

INFORMATION SYSTEMS EDUCATION JOURNAL

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The **Information Systems Education Journal** (ISEDJ) is a double-blind peer-reviewed academic journal published by **EDSIG**, the Education Special Interest Group of AITP, the Association of Information Technology Professionals (Chicago, Illinois). Publishing frequency is six times per year. The first year of publication is 2003.

ISEDJ is published online (<http://isedj.org>) in connection with ISECON, the Information Systems Education Conference, which is also double-blind peer reviewed. Our sister publication, the Proceedings of ISECON (<http://isecon.org>) features all papers, panels, workshops, and presentations from the conference.

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Strategic Plan for Enhancing Online Learning

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Abstract

E-learning has evolved over the past years with many universities following the growing trend of incorporating online courses into their institutions. This four year public institution has not been left behind in its quality enhancement plan (QEP). QEP is designed to enhance online learning resulting in an E-focused environment. Surveys of faculty and students at the institution, however, show the potential difficulties faced in online learning. Inadequate training, lack of motivation, and poor time management are some of the major factors affecting student performance. This study assesses and investigates the progression of online learning and proposes approaches to enhance online learning. Data was collected to compare campus-based and online courses and monitor their progression over the years. Campus-based courses still have a higher pass rate than online courses, with an increase in passing rates over a three year period. The results serve as a baseline for improving online learning procedures and outcomes over the next five years.

Keywords: Online Learning, Assessment, Orientation, Student, Instructor, Institution

1. INTRODUCTION

Currently, the predominant method of distance-based course delivery is by online means. With increased accessibility to and affordability of the technology required by this method, students are taking advantage of online course offerings in ever greater numbers. Dialogue between the course instructor and students is readily facilitated by the technologies currently employed by distance education programs. Although the growth in course offerings by online means is rapid, some 4-year universities

are still reluctant to implement programs on a broad scale. In fact, the majority of growth lies with 2-year associate degree-granting institutions, which have accounted for over one half of enrollments in online courses in the last 5 years. In regard to the future, the primary goal among university administrators is finding a niche for distance education within universities. With the advent of online education, this mission is critical, as the majority of adult learning occurs through self-directed study. Students, especially nontraditional students, are more likely to enroll in the coming years, as online

classes afford flexibility and autonomy. However, faculty must be supported and rewarded for their contributions and continually trained in equipment use and "best practices" in course delivery and instructor-student interaction. Stand-alone modules, which rely on simulations and multimedia via the Internet and less on interaction with instructors, will continue to be developed and implemented. Online distance education will continue to grow and develop as it affords students the opportunity to solve problems and master the fine details within their chosen field of study through intensive interaction (Gaytan, 2007; Larreamendy-Joerns Leinhardt, 2006 as cited in Dobbs et al, 2009).

The traditional classroom has long been considered the standard of educational venues, but recent technological advances have brought a dramatic rise in educational offerings over the Internet. Many universities recognize the capability of this technology to increase student enrollment, resulting in the development of many new courses and even the awarding of college/university degrees using online techniques. For students, these online courses permit more flexibility to learn at an individualized pace, schedule course work around their personal and professional lives, reduce or eliminate travel time, and provide the opportunity to review course materials as often as they wish (Dobbs et al, 2009).

Statement of Problem

Online educational programs provide students with an opportunity to receive a degree from a university that may be located at a considerable distance from their homes and/or places of employment. However, disadvantages to online courses do exist. In order to be successful, students must possess a certain degree of technological competence prior to participating in online courses. Student satisfaction with online learning is essential for the learning process to be successful. Online courses may be more demanding for students because they require the student to assume more responsibility for their learning.

Consequently, anecdotal evidence suggests online course completion and program retention rates are lower than for similar campus-based programs. Online courses also present challenges for instructors which suggests that they are time consuming to develop and deliver (Hubble & Richard, 2006).

Moreover, in many cases the institution has inadequate resources available for online learning to progress. Tight budgets often result in lack of available technology and of training for both faculty and students, which make it difficult to implement broad, campus-wide e-learning solutions (Hubble & Richard, 2006).

Statement of Objectives

This study seeks to investigate the progression of online learning at a four year public institution. It reviews the current practices of online learning at the institution and suggests strategies to help enhance online learning. Further, by examining the perception of students and faculty, it reveals the problems faced in online learning. Additionally, this research analyzes freshman grades for 2008, 2009 and 2010 for both campus-based and online courses.

The research focuses on the following questions:

1. What is the perception of students of online learning?
2. What is the perception of faculty of online learning?
3. Is there a difference in grades in online courses over a 3 year period?
4. Is there a difference in grades in campus-based courses over a 3 year period?
5. Is there a difference in grades between campus-based and online course?
6. What steps need to be taken to improve online learning?

2. REVIEW OF LITERATURE

Background of the Four Year Public Institution

The institution began its online learning initiative in 2006 as a way to attract students displaced from New Orleans and scattered across the nation post Hurricane Katrina. Implementing online learning after Katrina has not only allowed the institution to keep its doors open, but it has also allowed the institution to move forward with its mission of providing higher education to students from diverse backgrounds. The four year public institution offers online degrees in Criminal Justice, Early Childhood Education, and General Studies as well as a Master's degree in Museum Studies.

Quality Enhancement Plan

The Quality Enhancement Plan (QEP) is the component of the accreditation process that reflects and affirms the commitment of the

Southern Association of Colleges and Schools, Commission on Colleges (SACS-COC), to the enhancement of the quality of higher education and to the proposition that student learning is at the heart of the mission of all institutions of higher learning.

QEP topic: E-FOCUSED! Enhancing Student Learning in Online Courses by Improving Institutional Readiness.

The QEP will accomplish the following three major goals:

- enhance the performance of first year freshmen in online general education courses;
- enhance the online instructional skills of faculty and staff through regular training and assessments; and
- improve institutional readiness for online teaching and learning.

Enhance the performance of first year freshmen in online general education courses.

Curriculum content must be relevant to the real world as well as facilitate problem-centered learning (Fish & Wickersham, 2009). To give equal importance to both technological usage and actual subject-matter, the instructional design should institute the need to master specific learning objectives outside of class meetings. This focus allows the instructor to assist students in their heurism, rather than demanding their blind obedience. Instructional and course designs interpret this view into planning and implementing of transition course activities from content centered to learning centered (Fish & Wickersham, 2009).

Incorporating new and advanced information technology tools and software such as wiki and AskOnline (an easy-to-use online environment for tutoring) within the online environment, empowers faculty to create effective and engaging presentations through voice animations, which enhances interactivity and communication between faculty and students, and between students.

As a result, many online students develop meaningful connections with each other, which may result in enhanced career networking opportunities in years to come (Lee, 2000; Roper, 2007).

Prior to enrolling for online courses, students should take part in a training session like the

Smarter Measure, a web-based tool which assesses a learner's likelihood for succeeding in an online learning program. SmarterMeasure indicates the degree to which an individual student possesses attributes, skills and knowledge that contribute to success in online learning that exposes them to the expectations of in the online environment. This will enhance students' performance by eliminating any anxieties they might have with respect to what is expected of them within an online learning environment. Moreover, introducing a more user-friendly application package within the online learning sphere, and one-on-one tutoring, will help mitigate students' fears and consequently allow them to focus more on their course material than on striving to get conversant with the online architecture, processes, and/or applications.

Enhance the online instructional skills of faculty and staff through regular training and assessments

Online learning in the virtual classroom can present pedagogical and technological challenges for the faculty members in addressing students' learning styles. Research shows that online learning modules that are static provide little interactivity for learners (Cheng, 2008). Faculty members must transform their on-campus teaching style to fit the new technologically enhanced world of e-learning (Rockwell, Schauer, Fritz, & Marx, 2000). This can be done effectively through communicative channels which have allowed instructors to personalize their courses and feedback (Helvie-Mason, 2010). Modules that are properly created help students to remain at a required pace, to keep track of assignment due dates, and to meet students' expectations by providing well-written directions. Online course instructors can be trained to acquire a new set of competences to engage in effective instructional practices. In order for instructors to teach online courses, they should be properly trained to increase their ability in technological competency (Fish & Wickersham, 2009).

Motivation and incentives are additional factors that enhance online instructional skills of faculty. Every successful accomplishment of a faculty who creates an online version of a campus-based course should receive an incentive as a motivation producing efficacy. Efficacious faculty have strong beliefs that they can bring about a change in student learning and attitude (Cubukcu, 2008). If a teacher believes that all

students in that classroom are capable of learning, then the teaching style will involve rich standards, quality, and sensitivity to students' learning styles, regardless of the population the teacher serves (Muijs & Reynolds, 2002).

Improve institutional readiness for online teaching and learning

To use online learning effectively, institutions must adapt their pedagogy, enhance the technical proficiency of their users, and develop a reliable and robust technology infrastructure (Arabasz & Baker, 2003). Accordingly, it should continue to be a high priority for the institution to update its technological infrastructure, particularly with high-speed broadband Internet connections; thus, the administration should provide the necessary funds to obtain these software and hardware applications. Moreover, institutions should frequently update their servers and network systems to accommodate for the increasing demands for an efficient, user-friendly and effective online environment. A better technological infrastructure will increase the opportunity for faculty and students to utilize technology regularly for research and collaboration, cross discipline learning projects, and web communication and publication (Lan, 2001).

In examining retention and student success, one of the most important areas to support online learning is student services. Comprehensive student online training is essential. Students need to have support systems in place. One main objective to increase institutional readiness for online learning is to enhance student services for online students (Germanna Community College, 2007).

The delivery of online education provides a greater opportunity to serve more students, to increase enrollment, consequently increasing universities' revenue. Although the influx of students may be encouraging, online education is very demanding (Gibson & Colaric, 2008). Areas of technological deficiencies should be addressed to continue providing quality delivery and assurance in online education. According to Oh and Park (2009), instructional support and technology have been raised as problems with regards to the developing online instructions in many institutions.

Prior to assigning any online class to a faculty, the institution should evaluate and assess faculty knowledge and skills to efficiently and effectively manage an online class as well as

provide strong online learning infrastructures (Fish & Wickersham, 2009). The lesson of successful redesign is that many diverse members of the administration and faculty need to work together. Thus, the institution should encourage collaboration amongst faculty.

3. METHODOLOGY

The purpose of this paper is to review and discuss strategies to enhance the quality of online learning and instruction. One important factor in designing an online class is to understand instructors' and students' expectations.

Sample and data collection

Data from the Information Technology Center (ITC) of the institution for campus-based and online courses were used to examine freshman passing rates and failing rates. This includes data for campus-based versus online grade distribution for Introduction to Biology (BIOL 105), English Composition (ENG 111) and Fundamentals of Public Speaking (COMM 210) during the following semesters: Spring 2008, Fall 2008, Spring 2009, Fall 2009 and Spring 2010.

Year	Course	No. of students	
		Campus-based	Online
2008	BIO 105	367	91
	COMM 210	202	59
	ENGL 111	509	136
2009	BIO 105	334	104
	COMM 210	180	58
	ENGL 111	456	61
2010	BIO 105	404	53
	COMM 210	181	43
	ENGL 111	506	93

Table 1: Enrollments by Subject

Table 1 shows the sample size for freshman students registered in the general education course BIO 111, ENG 111 and COMM 210.

In addition, two perception surveys on students and instructors were conducted at the end of the Spring semester in 2010, in which 100 freshman students and 30 instructors responded. The

survey consisted of ten statements for freshman students and ten statements for instructors.

Data Analysis of Perception Survey

In the two perception surveys on students and instructors the Likert scale was employed to collect data based on the ten statements. Data analysis was accomplished by using the arithmetic means: $(X = [x_1 + x_2 + x_3 + \dots + x_n]/n)$ to measure the central tendency of the respondents.

Hypothesis

Students and faculty alike face problems in online courses.

Performance of students enrolled in a campus-based undergraduate course is higher than performance of students enrolled in the same course provided online. Performance in online courses (Fall and Spring semesters) increased between 2008 and 2010. Performance in campus-based courses increased between 2008 and 2010.

Findings

Freshman Students and Faculty/Instructor Perception Surveys:

Freshman students were required to mark strongly agree (SA); agree (A); neutral (N); disagree (D); or strongly disagree (SD) in response to the following statements:

1. I have full access to a personal computer and internet.
2. I understand how to access Blackboard which is required to navigate my online courses.
3. I have adequate course assistance from my instructor and the online learning administrators.
4. Software on Blackboard prevents students from cheating.
5. Taking courses online motivates me as a student.
6. Existing factors in online classes frustrates me as a student.
7. I participate in discussion sessions posted by the instructor.
8. Online teaching and practices need improvement.
9. The institution has a motivated and committed online education.
10. Online students need more training and in-service orientation.

Table 2 (see appendix) shows results of the student perception survey which reflects that 96.1% of the students have full access to a personal computer and internet and also understand how to access Blackboard which is required to navigate online courses. Most students (76.5%) agreed they had adequate course assistance from the instructor and the online learning administrators and believe that taking courses online motivates them as a student. Seventy-four percent of the students believe the software on Blackboard prevents them from cheating. Only 33% of them admitted to the fact that existing factors in online classes frustrated them as a student. Eighty-two percent of the students participated in discussion sessions posted by their instructor whilst only 42% agreed that online teaching and practices needed improvement. Most students (72.6%) agreed that the institution was motivated and committed to online education. Only 26.02% of the students believe that online students need more training.

Table 3 (see appendix) shows the faculty's perception of online teaching. Instructors were asked to respond strongly agree (SA); agree (A); neutral (N); disagree (D); or strongly disagree (SD) to the following statements:

1. The expectations of students who earn grades in online learning courses are realistic.
2. The current online learning platform is adequate to enhance student participation.
3. The software currently used prevents cheating in online courses.
4. Online learning is user friendly at the institution.
5. Faculty members teaching at the institution are motivated.
6. There are major factors that frustrate faculty when teaching online courses.
7. Faculty hold adequate discussion sessions in online courses.
8. Online teaching and learning practices need improvement.
9. The institution has a motivated and committed online education.
10. Online faculty need more training and in-service orientation.

Table 3 (see appendix) shows that 55.2% of the faculty agreed that the expectations of students who earn grades in online learning courses are realistic, while 45.4% of them agree that the

current online learning platform is adequate to enhance student learning. A slight plurality (52.4%) of the faculty disagreed with the fact that the software currently used prevents cheating in online courses. According to 68.2% of the faculty, online learning is user friendly. Most faculty (63.7%) agree that faculty members are motivated to teach online courses. Major factors are evident that frustrate faculty teaching online courses and 59.1% agree with this statement. Only 42.8% agreed that faculty held adequate discussion sessions in their online course. A large majority, 81.8%, believed that online teaching and learning practices need improvement. Only 50% percent of the faculty agreed with the proposition that the institution has a motivated and committed online education program. Lastly, 72.7% of the faculty agreed that online faculty needed more training and in-service orientation.

Data Analysis of Freshman Grade

Data from the Information Technology Center (ITC) of the institution for online courses were used to examine freshman passing rates and failing rates. SAS and Microsoft Excel 2010 software were used to analyze the data in order to examine the rate of students' passing to failing. A, B, C, and D are passing grades, while F is a failing grade. ANOVA can be used to make inferences about mean grade of students semester to semester between 2008 and 2010 (semester grades present a groups or variables). Since we have more than two groups or variables we can use ANOVA. This includes data for campus-based versus online grade distribution for Introduction to Biology (BIOL 105), English Composition (ENGL 111) and Fundamentals of Public Speaking (COMM 210) with respect to the following semesters: Spring 2008, Fall 2008, Spring 2009, Fall 2009 and Spring and Fall 2010.

4. FINDINGS AND DISCUSSION

Table 4 shows the progression of grades for campus-based and online courses from the year 2008 to 2010.

The p value for the campus-based BIOL 105 course is 0.93; therefore, there is no significant difference in grades for the BIOL 105 campus-based course from 2008 to 2010. The p value for the campus-based COMM 210 course is 0.75. Therefore, there is no significant difference in grades for the COMM 210 campus-based course from 2008 to 2010. The p value for the campus

based ENGL 111 course is 0.4436; therefore, there is no significant difference in grades for ENGL 111 campus-based course from 2008 to 2010. The p value for BIOL 105 is 0.0011.

Campus-based courses			
Course	F- value	P-value	Significance
BIOL 105	0.07	0.93	Not Significant
COMM 210	0.29	0.75	Not Significant
ENGL 111	0.81	0.44	Not Significant
Online Courses			
BIOL 105	7.05	0.0011	Highly Significant
COMM 210	0.75	0.48	Not Significant
ENGL 111	2.93	0.056	Significant

Table 4: Progression of Campus-based and Online courses from 2008 to 2010

Therefore the difference is highly significant. The p value for COMM 210 is 0.48. There is no significant difference in grades for the online course between the years 2008 and 2010. The p value of ENGL 111 is 0.056 which is significant at 90% confidence limit with a 0.1 level. Thus, there is a significant difference in online course grades from 2008 to 2010. Table 5 (see appendix) represents the pairwise comparison of the BIO 105 online course from 2008 to 2010. There is a significant difference in grades for BIO 105 between 2008 and 2010 as well as between 2008 and 2009. However there is no significant difference in grades for the BIO 105 online course from 2009 to 2010.

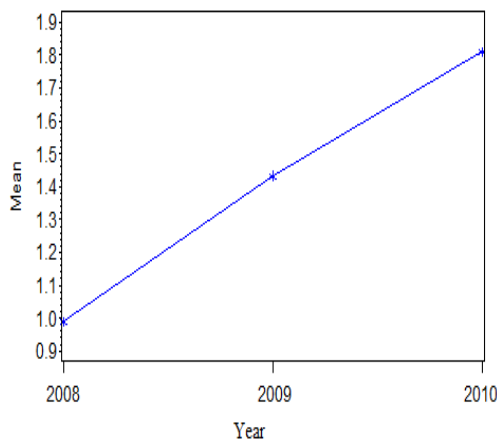


Figure 1: Mean distribution for BIO 105

Figure 1 shows an increase in grades; this is highly significant between 2008 and 2009, not

significant between 2009 and 2010, but significant from 2008 to 2010.

Table 6 (see appendix) displays the difference of means of ENGL 111 between 2008 and 2010. There is no significant difference of grades from 2008 to 2009 and 2009 to 2010 but there is a significant difference of grades from 2008 to 2010 when compared at the 0.05 level. Figure 2 illustrates an increase in grades over the 3 year period; this is not significant between 2008 and 2009 and 2009 and 2010 but significant from 2008 to 2010.

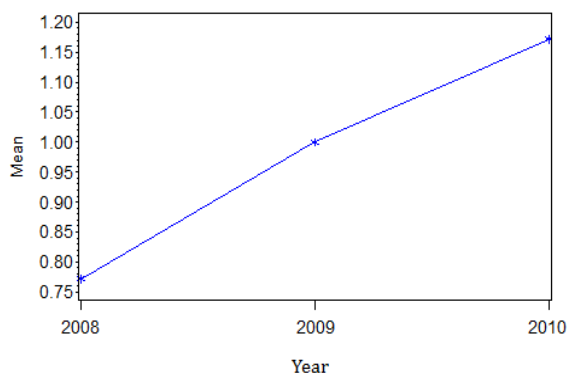


Figure 2: Mean Distribution for Online ENGL 111

Table 7 shows the t-test and p-value for the comparison between campus-based and online courses. The difference for the BIOL 105 campus-based courses and online courses is highly significant, revealing that campus-based is better. COMM 210 campus-based and online course has no significant difference whilst the ENGL 111 campus-based and online course has a significant difference over the 3 year period.

Course	T-value	P-value	Interpretation
BIO 105	3.93	< 0.0001	Very Highly Significant
COMM 210	1.35	0.1787	Not Significant
ENGL 111	2.50	0.0125	Significant

Table 7: T-test comparison between campus-based and online courses

Figure 3 shows a mean of 1.58 for campus-based courses whilst online courses have a mean of 1.36. Therefore, campus-based courses have a higher passing rate than online courses.

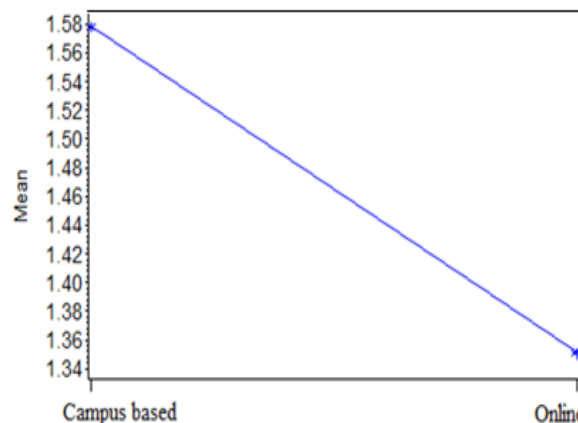


Figure 3: Mean distribution of campus-based and online courses

Figures 4, 5, and 6 (see appendix) show the percentage passing and failing rates for online and campus-based courses in BIOL105, COMM 210, and ENGL 111 respectively from 2008 to 2010 along with student retention. As per the data, in the campus-based BIOL 105 courses, the pass rate was 54% in 2008, 53% in 2009, and 55% in 2010. This shows that there has been a slight decrease and finally an increase in pass rates over the period. On the other hand, the online BIOL 105 courses show a steady increase in pass rates over the same period with 34% in 2008, 47% in 2009, and 64% for the year 2010. The results of the campus-based COMM 210 courses show a pass rate of 71% in 2008, 75 % in 2009, and 74 % for the year 2010. A similar pattern is seen for the online COMM 210 course as well, with 66% in 2008, 72% in 2009 and 71% for the year 2010. The campus-based ENGL 111 courses had a pass rate of 44% in 2008, 43% in 2009, and 48% for the year 2010. The online course results show 29% in 2008, 36% in 2009, and 40% for the year 2010. The passing rates for BIOL 105 and ENGL 111 is lower than COMM 210 for campus-based versus online courses. Overall, the campus-based courses have a higher passing rate than online courses.

PROPOSED MODEL

In order for the institution to fully achieve its QEP goal of being E-Focused, a holistic approach of student, faculty, and institutional readiness

should be adopted. The proposed model illustrates different components that can help achieve this goal.

As seen in figure 7 (see appendix), student readiness involves the accessibility to a computer. A student cannot take an online class without having full access to a computer. A readiness software tool such as SmarterMeasure needs to be administered to all students who desire to take an online course, one which tests the student's readiness to take the course by testing effectiveness in reading, technology, learning styles and typing skills. Ongoing training is another important component that needs to be provided for all students; this training will help educate students on how Blackboard works. Finally, students have to make sure they get intimately involved with the Blackboard environment, making sure there is as much interaction as possible. Time management is a very important component in student success online. Students need to set aside adequate time for assignments, tests and any other work required by the instructor. Instructors can motivate online students by awarding points for the processes online students use in order to arrive at the final answer. Such processes include critical thinking, interaction, collaboration, communication, and application (Reynard, 2008). These components achieve students' readiness.

Instructors need to have full access to updated technology for use in their online classes. In-service training should be provided by the e-learning department on Blackboard usage and curriculum design. The online curriculum should be designed in order to foster collaboration, engagement and student-instructor interaction.

The engagement of students in an online course is especially important because "without intentional engagement of students, little, if any, learning will take place" (Association to Advance Collegiate Schools of Business, 2010). This should include applications such as wikis, discussion boards, chats sessions, blogs, group tasks, and peer assessments. Instructors should have a mechanism in place for time management in online classes. They need to realize that online classes may require constant monitoring in order to respond in a timely manner to students' needs. Finally, constant motivation is needed to keep track with upcoming technology and changing curriculum.

The role of the institution, however, is not to be undervalued; the institution needs to provide up-to-date technology for instructors and students in order to foster the online learning process. Student support services, including library services, disability services, retention office, student counseling, etc., should be available. These are vital parts that help motivate and assist students in their pursuit in online classes. Incentives and continuous support should be given to faculty who embark on teaching an online course to motivate them to continue teaching it. The provision of motivation to faculty that comply with the established online policies to create a successful online learning environment is important. The combination of students' readiness for online learning, faculty readiness for online learning, and institutional readiness for online learning lead to the overall goal of enhanced online learning. Finally, the institution needs to always provide an evaluation mechanism that helps evaluate online course instructors and students. Feedback sought from assessment helps to make the much needed improvement for online courses. These components lead to institutional readiness for online learning.

5. CONCLUSION

Online learning is steadily becoming more popular in higher education institutions. Students opt for online courses in order to have the flexibility in times, especially for working and non-traditional students, as is evident at the institution. The institution's QEP is designed to enhance online learning for students early in the freshman and sophomore years.

The SmarterMeasure assessment is required for students classified as New Freshmen or Freshmen; these students have to take and pass the assessment in order to take a 100% online course.

Analysis of grades for both campus-based and online freshman BIOL 105, COMM 210 and ENGL 111 courses show that both are progressing each year even though it is by a smaller margin. However, the online course in BIOL 105 and ENGL 111 had a significant increase in grades over the 3 year period. When campus-based and online courses in COMM 210 were compared, it was evident that there was no significant difference between the two. This could be attested to the fact that both the online and campus-based course were taught by the same

professor. On the other hand, the BIOL 105 and ENGL 111 campus-based course had a higher passing rate than that of the online course. Based on these findings, the institution's QEP can be accomplished by increasing readiness of students, faculty, and the institution for such a learning environment. Improving students' skills will enable them to more critically evaluate the learning process and to learn better in the online learning environment. Enhancing faculty skills will make the online learning environment more exciting and conducive to quality learning. Developing strategies for effective course management should be a collaborative effort by both the instructors and the institution. In addition, feedback from the student survey further echoes the need for student training and does not ignore the fact that students are not oblivious to the need for improvement in online teaching and practices. This understanding could help faculty make improvements in the delivery of online courses.

The proposed model incorporates the three elements of student, faculty, and institutional readiness to achieve enhanced online learning. Results of this study will be evaluated yearly and the weakness will be addressed in order to improve online learning procedures and outcomes over the years.

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APPENDIX
Table 2: Student's Perceptions of Online Courses

Statement	SA	A	N	D	SD
1	86.3%	9.8%	0.0%	2.0%	2.0%
2	86.3%	9.8%	2.0%	2.0%	0.0%
3	54.9%	21.6%	9.8%	13.7%	0.0%
4	50.0%	24.0%	16.0%	4.0%	4.0%
5	54.9%	21.6%	13.7%	5.9%	3.9%
6	11.8%	21.6%	23.5%	29.4%	15.7%
7	54.0%	28.0%	8.0%	6.0%	4.0%
8	16.0%	26.0%	26.0%	22.0%	10.0%
9	37.3%	35.3%	19.6%	3.9%	3.9%
10	3.9%	23.5%	31.4%	27.5%	13.7%
Average	45.54%	22.12%	15.00%	11.64%	5.72%

Table 3: Faculty's Perceptions of Online Courses

Statement	SA	A	N	D	SD
1	9.1%	45.5%	27.3%	13.8%	4.5%
2	4.5%	40.9%	27.3%	22.7%	4.5%
3	0%	33.3%	14.3%	28.6%	23.8%
4	18.2%	50.0%	22.7%	9.1%	0.0%
5	27.3%	36.4%	27.3%	9.1%	0.0%
6	22.7%	36.4%	27.3%	13.6%	0.0%
7	9.5%	33.3%	42.9%	14.3%	0.0%
8	31.8%	50.0%	19.2%	0.0%	0.0%
9	13.6%	36.4%	27.3%	22.7%	0.0%
10	22.7%	50.0%	22.7%	4.5%	0.0%
Average	15.93%	36.23%	25.83%	13.83%	3.23%

Table 5: Pairwise Comparison of online BIO105 2008 to 2010

Group Comparison	Difference Between Means	95% Confidence Limits		
<i>Biol105_2008 - Biol105_2009</i>	0.44	0.07	0.81	Significant
<i>Biol105_2009 - Biol105_2010</i>	0.37	-0.05	0.81	Not significant
<i>Biol105_2008 - Biol105_2010</i>	0.82	0.37	1.26	Significant

Table 6: Pairwise Comparison of online ENGL 111 2008 to 2010

Group Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
Engl111_2008 - Engl111_2009	0.23	-0.22	0.68	Not significant
Engl111_2009 - Engl111_2010	0.17	-0.31	0.654	Not significant
Engl111_2008 - Engl111_2010	0.40	0.01	0.79	Significant

Figure 4: BIOL 105 Campus-based versus online percentage passing and failing rates

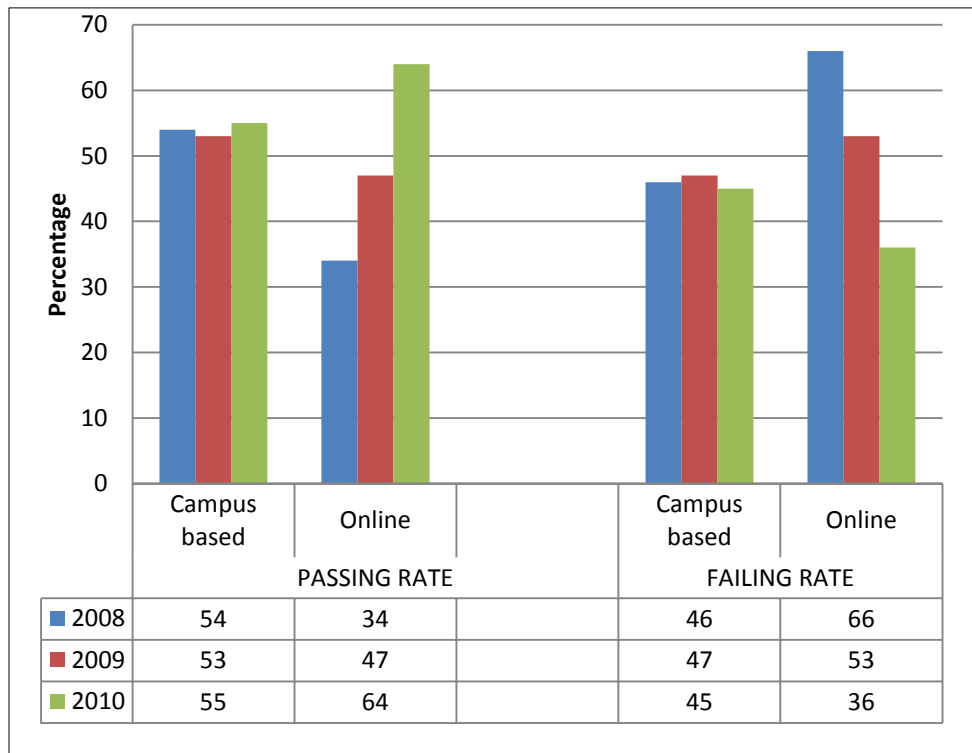


Figure 5: COMM 210 Campus-based versus online percentage passing and failing rates

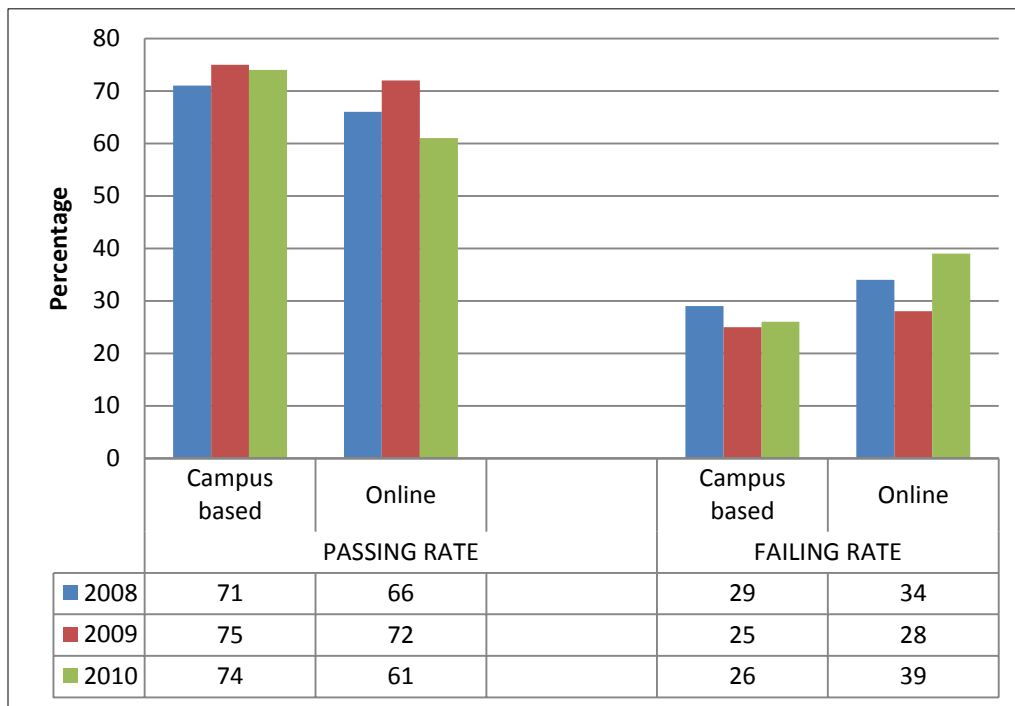


Figure 6: ENGL 111 Campus-based versus online percentage passing and failing rates

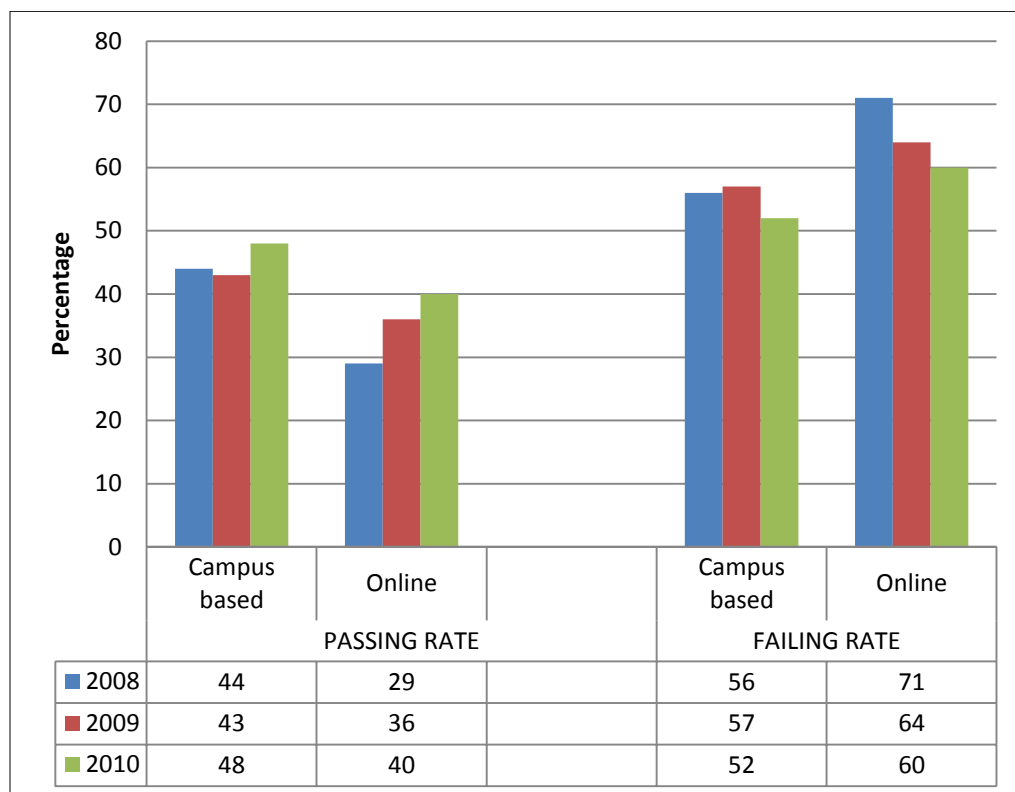


Figure 7: Model for Enhancing Online Learning

