takers scored only 0.63 less than the in class test takers and p-value for the t-test ( $p=.724$ ) indicates that the difference between the two testing procedures is not statistically significant. The mean Total Views for students who took the tests online was 47.27 and the mean for students who took the tests in the classroom was 48.82. Thus, the students who took tests online versus in the class had only 1.55 less views and the p-value for the t-test ( $p=.674$ ) indicates that the difference between the two testing procedures is not statistically significant. The other measure of student study effort (Views 10 Days Preceding Tests) is also not significantly different across the two groups. Comparison of all the control variables across the two group yield insignificant differences.

We performed a multivariate regression analysis analyzing students' study efforts and course performance (Panel B) for online versus classroom testing. We first regress Total Views Between Tests over the semester against our control variables and then add our online dummy variable. Our results indicate that neither students' study efforts nor their course performance differed when they were tested online versus conventional in-class testing, *ceteris paribus*. The Cumulative GPA is significantly positive in all regressions. As one might expect, better students (as measured by Cumulative GPA) study more and subsequently do better in the course. None of the other control variables are significant in any of the regressions.

## **SUMMARY AND CONCLUSION**

The purpose of this study was to investigate whether the use of online testing as compared to traditional paper-and-pencil classroom testing affected students' study efforts and performance. The

results of our investigation revealed that students' effort and performance did not significantly differ among different sections of the same course where the testing procedures differed. We use the statistics tracking feature of the Blackboard course management system as a valid objective measure of student effort. We do find a strong positive correlation between students' study efforts and their course performance. We also find a strong positive correlation between both study efforts and course performance with students' Cumulative GPA. We find gender, academic class, or semester credit load to have little influence on either course performance or study efforts.

The results of this study may give instructors more confidence in utilizing online testing in their courses. The potential benefits of the increased flexibility and convenience for both students and instructors and the option of providing immediate feedback are just a few of the major advantages online testing can have over traditional in class paper-and-pencil testing. In addition online testing allows for more detailed monitoring of how students are doing both during and immediately after the exams are completed. This can provide instructors with more accurate feedback with which they can make modifications to future class coverage, assignments, and/or techniques. Lastly, online testing resources provide instructors with the ability to employ a wide variety of assessment options with different settings for feedback that may be provided. The relationship between different types and combinations of assessment options and feedback options on student effort and/or performance is an area that could offer many rich insights into how instructors can enhance their students' learning. If properly implemented, these advantages can be available without a loss of effort by students or grade inflation.