Work in Progress: Analyzing Educational Methodologies for Electronic Technology Students

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Abstract

The evolution of the educational environment has rapidly evolved over the past decade. The Internet's inclusivity has impacted demographic regions around the world that in many cases have limited educational access. In this paper, we examine our university's educational environments; more specifically, traditional education vs. online education. Of the two, which one is more beneficial for students enrolled in our degree programs? There have been countless debates over which methodology produces better results. However, there are many dynamics that must be considered when attempting to answer that question. Our goal is to research which educational means is most beneficial for a particular student and which is not. Which student demographic performs best in traditional courses and why? Is online education more advantageous for our millennial students? Do non-traditional students require more flexibility but more faculty support? We have taken a sample set of courses which offer traditional and online classes in the College of Science and Technology, analyzed student outcome data and developed a hypothesis on which education method is more effective. We compare achievements in terms of individual effort, group effort and knowledge gained. This information is paramount because it allows us to study the experiences, challenges, and triumphs of our students which will advance the knowledge of faculty and researchers in our college about which strategies offer the most efficient results for future educational methodologies. It will also bring greater understanding of the student experience to College of Science and Technology's mostly underrepresented student experience.

Introduction

The culture of education has changed drastically since the advent of the internet which has allowed the academy to reach the outermost regions of the world; educating persons in the most remote and non-traditional locations. This trend has led to modifications of the trajectory for educational methodologies and bias attitudes resistant to this ever changing environment. Educators have been most affected by the rapid change in climate as they are intrical parts of the learning process. Today's educators must embrace the technological evolution if they want to be an effective instructor in this millennium.

The rise in the demand for online education has increase yearly. About 5.8 million students were enrolled in at least one distance learning course in fall 2014 – up 3.9 percent from the previous fall, according to "Online Report Card: tracking Online Education in the United States," an annual report by the Babson Survey Research Group [1]. This fall, our Electronic Technology degree program will be offered through distance learning to meet the ever pressing demand for distant learning. In order to scale our online learning offering appropriately, administrators need a better understanding of what is most beneficial for our students. In this paper, we take a sample set of STEM courses offered to our Electronic Technology undergraduate and graduate students to examine the student achievement in our degree program. We selected a total of 19 face-to-face and online courses ranging from freshman to graduate course to study a wide range of student

profiles. We excluded any course offering that had laboratory co-requisites to streamline the comparisons for the sample set. The courses were pair (face-to-face with distance learning) according to the year and subject matter giving us nine total comparisons from 2014 through 2016. The total sample set of 302 students.

Background

The millennial educator must be efficient with providing the same content and achieving the same student learning outcomes for students enrolled in distance learning courses as students in traditional classroom setting. This is most often achieved by using a Learning Management System (LMS) like Blackboard to provide course materials. In some cases, pre-recorded lectures and discussion board are used in tandem with textbooks to help facilitate the distance learning process. In addition to the absence of real-time interactions and the subconscious communication clues created by physical classroom setting, there may be a variation in the immediate feedback that instructors can provide the online students and its affects.

So why are so many students demanding the distance learning alternative? Several studies have established that convenience and flexibility are key factors that attract students to enroll in online course work [3]. Online classes are beginning to become a more affordable option than traditional education allowing the student to have the option of taking advantage of the reduced cost and flexibility [4]. The student can establish his/her own pace and choose the best suitable time and place to study. In contrast, few students choose online course work because they believe it will provide a superior learning experience [5].

Are there benefits in pursuing the traditional course route? In a recent research study, many of the students believe that it is easier to learn when the instructor is present [6]. One of these advantages is the experience you receive. For many college students, college life could be considered the "training wheels" of life. It is the time period when you leave home and your responsibilities gradually increase until you a fully responsible for yourself. During that time period, especially if you are living on campus you are exposed to living and learning with other students training for life as well. When receiving a traditional education, the actual college experience includes meal plans, Greek life, sporting events, festivities, etc. [7]

Another benefit of receiving a traditional education is the networking. The environment is comprised of students, faculty and professionals in all degree areas. Prior to graduating, the networking students gained can come from the career center, previous professors, or even alumni. Typically attending to a traditional college aids students in receiving an internship, study abroad and full-time employment positions.

Data Collection

The data discussed in this paper is drawn from universities semi-annual student evaluation survey given to students at the end of each course to evaluate student satisfaction and attitudes about course work taken and instructor performance. This process is voluntary and completely confidential. Surveys are sent out electronically to students near the end of the semester and

information attained is used in the instructor's annual review for continuous improvement, appointment, promotion and tenure review process.

To compare the two methodologies of both traditional and online education, we comprised graphs based on surveys provided to the students to collect their opinions on how they would rate different aspects of the course. For the first analysis, figure 1, students were asked if the course objectives were clearly explained at the beginning of the course. This question is important because it gives the students a road map of what will be cover and what students should have learned in successfully completing the course. We concluded that the face to face students were more satisfied. We also asked the students if the course readings were related
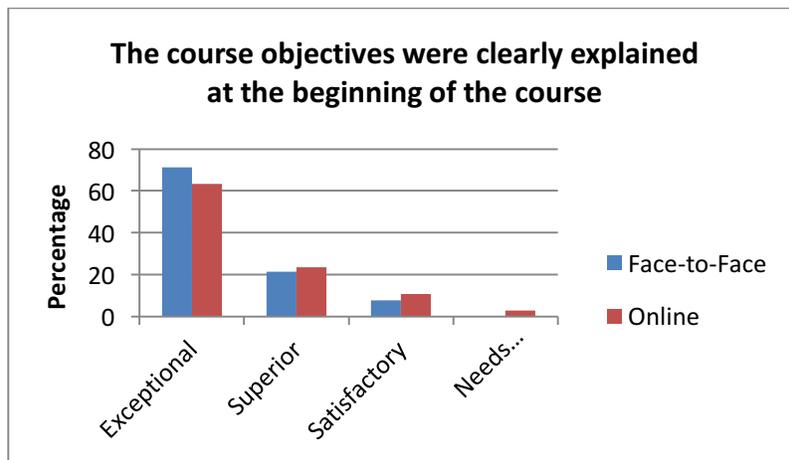

The course objectives were clearly explained at the beginning of the course

Figure 1

to these course objectives? The majority of all students strongly agreed. However, once again the face to face students had 5 percent higher satisfaction rating. The questions then become "Did the teacher provide the same course readings for both class types?" and if so, could supplemental readings for online students increase online student satisfactions?
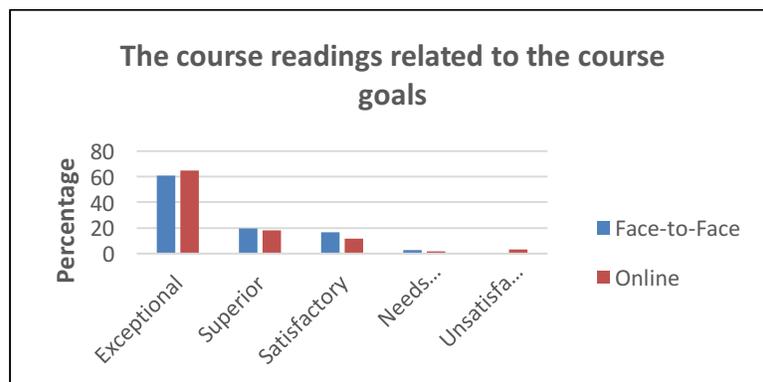

The course readings related to the course goals

Figure 2

Next we examined the instructor's application of course materials as it relates to course assignments and test preparation. In figure 3, we asked the students if the instructor appropriately present practical application of the course material. Again, the face to face students had a higher
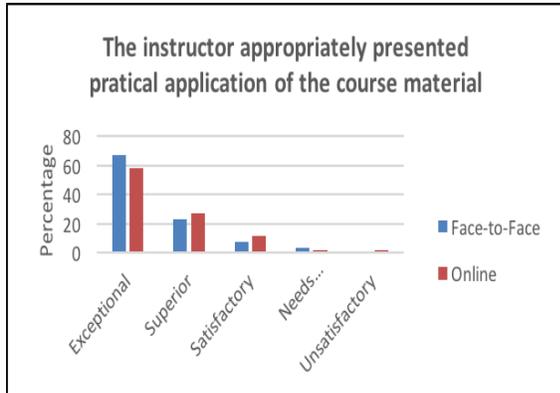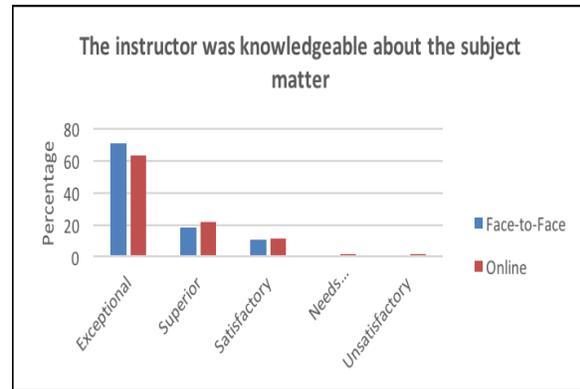

Figure 3

Figure 4

satisfaction rating. In these findings, we had an 8 percent difference in satisfaction. In conjunction, figure 4 illustrates the results of a fundamental teaching question. Was the instructor knowledgeable about the subject matter? In these findings, the face to face students were also more satisfied. The students reported almost 9 percent difference in satisfaction. According to the graph, online students felt that the professor was not as exceptional as the face to face students. Also, a small percent of online students believed that the instructor knowledge about the subject matter "needs improvement" and "unsatisfactory." We followed that question by inquiring if the instructor used examples to clarify course materials. The satisfaction results we about the same.
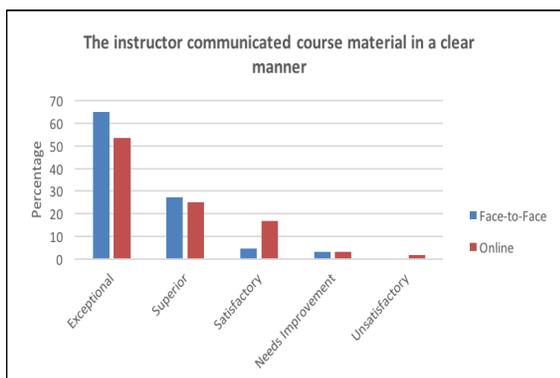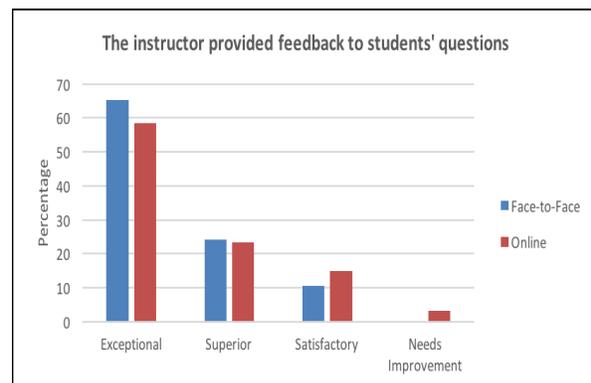

Figure 5

Figure 6

In figure 5, we asked the students if the instructor communicated course material in a clear manner. For this question, we found that online students had a 12 percent higher satisfaction. Another area of investigation was feedback for students (see figure 6). In contrast to the face to

face environment where students generally ask questions during the lecture and feedback is given immediately, many online learning environments questions do not receive instant feedback because the time flexibility that online courses offer does not mandate that the student and instructor be present at the same time. Thus, feedback can be delayed. We found that online students have 5 percent lower satisfaction than the face to face students.

Assessment

The ultimate objective of this paper is to analyze our data collection and use it to improve student learning outcomes and student success for all of the students enrolled in our Electronic Technology degree program. Our goal is to research which educational means is most beneficial for a particular student and which is not. Which student demographic performs best in traditional courses and why? Is online education more advantageous for our millennial students?
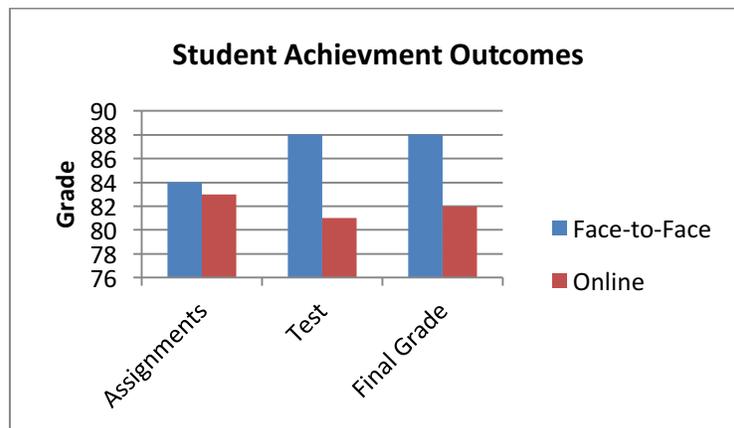

Figure 7

Do non-traditional students require more flexibility but more faculty support? With the data collected thus far, we found that our distance learning students' satisfaction with delivery and content for courses taken in our electronic technology program is less than students enrolled in the face to face courses. We have also found that the student achievement outcomes are less than the face to face students. We examined three areas: Individual effort, group effort and final knowledge gained as shown in figure 7.

We compared the face to face vs. online courses in terms of individual effort (test) to examines what the student is able to achieve independently using only instructor supplied support (lectures, textbook and supplemental resources). We seek to understand how the student-instructor relationship affects the students learning outcomes. For this assessment area, statistics show that our online students score an average of 7 points lower than face to face students given the exact same test. This grading trend was echoed for final grades for both groups. Next we assessed assignments grades where students were encouraged to work on teams (which includes group projects, discussion board and Dropbox) to examine what the student is able to achieve functioning as part of a whole. We seek to understand how the peer to peer relationship affects

students learning outcomes. For this assessment area, there was only a one point grade difference between face to face and online student grades leading us to believe that group assignments are beneficial for improving our online students learning experience.

Future works

In order to further our investigation on how to design our electronic technology degree program to best serve our students, we must to examine the individual demographics of students. For example: work schedule, age, traditional or non-traditional student, family composition, and income level. All of the factor will help us study and understand our student population to create and design curriculums that better serve our demographic. A survey has been created to collect this data. We believe that if we fully understand our students that we are better positioned to design course offering to meet the needs of our student population. We have also included a suggestion for improvement question in the new survey that will allow instructors to continually evaluate and improve course content. The desire is to offer an online electronic technology degree program with comparable statistics of the face to face course offerings.

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