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Research Article

"Comparative Analysis on effectiveness of classroom teaching and web-based teaching: Teaching Quantitative methods & Techniques in Asian Higher educational Institutes "

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ABSTRACT

As **Accounting, Business and Management** programs in various **B-schools** outspread their online education offerings to reach more time- and place-bound students, and as accredited institutions become interested in documenting teaching and learning effectiveness, the degree to which online students are successful as compared to their classroom counterparts is of interest to teaching faculty and others charged with assessment. By comparing student performance measures and assessments of learning experience from both online and traditional sections of a required Quantitative methods & techniques course taught by the same instructor, this paper provides evidence that student performance as measured by grade is independent of the mode of instruction. Persistence in an online environment may be more challenging in **Quantitative methods** classes than in other subject classes. Furthermore, participation may be less aggressive, and the quality and quantity of interaction may be affected in online classes.

Keywords & Abbreviations : fo - Observed frequency ; fe – Expected frequency
Main Conference Topic: Learning/Teaching Methodologies and Assessments.

Literature Review

Two trends have recently converged in teaching Accounting and Business management programs at various levels .As access to the Internet and World Wide Web has continued to grow, various academic programs have increasingly adopted Web-based instructional techniques. Online enrollment rates are expanding at much faster rates than traditional classroom Enrollment growth; specifically, in higher education, online enrollments have grown 21%, whereas growth for traditional classroom instruction registers only 2% since 2002 (Allen & Seaman, 2007).Simultaneous with the expansion of online education, higher education programs today are struggling with how to respond to ever-increasing responsibility demands. The development of these two trends merging in contemporary education setting raises a question about the effectiveness of online courses, particularly as compared to traditional classroom learning and in relation to individual student needs, perceptions, and learning outcomes. This research explores the key issues of online, as compared to classroom, learning and compares the major dimensions of learning effectiveness of the two cases. This study focuses on the experience of one instructor in a quantitative techniques course in a business and management program. In the following pages, the article reviews the literature addressing the impact of the learning environment and examines past studies on online learning effectiveness. The author then describes the research setting and methodology. Finally, results and discussion are presented following the investigation, drawing conclusions as to critical issues and presenting lessons learned and directions for future research.The impact of learning environments in relation to learning outcomes has constantly been explored by researchers of education. For example, Ramsden and Entwistle (1981). empirically identified a relationship between approaches to learning and perceived characteristics of the academic environment. Haertela, Walberg, and Haertela (1981) found correlations between student perceptions of social psychological environments of their classes and learning outcomes. Web-based technology has noticeably transformed the learning and teaching environment.

Supporters of online learning have seen that it can be effective in potentially eliminating barriers while providing increased convenience, flexibility, currency of material, customized learning, and feedback over a traditional classroom teaching(Hackbarth, 1996; Harasim, 1990; Kiser, 1999; Matthews, 1999; Swan et al., 2000). Rivals, however, are concerned that students in an online environment may feel isolated (Brown, 1996), confused, and frustrated (Hara & Kling, 2000) and that student's interest in the subject and learning effectiveness may be reduced (R. Maki, W. Maki, Patterson, & Whittaker, 2000).An important component of classroom learning is the social and communicative interactions between student and teacher, and student and student. A student's ability to ask a question, to share an opinion, or to disagree with a point of view are fundamental learning activities. It is often through conversation, discourse, discussion, and debate among students and between instructors and students that a new concept is clarified, an old assumption is challenged, a skill is practiced, an original idea is formed and encouraged, and ultimately, a learning objective is achieved. Online learning requires adjustments by instructors as well as students for successful interactions to occur. Online courses often substitute classroom interaction with discussion boards, synchronous chat, electronic bulletin boards, and e-mails. The effectiveness of such a virtual interactive venue is not without debate. Student-to-instructor and student-to-student interactions are important elements in the design of a Web-based course (Fulford & Zhang, 1993; Kumari, 2001; Sherry, 1996) because learners can experience a "sense of community," enjoy mutual interdependence, build a "sense of trust," and have shared goals and values (Davies & Graff, 2005; Rovai, 2002). Some scholars suggest that interaction in an online environment promotes student-centered learning, encourages wider student participation, and produces more in- depth and reasoned discussions than a traditional classroom setting does (e.g., Karayan & Crowe, 1997; D. Smith & Hardaker, 2000). Interaction in an online environment is less intimidating between individuals and also has less time pressure on students than does interaction in a face-to-face setting (Warschauer, 1997). Online discussions also can encourage more reticent students to participate to a greater extent (Citera, 1988). However, the advantage of online interaction may not be realized if close connection among the learners is absent. Haythornthwaite and colleagues (2000) found that students who failed to make online connections with other learners in their group reported feeling isolated and more stressed.

Methodology:

The purpose of this study is to compare student performance in online and face-to-face classes in terms of interaction and efficiency in a class. The study compares learning effectiveness in quantitative techniques classes taught in various Business management programs. The Quantitative methods and techniques is one of the required introductory classes in various business management programs. Most students would take the class during the first quarter of their undergraduate program, and most of them have neither online learning experience nor experience with the program. A student may choose between online or face-to-face classes based on commuting distance, working schedule (for students in employment), and tuition difference (due to an additional fee for online classes) instead of previous performance in a different learning environment. This study uses student performance records from both the modes (Online & Face-to-Face) Classes. To provide comparable learning experiences across the two modes of teaching, the content and structure of the two types of classes were designed to be as similar as possible which includes the timing of the classes as well. Further we have included the comparison of the content delivery mechanisms between the two instructional modes. Students in both online and face-to-face classes were given access to the online system (Blackboard). In the online classes, all course material activities were delivered via Blackboard. In the face-to-face classes, required readings other than the textbook and multimedia resources (mainly video cases for discussion) were made accessible online. In addition, the instructor also requires the students to use the assignment function on Blackboard to submit assignments and retrieve feedback. Otherwise, classroom activities such as lectures, discussions, and group projects were carried out in the classroom. The main difference between the two types of class is the mode of interaction between instructor and students as well as that among students.

Table-1(Comparison)

	Online	Classroom
Mode	Discussions through text only	Verbal discussions
Instructor Control	Less sense of instructor control. Easier for participants to ignore instructor.	More sense of leadership from instructor. Not so easy to ignore instructor. Instructor has complete control over the class
Discussion	There is existence of limited interaction.	There is the window for elicit discussion between the class instructor and students. There is
		scope of various doubt solving session as well.
Group Dynamics	Less sense of anxiety; More equal participation; Less hierarchies; Dynamics are 'hidden' but traceable; No breaks, constantly in the meeting; Can be active listening without participation; Medium (technology) has an impact; Different expectation about participation; Slower, time delays in interactions or discussions	Anxiety at beginning/during meetings; Participation unequal; More chance of hierarchies; Dynamics evident but lost after the event; Breaks between meetings; Listening without participation may be frowned upon; Medium (room) may have less impact; Certain expectations about participation; Quicker, immediacy of interactions or discussions
Rejoining	High psychological/emotional stress of rejoining	Stress of rejoining not so high

Table 2

Mode	Online mode	Classroom teaching mode.
Reference Material	Online	Online
Multimedia	Online	Online
Lectures	Power point slides sent to students.	Interactive sessions by instructors.
Discussion	Discussion portal Online	Classroom interaction
Projects	Students connected online	Face- to face groups, interacting at least once in a week.
Assignment submission	Online	Online and Hardcopy submission along with plagiarism report.
Quizzes	Online	Paper based
Student Feedback	Online	Online

Research Hypothesis

The main difference between the two types of class is the mode of interaction between instructor and students as well as that among students. This research explores two hypotheses:
Ho: There is no significant difference in learning effectiveness (Obtaining better grades) between Online and face- to-face classes (Grades are independent of the mode of teaching)
H1: Online class differs from face-to-face class in learning effectiveness (Obtaining Better grades) (Grades are not independent of the mode of teaching)
Chi-square test has been selected as the test statistics as we are dealing with the frequency of students who have received corresponding grades under two different teaching modes.

Data Collection

To study grades of 300 students who were enrolled in Quantitative methods and Techniques subject and has perceived either of the mode of study (Online &Classroom teaching). The following data represents complete scenario of the student's results under both the modes of instruction

(Table-3)No of students enrolled in different mode of teaching with their respective grades

			Total
	Classroom Teaching	**Online Teaching**	
Grade			
A+	20	17	37
A-	28	21	49
B+	30	24	54
B-	35	23	58
C+	14	34	48
D	5	25	30
F(Fail)	4	20	24
Total	136	164	**300**

To understand the student satisfaction regarding both the modes of teaching a short questionnaire was drafted. A random sample of 20 students was selected from each mode of study respectively.

Data Analysis

Based on our hypothesis best possible statistical test which can be used to check the learning effectiveness based on the mode of the teaching for a particular subject is **Chi-square test.** Moreover here are some of the observations from data:-

(1).**45%** of students opted for Classroom teaching which means that **55%** students preferred to go for the online mode of instruction.
(2).Out of students securing higher grades (A+) **54.05%** have undertaken classroom teaching while **45.95%** have chosen online teaching.
(3) Observing the failure rate (F) **2.94%** was for those who have undertaken of classroom teaching and **12.20%** was for those who took online mode of teaching.
(4) 60% of students were male and 40% were females.
(5) Demographically the data is scattered and we may consider its impact on the result as well.
After applying chi-square tests we obtain following solutions

Table-4

Observed Frequency(fo)	Expected Frequency(fe)	(fo-fe)	(fo-fe)2	Chi-square (Calculated Value)
20	16.77	3.23	10.43	0.62
28	22.21	5.79	33.52	1.51
30	24.48	5.52	30.47	1.24
35	26.29	8.71	75.86	2.88
14	21.76	- 7.76	60.21	2.76
5	13.60	-8.60	73.96	5.43
4	10.88	-6.88	47.33	4.35
17	20.22	-3.22	10.36	0.52
21	26.78	-5.78	33.40	1.25
24	29.52	-5.52	30.47	1.03
23	31.70	-8.7	75.69	2.38
34	26.24	7.76	60.21	2.29
25	16.40	8.6	73.96	4.50
20	13.12	6.88	47.33	3.60
				34.36

Chi-square (Tabulated Value) = **12.59**
Chi-square (Calculated value) = **34.3**
As observed from the results above we conclude that **at 5% level** of significance chi-square value will be 12.59. On calculating chi-square value, we obtain the value as **34.36 > 12.59**.Finally we conclude that there is no sufficient evidence to accept Ho. We reject Ho and accept H1. Grades are not independent of the mode of teaching. There exists a difference between learning effectiveness in either of the case in which students opt for online mode or classroom teaching mode.

Student satisfaction survey (Class- room teaching Mode & Online-Mode)

		Classroom		Online	
Sr.no.		Mean	S.D	Mean	S.D
1.	Teaching mode improves my analytical skills	4.85	0.37	3.50	0.95
2.	Teaching mode improves my logical skills	4.50	0.51	3.75	0.72
3.	Teaching mode brings appropriate conceptual clarity	4.70	0.47	2.70	0.57
4.	Teaching mode is more user friendly and effective	4.45	0.51	3.15	0.81
5.	Teaching mode is successful for the subject under study	4.40	0.75	3.05	0.83

The mean scores of classroom teaching mode of study is relatively higher than the online mode of study which once again supports the above **chi-square test** results of the study.

Conclusion

This study compares the effectiveness of online and classroom learning. The results of this study indicate that although student performance is not independent of the mode of instruction, certain courses like Quantitative methods, Statistics and mathematics are more challenging to students who persist in the virtual(Online mode) environment than in the classroom. Above subjects require a lot of interaction with the instructors and fellow mates as well. It has been proven from the study that classroom teaching and discussion bring better conceptual clarity as compared to online mode for the subjects which are more numerical and technical. Besides, participation may be less approachable, and the quality and quantity of interaction may be decreased in online classes. Online interaction can be used to enhance learning, especially for students who tend to be reserved in the classroom setting. In developing online courses, we should realize that some courses may be more challenging to students who persist in the online environment. Course developers of such courses need to carefully analyze what are the specific subjects that may hinder tenacity and supplement instruction with classroom teaching, advising, or tutoring. Although an online class offers a comparably effective learning alternative, we should recognize that online learning has its unique advantages and disadvantages. In curriculum development for the courses like quantitative methods, we need to consider how to exploit and assimilate the comparative advantages of different modes of instruction to specific courses by offering not only fully classroom teaching or online teaching but also amalgam classes to overcome the constraints of time, place, and resources. This approach, in turn, will contribute to the training of online instructors in methods and the designing of educational support programs that allow students to succeed in both traditional classroom environment & online environment. As we continue to assess, improve, and therefore accumulate knowledge of teaching and learning effectiveness in an online environment, we hope that students, too, will achieve a greater understanding of and enjoy greater benefits from this new mode of instruction. Above Research also opens doors for other researchers to consider the experience of same set of students under two different modes of teaching by applying various other test statistics as well.

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