A comparison of student achievement in Eco 3401 (Quantitative Business Tools I) delivered through video streaming versus face-to-face lecture

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Abstract

This paper investigates whether there is a difference in student learning in a quantitative business course taught through video streaming with the option of going to a face-to-face lecture, compared to the same course taught only through face-to-face lecture. This topic has been the subject of research in recent years because of the importance of this new tool in the delivery of information to students in many high-schools and Universities. Our study focuses on students in the College of Business Administration in a large (50,000 plus students) urban university, enrolled in a core quantitative business tools course.

Keywords: distance learning, video streaming, learning environments.

Introduction

This paper explores the contribution of streaming video in the learning of college students. This subject has been under research now for many years because of the importance of this new tool in the delivery of information to students adopted now by many high schools and Universities. According to Boster , Meyer, Roberto, Inge and Strom (2006) "Video streaming refers to the process of viewing video over the Internet." The Joint Information Systems Committee webpage (JISC, 2009, Para 2) defines Video Streaming as the "Transmission of moving images over the internet in compressed form as a continuous stream. A recipient equipped with suitable 'player' software can decompress and view the images in real time." According to a study conducted by Fill and Ottewill (2006), video streaming "increases student's control" and allows "students flexibility with respect to accessing, starting, stopping and searching the video." Students are able to play back the lecture as many times as they want.

Streaming Video is also a cost effective method to reach students. In 2009, the economic condition in The United States forced many states to slash the budgets of schools. However, the enrollments remain the same and schools are asked to deliver the same quality education despite the reduced funds. This problem in not new, Brown (2004) was reporting that "school budgets are constantly being stretched to meet more demands without necessarily being increased."

To meet their budget reductions, Universities are employing the use of more video streaming classes. The College of Business at the University of Central Florida, for example, did not offer any video streaming classes five years ago. For Fall Semester, 2009, all 16 General Core Business courses are offered via video streaming. The classes have an average capacity of 500 students each.

A study by Clark and Stewart (2007) suggested that streaming "videos are created easily and at low cost." Sheppard (2003) also described some of the advantages over other media. "Streamed video is also different from CD-based or DVD (Digital Versatile Disc)-based video. Individual CDs or DVDs need to be produced and distributed to each user; not so for the streamed video." Furthermore, Dupagne, Stacks and Giroux (2007) indicated that "most students appear enthusiastic about the use of video streaming technology." Streaming video might be very important in a quantitative class. As reported by Bolster et al. (2007) "technology is most powerful when used as a tool to teach important aspects of mathematics, such as problem solving, conceptual development, computation skills, and critical thinking."

In our study, we wanted to determine whether there is a difference in the mastery of the student learning outcomes based upon the final exam between two sections of ECO 3401, Quantitative Business Tools I. One section delivered only face to face (F2F), the other section delivered via video streaming and face to face (VS). ECO 3401 is a 3-credit hour course that is part of the core curriculum required of all students in the College of Business Administration at the University of Central Florida (UCF). The 2008-2009 Undergraduate Catalog describes the course as, "an introduction to mathematical and statistical analysis of economics and business problems." The two prerequisites for the course are ECO 2023 (Principles of Microeconomics) and MAC 1140 (Pre-Calculus Algebra). The course covers a broad range of topics including matrix algebra, financial mathematics, business calculus, descriptive statistics, and an introduction to probability. Distance learning is not a new concept. Toni (2003) stated that the creation of an extensive and affordable postal system in the late 1900's led to the creation of print-based correspondence courses. In today's modern world, we've evolved from hand-written letters to web-based video and applications that provide a medium to deliver information,

assignments, and tests. The distance course is a web-based course where all material is delivered over the Internet and students and instructor mainly communicate using a chat function and e-mail. Boster, Meyer, Roberto, Inge and Strom (2006) conducted a study on the effectiveness of video streaming in high school student performance. Streaming video is another method to deliver distance education. They found that most of the high school students performed on average better. However, research shows there are many conflicting results. Some studies show no difference in performance between students exposed to video streaming and those not exposed. A study conducted by Nasser (2002) showed no statistical difference between face-to-face students and distance learning students. On the other hand, a more recent study conducted by Allen et al. (2004) showed that students in distance education classes perform on average better than students in traditional classes.

Additionally, there are conflicting results when comparing student learning styles. A study conducted by Argon and Shaik (2002) found that the student's learning style does not influence the success between online learning and face to face learning. However, Battalio (2009) found that there is a relationship between students' success and their learning style in distance education classes. The study suggested that reflective learners were doing better than any other group in online classes.

Method

This paper focuses on two sections of ECO 3401 that were offered during the 2009 Spring semester at The University of Central Florida. Section 0004 was delivered through traditional face-to-face lecture. This section consisted of 190 students, and met twice each week on Mondays and Wednesdays from 4:30 pm until 5:45 pm for 16 weeks. We had to ask permission from all students to use their data according to IRB (Institutional Review Board) specifications. Of these 190 students 137 gave us permission to use their data. Section 0L01 was delivered through video streaming. The section consisted of 198 students and 140 gave us permission to use their data in the study. The students in this section had the option of viewing the lecture live through a high-speed internet connection as it was being given, or later by accessing the video at a password-protected course management web page. The students in the video-streamed section also had the option of attending the live presentations that took place on Tuesdays and Thursdays from 4:30 pm until 5:45 pm for 16 weeks. Both sections were taught by the same instructor. In a study conducted by Heerema and Rogers (2001), high-quality instruction is best achieved when students received "an educational experience customized to their individual learning abilities." The students of both sections could communicate with the instructor during office hours, via telephone, e-mail and additionally with other students through threaded bulletin board discussions (via Webcourses). Students of both sections were required to do online homework assignments and were required to either buy the book or buy access to the online version of the book. A Help Desk with tutors was available to students 4 days a week for a total of 30 hours. The notes used in both sections were available on Webcourses. The instructor has over 8 years experience teaching Economics at UCF.

Students were required to take 3 unit exams plus a cumulative final and to do a set of online homework assignments. The exams were taken in a computer lab and questions were delivered via a computer. According to a study conducted by Yates and Beaudrie, (2009) there is no difference between test grades earned by students taking mathematic courses when the exam

is taken in a proctored environment or in an environment not proctored. In our computer lab there is always at least one proctor and there are cameras covering the students taking the tests.

The course has a set of 38 learning outcomes. The final exam consisted of 40 multiple choice questions, 38 of which were designed to test the students' mastery of the learning outcomes (one question for each learning outcome). The final exams were identical for the two sections. To ensure that the two sections were similar in their demographic makeup, we had the students complete a questionnaire in which they were asked to identify their gender, age, ethnic group, class standing, and college. We also collected the students' GPA information from the university to further compare the two sections.

We used SAS as our statistical software. We used the procedure TTEST. This procedure provides two types of tests: one under the assumption that the variances are equals, and one under the assumption that the variances are not equal. The software automatically performs the test of equality of the variances (F test).

Results

Demographic comparisons: We determined that the majority of students in both sections were male (F2F – 62.24%, VS – 54.35%), white non-Hispanic (F2F – 71.33%, VS – 73.91%), and sophomores (F2F – 57.34%, VS – 58.7%). 99.3% of the F2F section were students in the College of Business (CBA), and 97.83% of the VS section were CBA students. There was no statistically significant difference in GPA between the two groups. There was a statistical significant difference in the average age of the two sections (F2F: 20.9 years, VS: 20 years).

Of the 38 TTESTS we conducted to compare the results on the final exam, only two did not have a statistically identical mean: Question 28 (Learning Outcome 6.1) where the VS students had a mean of 92% and the F2F class had a mean of only 83%, Question 15 (learning Outcome 4.4) where the VS section had a mean of 67% and the F2F section had a mean of 78%. We used a level of significance of 0.05.

Conclusions

Under the current economic condition where Universities are asked to deliver the same quality education with fewer funds, it is important to diversify and look for more economical methods of instructional delivery in order to maximize student achievement. Gagne and Shepherd (2001) found that student performance in a distance course is similar to the performance of students in a face to face course. Our study showed similar results: students taking a face-to-face class are as successful as students taking a video streaming class with an option of face to face.

The adoption of and preference for video streaming classes seems to be increasing among younger and more technically savvy students entering college these days. The average age of the students in our VS class is less than the average age of the F2F class. This contradicts the findings of Toni (2003) in which the study states that most of the Web Based Instruction students are adult students and working professionals. Web-based instruction is not only an option for working professionals that must fit in class around their full time work schedule (as in 2003). In 2009, web-based instruction seems to be more readily adapted by younger generations as their comfort level with technology is greater than that of older students.

Another aspect and benefit of this continued trend toward web-based instruction is the "Go Green" movement. Students no longer have to drive or use mass transit to get to class for F2F instruction – reducing dependence on fossil fuels and carbon emissions. Additionally, offering access to text books, class notes, assignments and tests in a digital format versus print reduces paper consumption and land fill waste.

According to Toni (2003) "It is not the location of education that determines the effectiveness, but the amount of transaction between the learner and the instructor." As the trend of Universities continues to focus on more efficient means of teaching students (higher quantity of students with a lowered operating budget), it falls to the instructor to design courses utilizing all available technology at his or her disposal to increase interaction with students and better accommodate their various learning styles. Holding office hours outside of the lecture or streamed class, making notes and additional supporting material available online, facilitating student discussion and interaction through web-based discussion threads and e-mail, and making tutors available to students: all of these should be options available to students in web-based instruction since it seems the delivery method of the lecture might not be as vital to learning.

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