A Longitudinal Comparative Study of Student Perceptions in Online Education

Yehia Mortagy and Seta Boghikian-Whitby
University of La Verne, La Verne, CA, USA

ymortagy@laverne.edu; swhitby@laverne.edu

Abstract

This paper, a subset of a larger experimental longitudinal study, compared students' perceptions over-time of an e-learning environment. This paper includes an investigation of eight beliefs corresponding to three main categories; course activities, interactions with instructors, and interactions with other students. Both face-to-face and online students' perceptions were measured over eight years, in a course designed using Chickering's Seven Principles of Good Practices and the constructivist approach to course activities. The study found that there was a change over time in students' perceptions and that the students included in the study were satisfied with course activities and interactions with other students. Additionally, the data indicates that online students believe faculty have high expectations and are available to interact, communicate, and present quality feedback to students. The findings of the paper support the opinion that in order to ensure a return on student's online education investment, colleges and universities should consider following research-based validated frameworks and benchmarks during the planning, designing, delivering, and assessing of online education. The success of an online course depends on effective course design using a student-centered model, delivery, and assessment.

Keywords: assessment, critical thinking skills, e-learning, face-to-face, faculty-student interaction, faculty availability, learning outcomes, online learning, student-student interaction.

Introduction

Higher education is undergoing a paradigm shift by integrating online courses into the curriculum (DiSlavio, 2008) and online course enrollment is growing exponentially. In 2007, a U.S. Department of Education study stated there were 12.2 million student enrollments in online courses in the 2006-2007 academic year, a dramatic increase over the 3,077 million student enrollments in the 2000-2001 academic year (Salimi, 2007). Moreover, 66% of online course offerings were in two and four year colleges and universities with 65% of the institutions reporting their courses were for credit. The report stated, *"Asynchronous course delivery is the most widely used teaching modality"* (Means, Toyama, Murphy, Bakia, & Jones, 2009, p. 2).

However, there are many misconceptions and misgivings regarding online education in spite of its longevity (offerings began in the 1990's (Allen & Seaman, 2007)) and popularity. For example, one misconception is that *"Online learning is only for people who are in remote locations"* (Li & Akins, 2005, p. 55). In addition, discussions about online education continue to lack consensus among the academic community,

Editor: Nicole Buzzetto More

which has led to the persistence of several contradicting perceptions. For example, Dublin (2004) identified 25 controversial issues concerned with the expectations in online education, online teaching, and online learning in higher education.

In this paper (which is a subset of a larger study) the authors investigated eight beliefs that dealt with student perceptions of online education. The issues selected are based on Chickering and Ehrmann's (1987) Seven Principles of Good Practice including *"encourages contact between students and faculty, develops reciprocity and cooperation among students, encourages active learning, gives prompt feedback, emphasizes time on task, communicates high expectations, and respects diverse talents and ways of learning"* (p. 1). This paper concentrates on students' perceptions as customers of an online education as a product.

This research used face-to-face student perception in order to set a benchmark, which allowed two areas of study: (1) Has there been any change over time in the perceptions of online students? and (2) Has there been a similar change in face-to-face students' perceptions or is the slope of the change sufficiently different to conclude distinctive changes in online students' perceptions? For example, in order to evaluate students' perceptions of faculty expectations the study measured the perceptions of students in face-to-face and in online classes over an eight year period. Furthermore, this study compared the differences between the two groups and investigated whether students' perceptions had changed over time using regression analysis. Therefore, this study is able to explain opposing research findings that may have appeared over time, and to report on current students' perceptions of online education.

This study sought to evaluate students' perceptions in three distinct areas: faculty-student relationship, satisfaction with course activities, and student-to-student interactions. The three areas resulted in eight different assertions concerning students' perceptions about online education. The assertions are: (1) Online faculty members have low expectations; (2) Online faculty members are not available to students: (3) Online classes have no faculty-to-student interactions; (4) Online faculty don't provide good quality feedback; (5) Online students are dissatisfied with course activities; (6) Online students do not have flexible time to complete assignments; (7) Online students do not use critical thinking skills; and (8) Online students feel isolated: there is no student-to-student interactions.

The remainder of this paper is organized as follows: a review of literature dealing with each of the eight issues listed above, research methodology, timeline, demographics of study population, course development, findings and discussion, contributions and limitations, and conclusions and recommendations for future research.

Literature Review and Hypotheses Development

The literature review was organized as follows: introduction of an assertion concerning online courses, one or two examples of contradictions, and hypotheses to support or reject the contradictions.

Assertion 1: Online Students Perceived That Online Classes are Easier or Faculty Members Have Low Expectations

Li and Akins stated, "*Online teaching and learning is quick and easy*" (2005, p. 56). They believed that people, including administrators, faculty, and students, who had never taught or studied online perceived that online classes were easy. They explain; that this perception led to the belief that faculty members who taught online courses must have very low expectations.

Pan, Sivo, Gunter, & Cornell (2005) found different student perceptions among different disciplines. In their study, online education worked better with psychology majors than with engineer-

ing students. Psychology majors perceived that faculty members had clear and high expectations and were satisfied with course activities. On the other hand, engineering majors found faculty members' expectations unclear. Pan et al. (2005) suggested that faculty members should address students' concerns in order to improve students' attitudes in online education. They advised faculty to selectively use available technological features in virtual management systems that best facilitated effective course activities and increased learning outcomes. DeVillers emphasized, "Technology is a tool and a medium, but not the message itself" (2007, p. 19).

Dobbs, Waid, & del Carmen (2009) studied students' perceptions of online course experiences. The study, which included 180 students taking online classes and 100 students taking face-to-face classes, reported that students perceived that traditional face-to-face courses were easier than online courses. In addition, students who had never taken any online courses had totally different perceptions about online education compared to students who had taken online courses. Students who had never experienced online education perceived that faculty have low expectations, whereas students who experienced online courses believed that faculty have high expectations. Moreover, the study found a correlation between students' perceptions and number of courses completed; the higher the number of online courses students taken, the higher the perception of faculty having high expectations and the stronger the acceptance of online courses.

Another study (Wyatt, 2003) revealed that students, who took online classes because they were convenient, found the courses more demanding, sometimes overwhelming, and that faculty had very high expectations compared to face-to-face courses. This resulted in a high dropout rate. Furthermore, the study found a high correlation between student age and the perception that online instruction provided a high quality experience; the older the student, the higher the perception.

Therefore, in order to investigate the assertion, the following is hypothesized:

Hypothesis # 1: Faculty have lower expectations of online students than face-to-face students.

Assertion 2: Online Faculty Members Are Not Available to Students

A study by Dublin (2004) found that online learners knew what to expect; they expected immediate reply to their e-mails. According to the findings, student considered faculty not available if they did not receive a reply to their e-mails within 24 hours.

Advancements in technology, such as mobile phones, have elevated this expectation to a higher level. A Recruitment and Retention survey conducted by the Noel-Levitz, Inc. (2006) indicated that online students want more faculty availability, better instructional quality, and better quality feedback.

Contrary to the above, Billings, Skiba, & Connors (2005) examined the differences between undergraduate and graduate students' perceptions of best practices in online education. The study investigated generational differences between undergraduate and graduate students and how that affected their perceptions about online education. The study reported that graduate students spent more hours per week on their courses and needed more faculty member's attention compared to undergraduate students. Moreover, since undergraduate face-to-face classes tended to be large, undergraduate students were satisfied by communicating with faculty members via e-mail. As a result, the study reported, that faculty availability to students in online courses was less satisfactory to graduate students compared to undergraduate students (Billings, et al., 2005).

Therefore, the following is hypothesized:

Hypothesis # 2: There is no difference in students' perception of faculty availability between online and face-to-face students.

Assertion 3: Online Classes Have No Faculty-to-Student Interactions

"Online learning is a one way learning process, teacher-to-student in a given time block" (Li & Akins, 2005, p. 58). Students enrolled in online education characterized themselves as different compared to students in face-to-face classes. They had different needs and different expectations. Therefore, they perceived that faculty-to-student interaction and student-to-student interactions were more characteristic of on-campus courses and that those factors were not important (Wilkes, Simon, & Brooks, 2006).

The literature was clear about students' desires with respect to online education. Students continuously rated student to student and faculty-to-student interactions as important factors (Sher, 2009) with faculty-to-student interactions reported as being of greater significance (Marks, Sibley, & Arbaugh, 2005; Tucker, 2001).

Therefore, the following is hypothesized:

Hypothesis # 3: There is no difference between online and face-to-face students in their perceptions of the level of faculty interactions with students.

Assertion 4: Online Faculty Does Not Provide Good Quality Feedback

"Communication is about telling" (Dublin, 2004, p. 292). Faculty members teaching online tend to broadcast their messages to the entire class. Sometimes, those messages are very short and general. After a while those messages are treated like spam advertisements and students simply do not pay attention to them.

Tanner, Noser, & Totaro (2009) replicated a comparative study conducted by Wilkes et al. (2006) to generalize students' and faculty members' perceptions in online courses and degree programs. The study confirmed that faculty perceptions of feedback were different from students' perception of feedback. In addition, the study recommended that administrators who are planning on offering online courses should take students' perception into consideration; they should address the concerns and anxieties of both students and faculty before making decisions (Tanner et al., 2009).

At the same time, the Recruitment and Retention Survey conducted by the Noel-Levitz, Inc. (2006) indicated that online students want better personalized quality feedback.

Therefore, the following is hypothesized:

Hypothesis # 4: The quality of faculty feedback (in terms of quality and timeliness) is perceived to be less by online students than by face-to-face students. This hypothesis is addressed by two sub-hypothesis.

Hypothesis # 4.1: There is no difference between online and face-to-face students' perceptions of the quality of faculty feedback.

Hypothesis # 4.2: There is no difference between online and face-to-face students' perceptions of timely communication from faculty.

Assertion 5: Online Students Are Dissatisfied With Course Activities

A common perception is that *"Online learning is limited to content learning"* (Li & Akins, 2005, p. 49). However, a study by Schilling (2009) used a textual delivery format for one group and multimedia course enhancement system for another group. The study examined internet-based and telehealth models for delivering health information to consumers. Data demonstrated that students using a multimedia course enhancement system had significant improvement in engagement with course materials and with student-to-student interaction. Further, students' attitudes and perceptions were positive in the course evaluation (Schilling, 2009).

Dennen (2005) conducted a cross case analysis of nine naturalistic case study online classes. Her findings reflected that rubrics, deadlines, feedback, and faculty presence affect the learning of students in online courses. She reported that integrating discussions in class activities correlated with student motivation, participation, and overall satisfaction with course activities.

Therefore, the following is hypothesized:

Hypothesis # 5: There is no difference between online and face-to-face students' satisfaction with class activities.

Assertion 6: Online Students Do Not Have Flexible Time to Complete Assignments

A common misconception regarding online students is the availability of flexible time to complete assignments. Huett, Moller, Foshay, & Coleman (2008) studied student, faculty, and administrators' perceptions. The study found that online students were not in favor of synchronized chats due to time constrains and lack of time flexibility. They recommended that faculty members should not treat online courses the same as face-to-face course and should consider integrating flexibility to complete assignments in their online course design. Moreover, they recommended that administrators and faculty members attempting to teach online courses should start thinking outside the box, and collaborate with each other to advance the common vision of online education.

In the medical field, flexibility is a major factor in the success of online education. Another study reflected that students perceived the online delivery modality was convenient, flexible, and appropriate to their needs. Moreover, they included time flexibility to complete assignment as a critical factor, among other factors, in the success of online education (Dyrbye, Cumyn, & Heflin, 2009). Another study compared working adults with traditional students' perception on communication and time flexibility. The study reported that working adults scored lower on communication flexibility than traditional students (Booth-Butterfield, 1998).

Therefore, the following is hypothesized:

Hypothesis # 6: There is no difference between online and face-to-face classes in students' perceptions of the flexibility of time to cover course material.

Assertion 7: Online Students Do Not Use Critical Thinking Skills

Is critical thinking skill a "buzz phrase?" Kuhn presented the first model of critical thinking that began with the question, "Do we really know what critical thinking is?" (1999, p. 16). Since that time, the academic community has gradually adopted the model, fostered and assessed critical thinking skills in their pedagogy, and recognized when students are using critical thinking skills (Osborne, Kriese, Tobey, & Johnson, 2009).

The literature reflected a lack of evidence about the existence of critical thinking skills activities in online education. One of the misconceptions that sparked as a result includes: *"Learners' responses to discussions cannot evolve"* (Li & Akins, 2005, p. 56). The academic community constantly mentioned the misconception that critical thinking skills were implemented in online education. Beckett-Camarata (2007) investigated the existence of critical thinking skills in online courses. She reported that many online courses fail to integrate critical thinking skills in their courses.

However, the literature also reflected that case studies and asynchronous discussions included in online courses can encourage students to apply critical thinking skills (Buzzetto-More, 2008; Sanders & Morrison-Shetlar, 2002). In a study of MBA students, Hay, Peltier, & Drago (2004) presented a reflective learning framework. After measuring the framework in online and traditional classes, they insisted that online management education was capable of encouraging higher levels of learning including critical thinking skills. They identified the key success factors as student-to-student interaction, role of faculty, and course content activities.

Therefore, the following is hypothesized:

Hypothesis # 7: There is no difference between online and face-to-face students in their perceptions of the level of critical thinking needed in the class.

Assertion 8: Online Students Feel Isolated; There Is No Student-to-Student Interaction

Another common assertion is *"Online teaching and learning promote isolation, lack of community"* (Li & Akins, 2005, p. 53). A study examined MBA students' perception about student-to-student interaction in an online class modality. They reported that 64.5% of students did not perceive student-to-student interactions as an integral part in their learning outcome. They identified three possible reasons: time inefficiency, interaction dysfunction, and flexibility intrusion. They concluded that undergraduate students' needs might not be the same as graduate students' and recommended taking student-to-student interactions into consideration during future new course development stages (Kellogg & Smith, 2009).

On the other hand, Mash et al. (2006) stated that students valued interaction in online learning programs. The study showed statistically significant differences in faculty-to-student interactions and student-to-student interactions when comparing face-to-face to online class delivery modalities. However, more flexibility and better paced instructional design was recommended (Bloxham & Armitage, 2003).

A study by Easton and Katt (2006) compared face-to-face and online courses in social science and investigated students' perceptions on the effect of social learning expectations and experiences of students with regard to motivation, comfort, and learning outcomes. The experiment consisted of three sections of the same course taught by three different instructors. One of the sections was online and the other two were in face-to-face modalities. The results indicated that students in all groups started the class with the same expectations. However, there was a difference in experience. The study concluded that differences in experiences were not a result of delivery modalities between face-to-face versus online and that social learning experiences were positive regardless of delivery modality.

Finally, according to Brannan (2005) online education consists of three critical interactions: student-to-content interactions (class activities), student-to-student interaction, and faculty-to-student interactions. In a study by Marks et al. (2005) students rated faculty-to-student interactions twice as high as student-to-student interactions.

Therefore, the following is hypothesized:

Hypothesis # 8: There is no difference between online and face-to-face students' satisfaction in the level of student interactions in the class.

Methodology

In this research, a longitudinal quasi-experimental design was used to collect data for the study. A combination of Chi Square tests, weighted average, regression analysis, and ANOVA were used to analyze the data. This is a work-in-progress study. This study considers the face-to-face control group as a benchmark. It evaluated online students' perceptions with respect to face-to-face students' perceptions.

Timeline

The current data covers 8 years (16 semesters). The experiment began in Fall 2001. Time was represented using calendar year; each year consisted of two semesters (fall and spring) except for 2001 and 2009 (Fall 2001 and Spring 2009) that were single semesters.

Population

The participants were 664 undergraduate students enrolled in a Management of Information Systems class at a private university in Southern California. A total of 316 students were enrolled in the traditional face-to-face class. Their ages ranged from 18 to 50 years with the average age being 23. A total of 131 students were female and 185 students were male. The online class consisted of 348 students. Their ages ranged from 19 to 79 years with the average age being 34. A total of 193 students were female and 155 students were male (see Table 1).

Table 1: Population By Gender

COURSE \ GENDER	FEMALE	MALE	TOTAL
Face-to-face	131	185	**316**
Online	193	155	**348**
Total:	**324**	**340**	**664**

Course Development

The Management of Information Systems class was a required course for all Computer Science and Business Administration majors. In addition, students from different disciplines frequently enrolled in the course because the course satisfied a Social Science General Education requirement. The university is a liberal arts school that offers doctoral, masters, and baccalaureate degrees in liberal arts, sciences, education, and professional studies.

One of the authors of this paper developed and taught both face-to-face and online courses. The researcher designed the course with a learner-centered model in mind. She integrated two research based models and theories. First, Chickering and Ehrmann's (1987) Seven Principles of Good Practice theory was incorporated in the course design. Secondly, constructivist instructional model elements were used in the development of course assignments and activities - such as exploration, real word relevance, self reflection, scaffolding, dividing the class into teams to create social negotiation and collaboration, self assessment, team assessment, and faculty assessment (Koohang, 2009, p. 95). Except for the syllabus and lecture notes, the course was conducted as a paperless class.

Both online and face-to-face students studied the same course contents; they completed the same homework assignments; they were allotted the same time for completion of assignments. All students were given the same pre-test, Myers Briggs test, homework, research paper, weekly quizzes, weekly case study facilitation and discussion, and post-test (final exam). The pre-test and post-test were identical. The pre-test was administered the first week of the semester before the beginning of the course. The post-test was administered at the end of the semester. The pre-test / post-test exam consisted of 100 questions (true / false and multiple choice). Students were grouped in teams of twos and threes depending on the size of the class. Each team took turns facilitating the case study discussions. All homework assignments were graded using the same grading rubric for both sections. Additionally, every student was required to complete a research paper by the end of the semester.

All students filled out a fact sheet survey at the beginning of the semester (demographic information about the students); they took a midterm evaluation survey in the middle of the semester; and they filled out the final assessment survey at the end of the semester. The survey used a 7 point Likert scale, and the analysis of this study was from the data collected. Finally, all students took the official course evaluation survey administered by the university's institutional research department.

Other similarities were that both classes used Blackboard as the course management system and both classes were able to contact the faculty via e-mail and telephone at all times. Additionally, both classes were required to participate in case study class discussions. In the face-to-face class, students participated using a synchronized chat feature in the computer lab; in the online class, students participated asynchronously using the discussion board on Blackboard. Both classes turned in their homework assignments using the digital drop box or the discussion board in Blackboard. The faculty used the same rubric to correct all assignments.

The classes differed in the following ways:

> Scheduling: the face-to-face class met on Tuesdays and Thursdays from 9:40 – 11:10 a.m. with the faculty present; course material for the online class was posted on Blackboard and students had a deadline to turn their assignments by midnight on Sundays;
>
> Attendance: the faculty member provided 5 points for attending class in face-to-face course (2% of grade); online students were required to e-mail the faculty on a weekly basis to earn their 5 points of attendance;
>
> Instruction: in the face-to-face class the faculty lectured using PowerPoint slides to keep focused on the topic; in addition, the faculty provided the class with the lecture notes; in the online class, even though the lectures were posted on Blackboard, the same lecture notes were mailed to students.

Findings

This section lists the results of the research. Each subsection starts with the hypothesis under consideration, the actual question in the instrument that the students answered. The results were tabulated using Chi Square test; if appropriate, the weighted average for each hypothesis was calculated. The process was duplicated for face-to-face and online class modality. Finally, and when appropriate, a regression analysis was generated to study the relationship over time. The regression analysis tables are available upon request.

Hypothesis # 1: Faculty has lower expectations of online students than face-to-face students.

There is no significant difference between face-to-face and online students in their perception of faculty expectations of their performance.

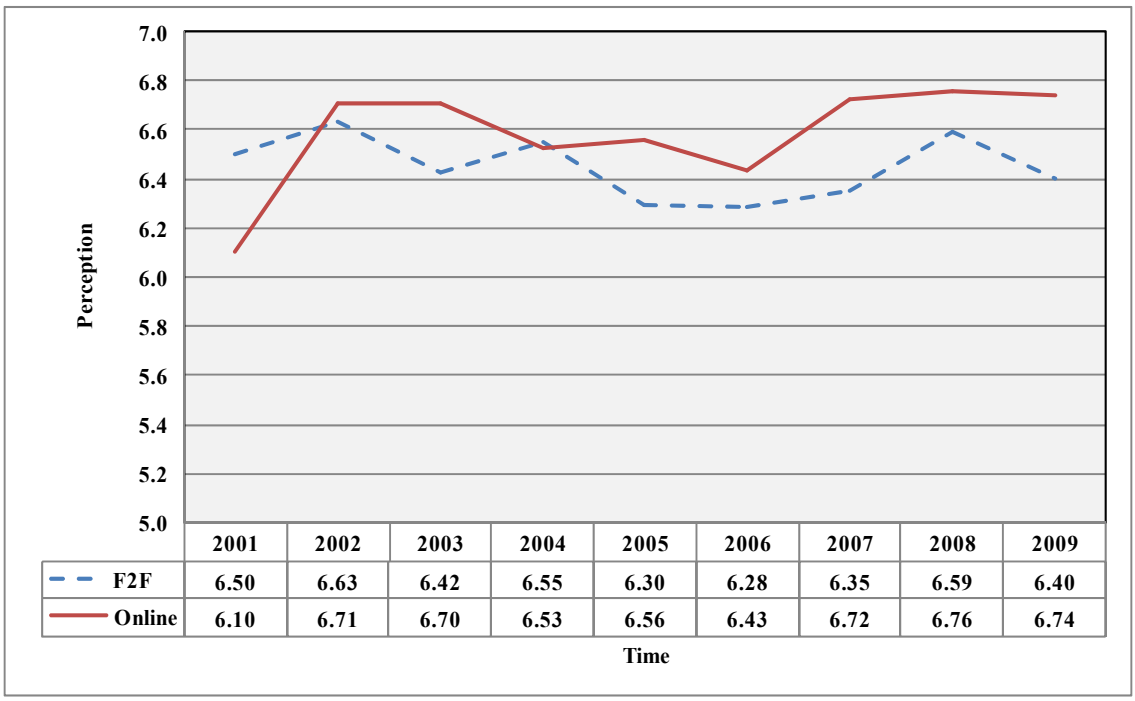
The survey asked the students in two class modalities, face-to-face and online, to provide their perceptions with the following statement: "Faculty had high expectations of student performance."

This study did not support this hypothesis. Online students perceived the faculty had higher expectations compared to face-to-face students. Table 2 presents the result of a Chi square test, which rejected the hypothesis with a $P < 0.000$. The second half of the table reflects the average for the Likert scale statement by class modality. The mean of the face-to-face students' was 6.44, while the mean of the online students was 6.63. This implies that online students' perception of faculty expectations of student performance was higher than face-to-face students.

Table 2: Students' Perception of Faculty Had High Expectations

CHI SQUARE / AVERAGE	VALUE
Chi Square	8.70177E-05
Reject hypothesis #1	Yes
Average	
Face-to-face	6.44
Online	6.63

However, in order to further investigate the various results of prior research, we performed regression analysis on our data to investigate the changes that occurred over time. We found that in earlier years, online students had less support for the notion that faculty had high expectations for students. This, however, changed over time and the difference appeared to increase. The regression analysis showed that time as a variable might be used to explain 32% of the variability of the online student perception. The data proved that faculty perception was not always the same as the students' perceptions (Tanner et al., 2009). In the first semester, the faculty member failed to efficiently communicate her expectations with the students. At the end of the semester, she found out that students were not reading her feedback (see Figure 1).



	2001	2002	2003	2004	2005	2006	2007	2008	2009
F2F	6.50	6.63	6.42	6.55	6.30	6.28	6.35	6.59	6.40
Online	6.10	6.71	6.70	6.53	6.56	6.43	6.72	6.76	6.74

Figure 1: Faculty Had High Expectations

Faculty Student Relations

The second section of the research examined faculty-student relations. This factor was further divided into several dimensions. The first was faculty availability to students (Hypothesis 2), the second was faculty interactions with students (Hypothesis 3), and the third was faculty communication with students, which was further divided into quality of faculty communication (Hypothesis 4.1) and its timeliness (Hypothesis 4.2).

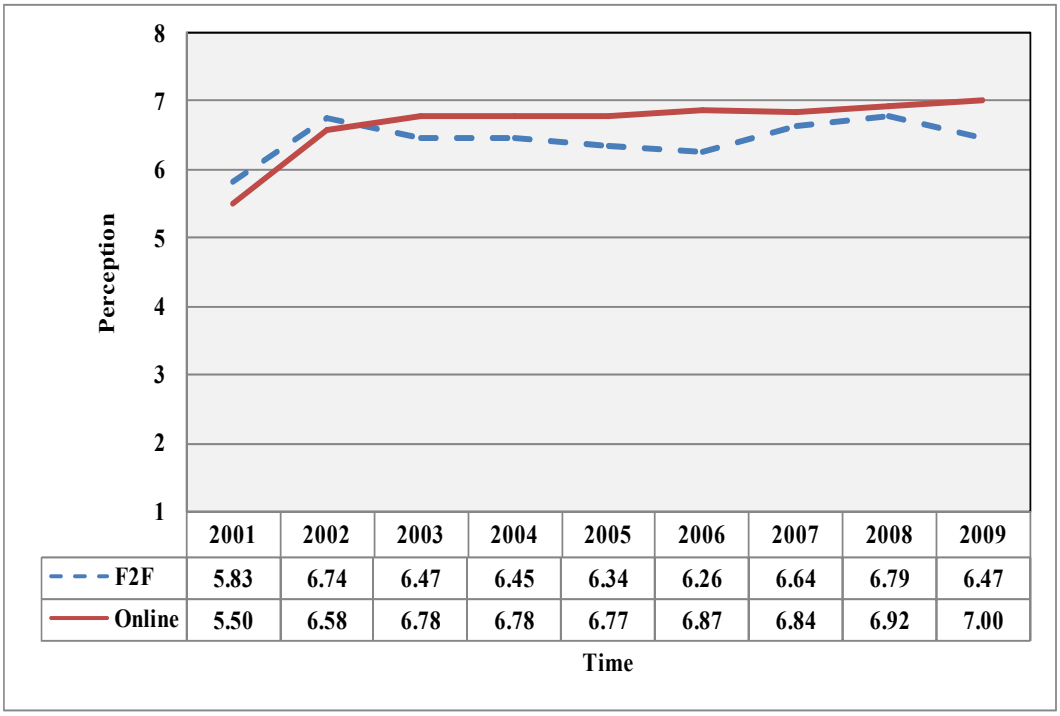
Hypothesis # 2: There is no difference in students' perception of faculty availability between online and face-to-face students.

The survey asked the students to evaluate the statement, "Faculty was available to students." Our findings did not support the hypothesis that there was no difference between face-to-face and online students' perception of faculty availability (see Table 3). Support for the Likert scale statement was 6.48 for face-to-face students, while it was 6.76 for online students.

Table 3: Students' Perception of Faculty Availability

CHI SQUARE / AVERAGE	VALUE
Chi Square	7.5685E-08
Difference	Yes
Average	
Face-to-face	6.48
Online	6.76

In an attempt to explain the discrepancies found between this and previous research studies, we performed regression analysis over time for each type of class modality (face-to-face and online). Figure 2 presents the trend line for each class modality, which shows an increase in perception over time for online students, while the perception level for face-to-face stayed flat over the same period. The regression analysis and ANOVA did not support a linear relation between time and face-to-face student perception. However, there was support for such a relation between time and online students. According to the regression analysis, time as a variable explains 52% of the variability in online student perception.



	2001	2002	2003	2004	2005	2006	2007	2008	2009
F2F	5.83	6.74	6.47	6.45	6.34	6.26	6.64	6.79	6.47
Online	5.50	6.58	6.78	6.78	6.77	6.87	6.84	6.92	7.00

Figure 2: Faculty Availability

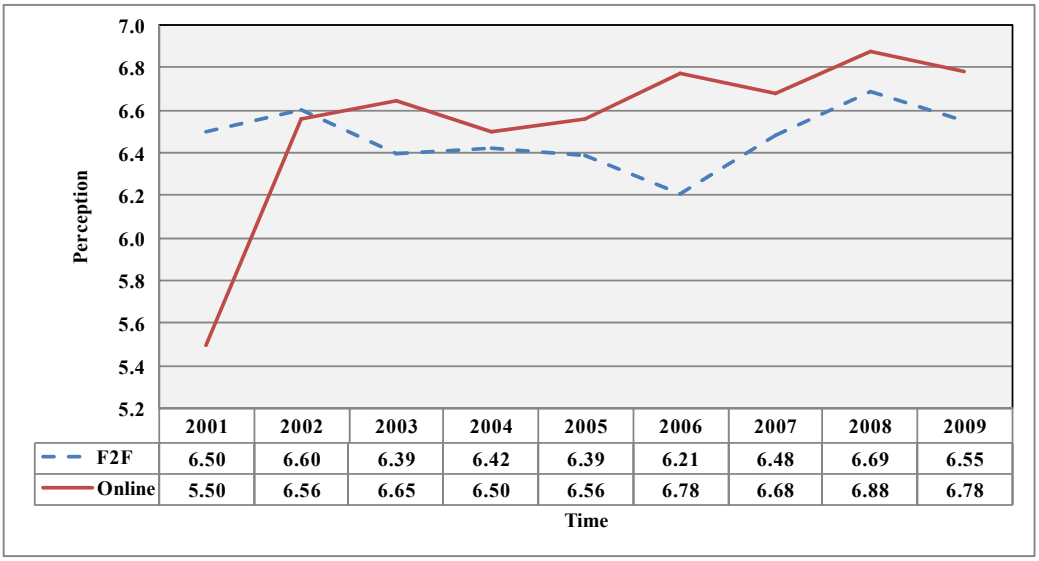
Hypothesis # 3: There is no difference between online and face-to-face students in their perception of the level of faculty interactions with students.

The survey asked the students to evaluate the statement, "Faculty interaction with students was satisfactory." The research did not find support for this hypothesis at $p < .000$ (see Table 4). In other words, online students believed more strongly, than face-to-face students, that faculty interaction was satisfactory. The average for face-to-face students was 6.45 (using the same Likert seven point scale as before) while the average for online students was 6.63.

Table 4: Students' Perception of Faculty Interactions with Students

CHI SQUARE / AVERAGE	VALUE
Chi Square	1.46727E-07
Difference	Yes
Average	
Face-to-face	6.45
Online	6.63

In an attempt to explain the discrepancies found between previous research studies, we performed regression analysis over time for each type of class modality (face-to-face and online). Figure 3 presents the trend line for each class type, which showed an increase in support over time for online students, while the support level for face-to-face stayed fairly constant over the same period. In addition, the regression analysis showed that time as a variable explained 50% of the variability in the faculty interaction, while the regression analysis and the corresponding ANOVA did not support a linear relation between time and faculty interaction for face-to-face students.



	2001	2002	2003	2004	2005	2006	2007	2008	2009
F2F	6.50	6.60	6.39	6.42	6.39	6.21	6.48	6.69	6.55
Online	5.50	6.56	6.65	6.50	6.56	6.78	6.68	6.88	6.78

Figure 3: Faculty Interactions

Hypothesis # 4: There is no difference between face-to-face and online students in their perceptions of faculty communication.

As previously stated, this hypothesis was further divided using two dimensions. The first examined the quality of communications and the second examined timeliness. The students were asked to assess the statements, "Faculty provided helpful quality feedback on assignments," and "Faculty gave notification after every posted update." Hence, hypothesis #4 has two sub-hypotheses:

Hypothesis # 4.1: There is no difference between online and face-to-face students' perceptions of the quality of faculty feedback.

The research findings did not support the hypothesis (rejected with $p < 0.000$) there was no difference between face-to-face and online students in the quality of faculty feedback. Online students' Likert scale statement average was 6.58 while face-to-face students' average was 6.29 (see Table 5).

Table 5: Students' Perceptions of The Quality of Faculty Feedback

CHI SQUARE / AVERAGE	VALUE
Chi Square	5.97084E-07
Difference	Yes
Average	
Face-to-face	6.29
Online	6.58

In an attempt to further investigate the difference, we conducted regression analysis on the data with time as the independent variable and perception of quality feedback as the dependent variable. Figure 4.1 presents the scatter diagrams for both class modalities. The regression analysis showed that there was no support for a sloped linear relation between perception of quality feedback and time for face-to-face students ($p = 23$). At the same time, it suggested there was a positively sloped linear relationship between online students' perceptions and time. Furthermore, 65% of the variability in online students' perceptions was due to time.

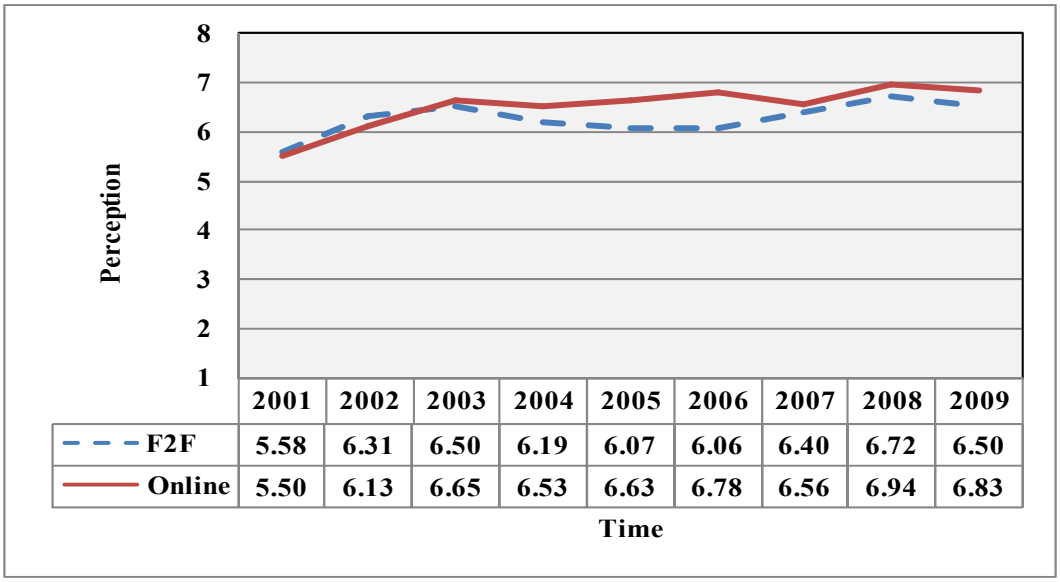


Figure 4.1: Quality Feedback

Hypothesis # 4.2: There is no difference between online and face-to-face students' perceptions of timely communication from faculty.

Our findings did not support the hypothesis there was no difference between face-to-face and online students' perceptions of timely communications with a $p < 0.000$ (see Table 6). Support for the Likert scale statement was 6.19 for face-to-face students, while it was 6.58 for online students. In other words, online students believed there was better (more timely) feedback from faculty than face-to-face students.

Table 6: Students' Perception of Timely Communication From Faculty

CHI SQUARE / AVERAGE	VALUE
Chi Square	2.28614E-11
Difference	Yes
Average	
Face-to-face	6.19
Online	6.58

In order to study how this perception evolved over time, Figure 4.2 presented the scatter diagram for both class modalities. In addition, the result of regression analysis did not support a linear relation between time and face-to-face students' perceptions of timely notification. On the other hand, there was a strong linear relation between time and online students' perceptions. ANOVA results indicated that 71% of the variability in students' perceptions may be explained by time.

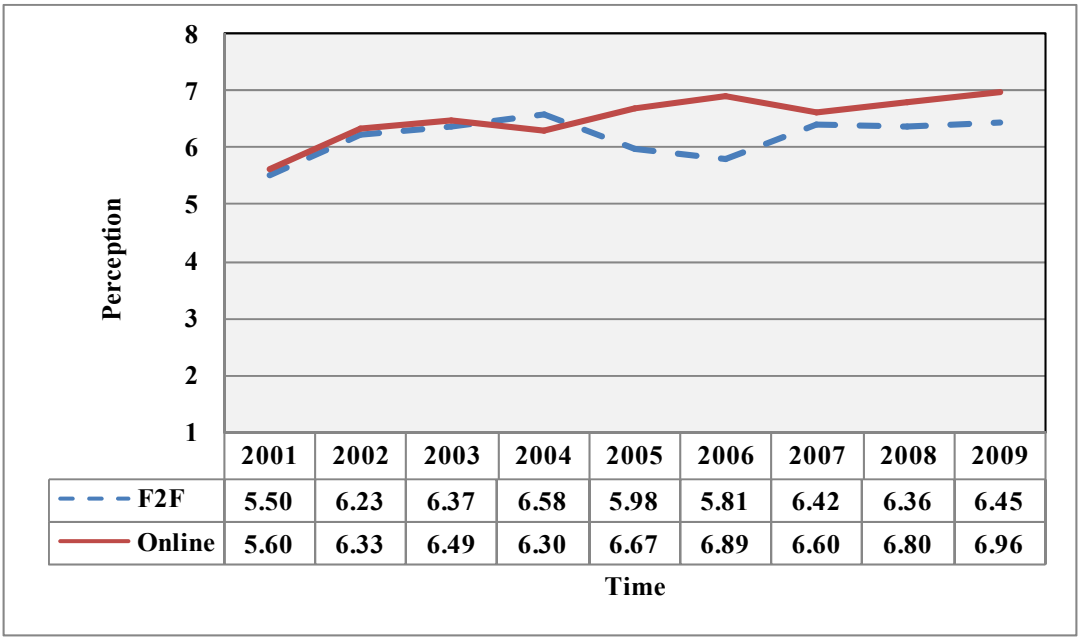


Figure 4.2: Timely Communication

Satisfaction with Course Activities

Hypothesis # 5: There is no difference between online and face-to-face students' satisfaction with class activities.

The survey asked the students to evaluate their support of the statement, "Course activities were satisfactory." The result of the Chi Square test is shown in Table 7. The analysis did not support the hypothesis. There was evidence to suggest that students in the two class modalities had different points of view with online students more satisfied than face-to-face students (average support of the statement is 6.15 for face-to-face and 6.28 for online students).

Table 7: Students' Satisfaction with Class Activities

CHI SQUARE / AVERAGE	VALUE
Chi Square	0.042038341
Difference	Yes
Average	
Face-to-face	6.15
Online	6.28

In order to investigate the difference between the two groups and to clarify some of the previous research results described earlier in this paper, we performed regression analysis studying each class modality over time. Figure 5 presents the scatter diagram for each class modality. The regression analysis did not support a linear relation between face-to-face student support and time, while there appeared to be a relation between online student support and time. Time explained 53% of the variability in online student satisfaction with course activities.

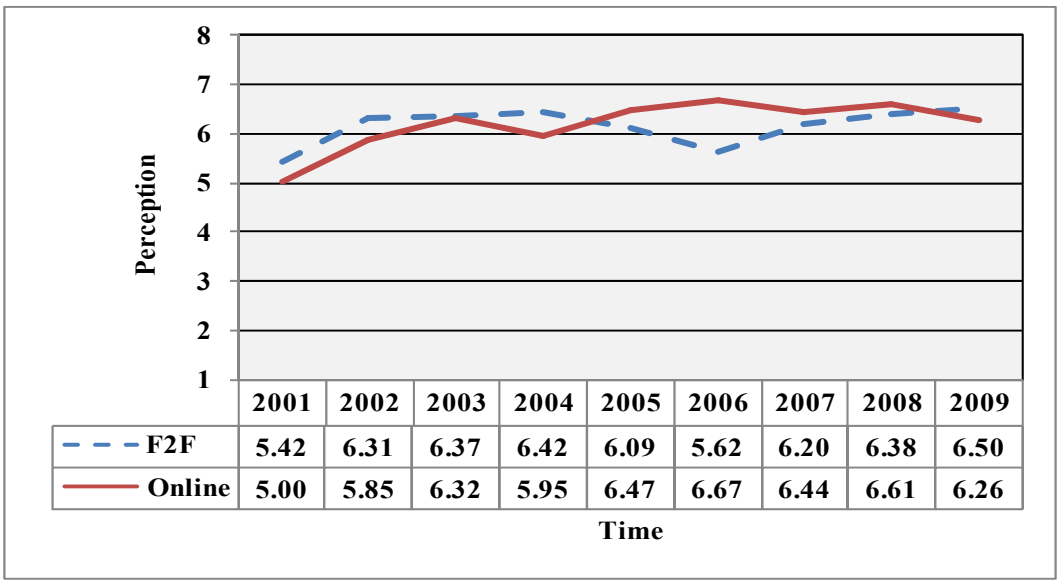


Figure 5: Satisfaction with Class Activities

Hypothesis # 6: There is no difference between online and face-to-face classes in students' perceptions of the flexibility of time to cover course material.

The survey asked the students to evaluate the statement, "Students had flexible time to cover material within a week." The results of the Chi Square test are shown in Table 8. The analysis did not reject the hypothesis that there was no difference between face-to-face and online students in their perception of time flexibility.

Table 8: Student Time is Flexible

CHI SQUARE	VALUE
Chi Square	0.65673195
Difference	No

Hypothesis # 7: There is no difference between online and face-to-face students in their perceptions of the level of critical thinking needed in the class.

The survey asked the students to evaluate the statement, "Students used critical thinking skills". Our research found no support (with $p < 0.05$) for the statement that there was no difference between the perception of the face-to-face students and online students in the level of critical thinking skills required in each class. Online students supported the statement more than face-to-face students. The average support by online students was 6.41, while that of the face-to-face students was 6.30. Table 9 presents the result of the analysis.

Table 9: Critical thinking expectations	
CHI SQUARE / AVERAGE	**VALUE**
Chi Square	0.014983178
Difference	Yes
Average	
Face-to-face	6.30
Online	6.41

Further analysis using regression techniques found that the average support for the statement was less for online students than face-to-face students in the early years (2001). However, online student support increased gradually over the years and surpassed that of face-to-face students, while it stayed stable for face-to-face students (see Figure 6 for chart). The regression analysis did not support a linear regression relation between time and face-to-face students' perceptions of critical thinking. At the same time, the analysis found a strong linear relation between online students' perceptions and time (with $p < 0.014$). Furthermore, time as a variable might be used to explain 53 % of the variability of online students' perceptions.

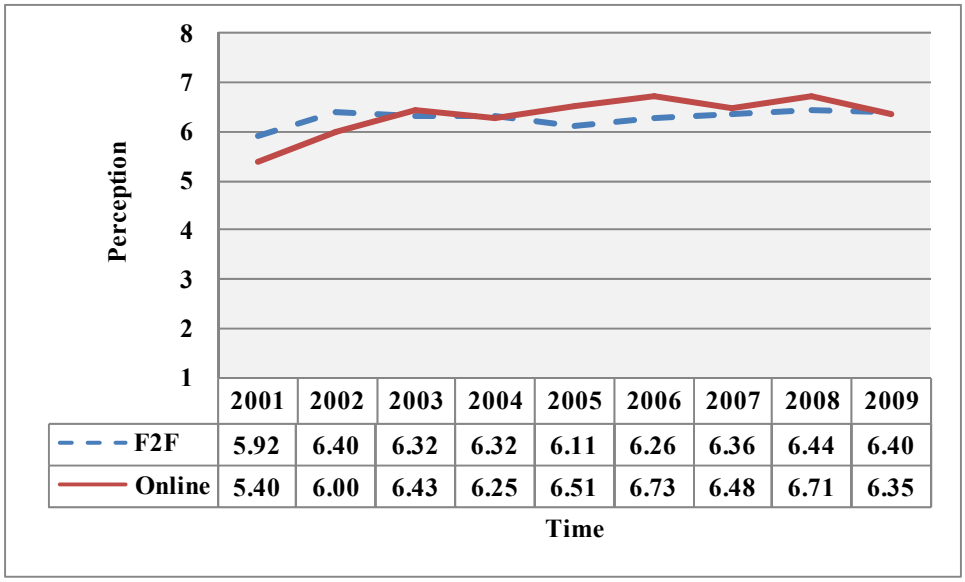


Figure 6: Critical Thinking Expectations

Student-to-Student Interaction

Hypothesis # 8: There is no difference between online and face-to-face students' satisfaction in the level of student interactions in the class.

The survey asked the students to evaluate the statement, "Student interaction with other students was satisfactory." The result of the Chi Square test is shown in Table 10. The analysis did not reject the hypothesis that there was no difference between face-to-face and online students in their perception of the level of interaction.

Table 10: Student-to-student interactions	
CHI SQUARE	**VALUE**
Chi Square	0.193744414
Difference	No

Discussion

One of the major findings of this longitudinal experimental study was that the perceptions of on-line students changed over time, while that of face-to-face students remained fairly constant or showed very little change over time. The regression analysis and ANOVA supported this statement in one issue after another. This finding was supported by, and might be used to explain, the many contradicting results of studies that investigated the same issue at a different time period. Table 11 summarizes all the findings.

Table 11: Summary of findings				
HYPOTHESES	**CHI SQUARE**	**SUPPORT**	**Face-to-face**	**Online**
Hypothesis # 1: Faculty has lower expectations of online students than face-to-face students.	8.70177E-05	Yes	6.44	6.63
Hypothesis # 2: There is no difference in students' perception of faculty availability between online and face-to-face students.	7.5685E-08	Yes	6.48	6.76
Hypothesis # 3: There is no difference between online and face-to-face students in their perception of the level of faculty interactions with students.	1.46727E-07	Yes	6.45	6.63
Hypothesis # 4.1: There is no difference between online and face-to-face students' perceptions of the quality of faculty feedback.	5.97084E-07	Yes	6.29	6.58
Hypothesis # 4.2: There is no difference between online and face-to-face students' perceptions of timely communication from faculty.	2.28614E-11	Yes	6.19	6.58
Hypothesis # 5: There is no difference between online and face-to-face students' satisfaction with class activities.	0.042038341	Yes	6.15	6.28
Hypothesis # 6: There is no difference between online and face-to-face classes in students' perceptions of the flexibility of time to cover course material.	0.65673195	No	-	-
Hypothesis # 7: There is no difference between online and face-to-face students in their perceptions of the level of critical thinking needed in the class.	0.014983178	Yes	6.30	6.41
Hypothesis # 8: There is no difference between online and face-to-face students' satisfaction in the level of student interactions in the class.	0.193744414	No	-	-

If we considered each issue by itself, we could conclude that students increasingly were appreciating online education. For example, students believed that faculty members were expecting more critical thinking skills of them in online classes. In addition, online students were more satisfied with course activities than face-to-face students. Another interesting finding that supported the conclusion was that online students did not express any concern with limited student interaction. This research found that there was no difference between face-to-face and online student in their satisfaction with student-to-student interaction.

The satisfaction with the level of student-to-student interaction might be the result of changes in society and young adults that are undergoing in terms of computerized social networking. The age of Facebook, Youtube, text messaging and similar activities might be showing its effects in the educational arena.

The satisfaction of students with faculty feedback in terms of both quality and timeliness was an interesting finding in light of the fact that the same faculty member was involved in both class modalities. Two plausible explanations are: (1) In an online class the communication might be classified as a one-to-one basis. Even in the case when a faculty sends out a group e-mail, each student receives the e-mail as a personal communication. This is not true in a classroom environment. (2) The comprehension and retention of issues maybe different between the two formats. Prior research had suggested that close to 70% of the issues discussed in a presentation were not retained by the audience, while in an online class the comprehension of communication between the student and the faculty might be higher (National Training Laboratories, 1998).

Another interesting issue was students' perceptions of faculty availability. In a typical classroom, students assume faculty members are available during class time and office hours. However, in an online class, a student may send an e-mail to the faculty any time, day or night. Hence, the discussion can occur (i.e., faculty is available) 24 hours 7 days a week. This is also an important issue for online faculty members to consider, namely, the need for frequent checking their e-mail.

Contributions and Limitations

It is clear that online education has evolved and it is on equal footing with the face-to-face teaching modality in many aspects. This study has successfully explained the current perceptions of many online students, and, in addition, some of the changes that have occurred over time. We are hopeful this study will encourage many more faculty members to consider offering online classes. However, this should not be done unless the faculty is aware of the many studies that outline the need for careful design of such courses.

According to MacDonald et al. (2005), *"There is little incentive for professors to devote the hours required to design technology-based resouces when their teaching scores, with traditional delivery methods suffice to obtain tenure and promotion. Further, professors may feel that their time is better spent securing research grants and publishing"* (p. 80). Thus, administrators and faculty members who are in governance role must consider modifying existing policies for "tenure and promotion" to incorporate online teaching and to provide incentives to junior faculty to teach online courses.

Moreover, according to Cohen & Nycz (2006), *"E-learning needs to be understood in the broader context of using technology to meet society's needs for learning. It also requires us to understand that adult learners have psychological needs that e-learning must address"* (p. 32). Hence, in a face-to-face class delivery modality, frequently facutly members instantly improvise and change their strategies based on the type of students in the class. This factor is missing in an online modality. Therefore, faculty members must assess their audience (type of students) even before designing their online courses; they should address the psychological needs of adult

students during the development phase of the course; and orchastrate their instruction to satisfy the needs of all students.

The study's findings reflect that online education is effective. Hence, the researchers hope that the results of this study will assist online education stakeholders (administrators and faculty) in gaining a better understanding of students' perceptions and needs in online courses. Administrators will have better information to make better decisions, and faculty will effectively plan, develop, and offer online instruction based on our findings.

One limitation of this study was that it focused solely on one class (Management Information Systems), one university, and one faculty member. Another limitation is that the majority of the students who were enrolled in the online course were adult students over 25 years old, whereas students enrolled in the face-to-face course were traditional 19 - 25 years and older.

Conclusion and Future Research

The study found that six of eight hypotheses showed statistically significant differences between face-to-face and online modalities. Online students perceived that faculty had high expectations, faculty members were available, faculty interacted and communicated with students in a timely manner, and course activities including critical thinking skills. In addition, there was no difference in the time flexibility or student-to-student interaction between fact-to-face and online students. Furthermore, by looking at the average, online students consistently were more satisfied with course activities compared to face-to-face students.

Consequently, to ensure a real return on a student's online education investment, colleges and universities should consider following a research-based validated framework and benchmarks for planning, designing, delivering, and assessing online education. The success of an online course depends on effective course design using a student-centered model, delivery, and assessment.

Since many regular university students do not register for online education, and many more drop out early in the course, further research is required to investigate the nature of students who continue, as well as those who drop out of online classes. Online education may not be for every student.

In this study, online students were more satisfied with the course activities than face-to-face students. This is an interesting finding in light of the fact that course activities were the same in both classes (e.g., assignments, tests, homework). Further research is needed in order to investigate the causes of this difference.

Other aspects to consider for future research are the effects of age, gender and other demographics on students' perceptions. If, as we are suggesting, students today are more comfortable with computerized social networks, then we expect to find that age and other demographics may result in different perceptions.

Future research may consider the correlation between the number of online courses taken and support of online education. Students who have never enrolled in online class may have different perceptions about online education compared to students who have taken an online course.

An additional study is needed to investigate the difference between adult and traditional age students in terms of class discussions, appreciation of real life case studies, appropriate topics that could relate to real life examples, and sharing of personal experiences.

References

Allen, E., & Seaman, J. (2007). *Online nation: Five years of growth in online learning*. Needham, MA: Sloan-Consortium.

Beckett-Camarata, J. (2007). Using critical thinking in a web-based public budgeting course. *International Journal of Public Administration, 30*(5), 499.

Billings, D. M., Skiba, D. J., & Connors, H. R. (2005). Best practices in web-based courses: Generational differences across undergraduate and graduate nursing students. *Journal of Professional Nursing, 21*(2), 126-133.

Bloxham, S., & Armitage, S. (2003). What a LUVLE way to learn law. *International Review of Law, Computers & Technology, 17*(1), 39.

Booth-Butterfield, M. (1998). Measurement of communication flexibility: Working adults vs. college students. *Communication Research Reports, 15*(4), 365.

Buzzetto-More, N. A. (2008). Student perceptions of various e-learning components. Interdisciplinary Journal of E-Learning and Leraning Objects, 4, 113-135.

Brannan, T. A. (2005). Learner interactivity in higher education: Comparing face-to-face, hybrid, and online instruction. *Distance Learning, 2*(2), 1-8.

Chickering, A., & Ehrmann, S. C. (1987, March). Implementing the seven principles: Technology as lever. *The American Association for Higher Education Bulletin*, 3-6.

Cohen, E. B., & Nycz, M. (2006). Learning Objects and E-learning: an informing science perspective. *Interdisciplinary Journal of Knowledge and Learning Objects, 2*, 23-34. Retrieved from http://www.ijello.org/Volume2/v2p023-034Cohen32.pdf

Dennen, V. P. (2005). From message posting to learning dialogues: Factors affecting learner participation in asynchronous discussion. *Distance Education, 26*(1), 127, 22.

DeVillers, R. (2007). The six C's framework for e-learning. In N. Buzzetto-More, *Advanced principles of effective e-learning* (pp. 1-25). Santa Rosa, CA: Informing Science Press.

DiSlavio, P. (2008). *Aligning faculty incentives with shifting modes of delivery*. Academic Leader Magna Online Seminar.

Dobbs, R. R., Waid, C. A., & del Carmen, A. (2009). Students' perceptions of online courses the effect of onlie course experience. *The Quarterly Review of Distance Education, 10*(1), 9-26.

Dublin, L. (2004). The nine myths of e-learning implementation: Ensuring the real return on your e-learning investment. *Industrial and Commercial Training, 36*(7), 291-294.

Dyrbye, L., Cumyn, A., Day, H., & Heflin, M. (2009). A qualitative study of physicians' experiences with online learning in a masters degree program: Benefits, challenges, and proposed solutions. *Medical Teacher, 31*(2), E40.

Easton, S. S., & Katt, J. A. (2006). Online learning: Expectations and experiences A comparative analysis between online and face to face classes in interpersonal communication. *International Journal of Learning, 12*(5), 177-186.

Hay, A., Peltier, J. W., & Drago, W. A. (2004). Reflective learning and on-line management education: A comparison of traditional and on-line MBA students. *Strategic Change, 13*(4), 169.

Huett, J., Moller, L., Foshay, W. R., & Coleman, C. (2008). The evolution of distance education: Implications for instructional design on the potential of the web. *TechTrends: Linking Research & Practice to Improve Learning, 52*(5), 63-67.

Kellogg, D., & Smith, M. (2009). Student-to-student interaction revsisited: A case study of working adult business students in online course. *Decision Sciences Journal of Innovative Education, 7*(2), 433-456.

Koohang, A., Riley, L., Smith, T., & Schreurs, J. (2009). E-learning and consructivism: From theory to application . *Interdisciplinary Journal of E-learning Objects, 5*(1), 91-109. Retrieved from http://www.ijello.org/Volume5/IJELLOv5p091-109Koohang655.pdf

Kuhn, D. (1999). A developmental model of critical thinking. *Educational Reseracher, 28*(2), 16-46.

Li, Q., & Akins, M. (2005). Sixteen myths about online teaching and learning in higher education: Don't believe everything you hear. *TechTrends, 49*(4), 51.

MacDonald, C. J., Stodel, E., Thompson, T. L., Muirhead, B., Hinton, C., Carson, B., et al. (2005). Addressing the eLearning contradiction: A collaborative approach for developing a conceptual framework learning object. *Interdisciplinary Journal of Knowledge and Learning Objects, 1*, 79-98. Retrieved from http://www.ijello.org/Volume1/v1p079-098McDonald.pdf

Marks, R. B., Sibley, S. D., & Arbaugh, J. (2005). A structural equation model of predictors for effective online learning. *Journal of Management Education, 29*(4), 531-564.

Mash, B., Marais, D., Van Der Walt, S., Van Deventer, I., Steyn, M., & Labadarios, D. (2006). Assessment of the quality of interaction in distance learning programmes utilizing the Internet or interactive television: Perceptions of students and lecturers. *Medical Teacher, 28*(1), 9.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009, May 7). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. Retrieved February 14, 2010, from http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

National Training Laboratories. (1998). *Learning pyramid*. Bethel: Maine.

Noel-Levitz, Inc. (2006). *National Online Learners Priorities Report.* Retrieved March 15, 2010, from https://www.noellevitz.com/NR/rdonlyres/8F7A812B-C791-452D-AFAC-54C536BBEB70/0/06ONLINE_report.pdf

Osborne, R. E., Kriese, P., Tobey, H., & Johnson, E. (2009). Putting it all toghether: Incormporating "SoTL Practices" for teaching interpersonal and critical thinking skills in an online course. *InSight: A Journal of Scholarly Teaching, 4*(1), 45.

Pan, C.-C., Sivo, S., Gunter, D., & Cornell, R. (2005). Students' perceived ease of use of an elearning managment system: An exogenous or endogenous variables? *Journal of Educational Computing Research, 33*(3), 285-307.

Salimi, A. (2007). The promise and challenges fo rdistance education in accounting. *Strategic Finance, 88*(7), 19-53.

Sanders, D., & Morrison-Shetlar, A. (2002). Student attitudes toward web-enhanced instruction in an introductory biology course. *Journal of Research on Computing in Education, 33*(3), 251-262.

Schilling, K. (2009). The impact of multimedia course enhancements on student learning outcomes. *Journal of Education for Library and Information Science, 50*(4), 214-2252.

Sher, A. (2009). Assessing the relationship of student-instructor and student-student interaction to student learning and satisfaction in web-based online learning environment. *Journal of Interactive Online Learning, 8*(2), 102.

Tanner, J. R., Noser, T. C., & Totaro, M. W. (2009). Business faculty and undergraduate students' perceptions of online learning: a comparative study. *Journal of Information Systems Education, 20*(1), 29-40.

Tucker, S. (2001, Winter). Distance education: Better, worse, or as good as traditional education? Retrieved December 12, 2009, from *Online Journal Of Distance Learning Administration:* http://www.westga.edu/~distance/ojdla/winter44/tucker44.html

Wilkes, R., Simon, J., & Brooks, L. (2006). A comparison of faculty and undergraduate students' perceptions of online courses and degree programs. *Journal of Information Systems Education, 17*(2), 131-140.

Wyatt, G. (2003). Satisfaction, academic rigor and interaction: perceptions of online instruction. *Education, 125*(3), 460-468.

Biographies

Yehia K. Mortagy, Ph.D., is Professor of Decision and Information Sciences, College of Business and Public Management, University of La Verne, La Verne, California,

Dr. Mortagy received his B.Sc. degree in Aeronautical Engineering for University of Cairo, Cairo, Egypt, MBA from University of California, Los Angeles in 1979, and Ph.D. in Management of Information Systems from the Claremont Graduate School, Claremont, California in 1997.

His current research interest includes online education, adoption of technology in developing nations, and quantitative strategic and operational systems. His recent publications include a chapter on the development of strategic information systems (SIS) for the Information Systems Encyclopedia (2003), papers and conference presentations on online education, and utilization of IT in developing nations. In addition, Dr. Mortagy is interested in quantitative models and their utilization in business.

Seta Boghikian-Whitby, Ed.D., Professor and Program Chairperson at the Computer Science and Computer Engineering Department, University of La Verne, La Verne, California.

Dr. Whitby earned her Ed.D. in Organizational Leadership, Masters Degree in Information Science, Masters Degree in Computer Education, and a Bachelors of Science Degree in Computer Science and Computer Engineering.

Dr. Whitby is very active in the university governance structure. In addition, she has extensive research experience in two major themes: First, teaching and researching distance learning courses for almost a decade; second, researching the utilization of Information and Communication Technologies (ICT) in developing nations. She has presented in conferences across the globe, published numerous articles in refereed journals, and she is on the editorial and review boards of several journals. She is an excellent speaker and is a beloved teacher for 26 years.