

An Evaluation of Online vs. Face-to-Face Instruction: An Experimental Study Using Learning Goal Assessment Measurement in an MBA Marketing Class

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Abstract

Purpose of the Study

Given the increasing importance of AACSB and its “Assurance of Learning” standards, this research was conducted to compare the relative effectiveness of online and face-to-face MBA marketing students’ learning, retention and application of analytical concepts.

Method/Design and Sample

The research design was Pretest-Posttest design where the students were required to take the analytical skills exam prior to being exposed to course material and then again at the end to the course. The groups tested were two MBA marketing strategy classes - one face-to-face (n=23) and one class (n=47). The groups tested were two MBA marketing strategy classes - one face-to-face (n=23) and one online class (n=47). The same instructor taught both classes. The face-to-face class was a night class that usually encompasses the same demographic group as the online class at the university where the research was conducted. Usually the biggest difference between online and night classes is the residential location of the online students being farther away from campus. At least 70% of the face-to-face students worked in full-time jobs. All MBA students can elect to take either face-to-face or online based on their personal preference. Both options were offered during the semester of the study. Table 1 reflects the comparison of the sample groups based on GMAT score and undergraduate GPAs.

Results

The results of the study indicated that students in the face-to-face class performed significantly better on learning goals and other measures than their counterparts in the online class.

Value to Marketing Educators

Numerous studies have been conducted to examine the effectiveness of online education over traditional methods of teaching. However, there is a lack of research that examines the efficacy of these two delivery mechanisms in the context of measuring learning outcomes in an MBA program. This research was an attempt to evaluate the effectiveness of online teaching versus a face-to-face method of instruction directed at a specific learning outcome.

Keywords: Learning Outcomes, MBA, Distance/Face-to-Face, Assessment, Experiment

Introduction

Much of the research that evaluates the comparison of online asynchronous education versus traditional face-to-face synchronous education uses the measurement of student attitudes and/or preferences (Alavi, Yoo, & Vogel, 1997; Aragon, Johnson, & Shaik, 2000; Glenn, 2001; Johnson, Aragon, Shaik, & Palmas-Rivas 1999; Ponzurick, France, Logar, 2000; Schutte, 1996; Sweeney & Ingram, 2001; Truell, 2001; Wilson, 2002). Other researchers have used direct measures of student learning such as GPAs or exam grades to measure differences in the educational methods (Helford & Lei, 1999; Jones, 1999; Leasure, Davis, & Thievon, 2000; Smeaton & Keogh, 1999; Tuchman, 2002; Tucker, 2000). Research reveals that information technology can be an effective tool in learning when there are specific learning goals and that few studies have examined skill development in online courses (Priluck, 2004). This study was conducted at small/medium southeastern university with a population of approximately 300 MBA students. An MBA marketing strategy course was taught to two groups of students (online and face-to-face) by the same instructor using the same materials and examinations. The research utilized a marketing strategy analytical skills exam developed to measure a specific learning goal to compare the effectiveness of online versus face-to-face instruction in an MBA Marketing Strategy class. The learning goal exam was then compared with other traditional quantitative assessment measures to test the effectiveness and validity of the alternative methods of course delivery.

Definition of Instructional Methods

For this study, online education will be defined as asynchronous online education and will be referred to as online education hereafter. The

traditional form of synchronous education where the professor delivers a lecture to group of students will be referred to as face-to-face hereafter. In this study, the face-to-face class was taught with traditional lectures using presentation technology. The face-to-face class was taught in 3 hour periods with the first half of the class used for a lecture and the second half used for a case. The face-to-face students had access to the same online materials (i.e., overheads, videos, course outlines and cases and as the online students). The same instructor taught both classes. The instructor has 25 years' experience teaching face-to-face and 20 years teaching online courses.

Online vs. Face-to-Face Delivery: Direct Measures of Performance

The expansion of online education has been recognized by both educational researchers and the media. However, the argument among researchers continues over the effectiveness of online education (Trawick, Lile and Howsen, 2010). Coates et al (2004), Farinella (2007) and Gratton-Lavoie & Stanley (2009) have found that economics students in online formats have poorer performance than in face-to-face formats. Trawick et al, (2010) in an experimental study found that students in online courses have poorer performance than face-to-face classes. It was also determined that there was no selection bias for students choosing the online section. The researchers also found that overall performance fell in online classes but that performance declined even more for students who would have otherwise preferred the traditional format.

Conversely, Tucker (2000) conducted an experimental study that compared the effectiveness of online versus face-to-face business communication students. The study found no significant differences between pretest scores and final course grades. However, examination revealed significant differences between post-test scores, final exam scores and students' age with distance students (the older part of the sample) having higher post-test scores and higher final exam scores. Glenn (2001) conducted a similar experimental study with political science students. There were no significant differences found between the pretest scores and the posttest scores for the online versus face-to-face groups.

When are Online Methods More Successful?

According to Sherry (1995) online programs must have interactivity to be successful. McNabb (1994) argued that convenience and access far outweighed the disadvantage of "dialogue" or interactivity and further stated that dialogue was lacking in most online courses. Garrison (1990) stated that the quality in the educational process resides in the sustained two-way

communication (synchronous) between the professor and the students.

Another major issue with face-to-face versus online learning is student preferences for a particular learning style (Imel, 1998). As universities move to more online courses, they may not be offering students their choice of learning style. Schlosser and Anderson (1994) found that although students really enjoyed the flexibility and convenience of online learning, they preferred face-to-face instruction. This creates a major dilemma for students who may perform better in face-to-face but choose online based on convenience (Simonson, 1997).

In a comprehensive literature review comparing undergraduate to MBA business students' online/face-to-face preferences, Arbaugh (2010) concluded that consideration of learning styles, student demographics, and perceptions of the course management system are more important in undergraduate online courses while ensuring effective participant interaction - particularly providing timely feedback - is a more relevant issue for graduate online courses. Arbaugh's research also concluded that graduate students might have less trouble adapting to an online learning environment than an undergraduate due to experience working with virtual teams

Hypotheses Development

Jones (1999), Leasure, Davis and Thievon (2000), Smeaton and Keogh (1999), Tuchman (2002), Tucker (2000), and Wilson (2002) found that when using GPA or test scores there were no significant differences between face-to-face and online education. In a literature review comparing several other studies, Lockee, Burton & Cross (1999) found support for the "no significant difference" argument between educational methods. Given that majority of research support this general hypothesis, the following research hypotheses are posited associated with the measures in this study:

H₁: There are no significant differences between the analytical posttest scores for the face-to-face and the online classes.

H₂: There are no significant differences between case quiz scores for the face-to-face and the online classes.

H₃: There are no significant differences between the case discussion scores for the face-to-face and the online classes.

H₄: There are no significant differences between final exam scores for the face-to-face and the online classes.

H₅: There are no significant differences between overall grade scores for the face-to-face and the online classes.

Research Method

This research study began with the development of an instrument to measure analytical skills as a learning goal for the MBA program. The analytical skills test was multiple-choice and true/false exam developed specifically to measure analytical skills in a marketing strategy MBA course. The database contained 100 questions, where 25 questions were randomly selected for each student exam. An example of the questions can be found in Appendix A.

The research design was Pretest-Posttest design where the students were required to take the analytical skills exam prior to being exposed to course material and then again at the end to the course. The Pretest did not count toward the students' final grade. However, the Posttest was worth ten percent of the final grade. Due to random selection each exam was different with a few of the questions potentially being repeated due to probability.

The treatment was the course mode of delivery which was conducted using both face-to-face, and distance education methods.

The Sample

The groups tested were two MBA marketing strategy classes - one face-to-face (n=23) and one online class (n=47). The same instructor taught both classes. The face-to-face class was a night class that usually encompasses the same demographic group as the online class at the university where the research was conducted. Usually the biggest difference between online and night classes is the residential location of the online students being farther away from campus. At least 70% of the face-to-face students worked in full-time jobs. All MBA students can elect to take either face-to-face or online based on their personal preference. Both options were offered during the semester of the study. Table 1 reflects the comparison of the sample groups based on GMAT score and undergraduate GPAs.

Table 1
GMAT and GPA Comparison

	Face-to-Face (mean)	Online (mean)	T-value	Sig.
GMAT	489	482	-.263	.794
GPA*	3.01	3.08	.514	.609

*Undergraduate GPA

Given that there are no significant differences between groups given GMAT and undergraduate GPAs, the following hypothesis is developed.

H₀: It is hypothesized that the Pretest Analytical test scores will not be significantly different.

Measurement and Treatment

The face-to-face and distance classes were taught with identical learning resources i.e., case discussions, case quizzes, five exams and a comprehensive final exam. All exams and quizzes were administered via a Learning Management System (Angel). Each exam was administered from a content specific database of questions that were randomly selected so students from both groups were measured using an identical testing method. Exams were all timed allowing one minute per question.

The case quizzes were multiple-choice with 5 questions per quiz. The quiz questions for each quiz were randomly selected from a database of 20 questions. Quiz questions were developed to measure the content of the case as well as the ability to answer case questions. There 11 cases in total or one case per topic.

An exam was developed to cover two topics with the last exam covering three topics. The exams contained 25 multiple-choice and true/false questions randomly selected from a database of 150 questions per exam. The exam questions were developed to cover material covered in the lectures with some book material used. The measurement for exams represented an average of the 5 exams.

The final exam was a multiple-choice and true/false exam of 50 questions selected randomly from the 5 individual exam databases.

Since the questions for each measure were randomly selected, normal tests for reliability or internal consistency cannot be executed. Therefore, the posttest exam scores were regressed against case quizzes, exam averages, case discussion scores and the final exam scores to measure the predictive validity of the posttest scores. The r-squared for the measures was 0.543 with final exam, exam averages and case discussion scores being significant predictors of posttest score. Given the sample size of 60 students in total, these results represent reasonable predictive validity. According to Messick (1995), correlations of 0.35 and above represent substantial predictive validity.

Regarding treatment, all students had access to the same teaching and learning tools in Angel. Included in the learning tools were the following: PowerPoint slides, lesson plans (details on how to study the material), lecture

videos (developed by the instructor using Tegrity - a recording software system), lecture outlines, cases and case questions, case quizzes and exams. All students recorded at least one viewing of the Tegrity videos as exams could not be opened unless the students viewed the video. The lecture videos content were identical to the lectures that the instructor gave in class. The treatment variation was the interaction between the students and lecturer. Online students could pose lecture clarity questions via email.

The only treatment variations between the classes were that lectures were given in class to the face-to-face students and cases were discussed in class. Students in both groups were required to post case question answers on a discussion board. These answers were graded based on content quality, research and writing clarity in the online class. Face-to-face students were required to post their answers prior to the case discussion in class. Face-to-Face students were graded in class for their case discussions and online students were graded based on their posted case answers.

Results

The best measure to establish a baseline to compare the sample groups was the Analytical Skills Pretest mean. The Analytical Skills Pretest score mean for the Face-to-Face student group (n=23) was 44.7%. The Analytical Pretest score mean for the Distance student group (n=47) was almost identical 44.8%. A t-test was conducted to test H_0 .

H_0 : It is hypothesized that the Pretest Analytical test scores will not be significantly different.

Table 2 shows that there were no significant differences between the groups relative to the Pretest scores. The results reflect that we are dealing with very similar groups regarding knowledge of Analytical Skills in Marketing Strategy. This result is also supported by the demographics of the sample (Table 1).

The hypotheses tests measuring the difference in means between face-to-face and distance students are recording in Table 2.

Table 2
Mean Differences between Groups by Mode of Delivery

Measure	Face-to-Face		On-Line		T-Value	Sig.	Cohen's d
	Mean	SD	Mean	SD			
Analytical Pretest	.447	.121	.445	.100	-0.057	.995	0.09
Analytical Posttest*	.840	.095	.747	.144	8.470	.000	-0.85
Case Discussions	.763	.238	.860	.178	1.399	.166	0.48
Case Quizzes*	.799	.082	.691	.090	-4.814	.000	-1.29
Final Exam*	.855	.085	.771	.095	-3.514	.001	-1.06
Overall Grade*	.835	.055	.768	.099	-2.602	.011	-0.76

*Significant at the 0.05 level

Hypotheses Tests

H₁: There are no significant differences between the analytical posttest scores for the face-to-face and the online classes.

This hypothesis is rejected. There was a significant difference between groups given the t-test in Table 2. In addition, the Cohen's d treatment effect is considered large.

H₂: There are no significant differences between case quiz scores for the face-to-face and the online classes.

This hypothesis is rejected. There are significant differences between the groups and the Cohen's d treatment effect is large.

H₃: There are no significant differences between the case discussion scores for the face-to-face and the online classes.

This hypothesis is accepted. The treatment effect (Cohen's d) is low.

H₄: There are no significant differences between final exam scores for the face-to-face and the online classes.

This hypothesis is rejected. The treatment effect is large.

H₅: There are no significant differences between overall grade scores for the face-to-face and the online classes.

The hypothesis is rejected. The Cohen's *d* effect is moderate.

Table 2 reflects that the Face-to-Face delivery method was superior and significantly different to the online method for all the measures except for the Case Discussions average and the Analytical Pretest grade. The hypotheses tests reflect that the test scores as a whole go in the opposite direction from what is predicted by the prevailing research. The Analytical Posttest measure showed that face-to-face students averaged 84% compared to 75% for the distance students. This learning goal measure was also significantly different at the 0.05 level.

The Case Discussions mean was not significantly different and showed a bias toward the distance mode of delivery. These differences can be attributed to a number of factors. Distance students' case answers were placed on a discussion board that were available to all students to evaluate and critique as well as for the instructor to grade. First, more thought was perhaps used by the Distance students due to peer scrutiny in writing case answers compared to verbal evaluation in the face-to-face mode. Second, the instructor graded the response quality of the students in face-to-face mode in "real-time" and perhaps was less objective compared to grading written responses. Third, the students in face-to-face mode would have been under more pressure to perform in a classroom situation.

Discussion

The results of this experimental study do not support the "no significant differences" argument between face-to-face and online education. In all cases except the analytical pretest and case discussions significant differences were found. The results of this study support the work of Coates et al (2004), Farinella (2007), Gratton-Lavoie & Stanley (2009), and Trawick, Lile & Howsen (2010). These researchers used direct measures of student performance and found that face-to-face teaching exceeded online methods on test scores.

This study found that on a measure of a specifically defined learning goal that face-to-face teaching outperformed online methods for the sample used in this study. The question becomes why were the face-to-face methods superior in this study?

The answer perhaps lies in the definition of analytical skills that have been defined as logical reasoning skills. When a student analyzes a factor associated with marketing strategy, perhaps interactivity between students and the professor improves the quality of the analysis. “What if” questions can be asked in a synchronous format and students get immediate feedback that enhances learning. This finding is supported by Arbaugh (2010) who found that providing timely feedback is more important in MBA classes.

Further studies are needed to substantiate the conclusions of this study. Other relevant issues such as the generalizability of these results to other areas of business with other samples. A study that examines online classes with more advanced synchronization technology (e.g., Elluminate and Wimba) is required to resolve the argument of the teaching effectiveness comparing face-to-face with online classes. In addition, it would be responsible to develop a general theoretical model that compares online with face-to-face teaching and learning with regard to measurable preference constructs and direct measures of student performance.

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Appendix A

The following questions represent an example of questions from the analytical skills exam.

When one uses a Penetration Pricing strategy, one of the major requirements is that one start with a low price as a barrier of entry. Logically, what is another factor that must be present to use a Penetration strategy?

- A) Inelastic Demand
- B) Derived Demand
- C) Brand Equity
- D) Short Technology Life Cycle
- E) None of the above

The experience effect measures cost of production differences against production history. The learning curve is exactly the same as the experience curve except for labor costs.

- A) True
- B) False

Prestige products show very high brand loyalty and premium prices. The demand curve for prestige pricing is reflected by these factors. Therefore, the most important characteristic of the Prestige Pricing curve is:

- A) price decreases lead to increased sales
- B) price decreases lead to brand equity
- C) price has no relationship sales of branded products
- D) price decreases lead to higher costs
- E) price decreases lead to decreased sales

Demand-pull is a promotion strategy in distribution channels. Channel members are the focus of the promotion. Therefore, demand pull is accomplished by which of the following:

- A) sales promotion incentives
- B) advertising directed at consumers only
- C) trade based advertising
- D) extensive personal selling
- E) advertising directed at channel members

Societal marketing forces marketers to consider the social costs of products. Therefore, the societal marketing philosophy forces marketers to:

- A) do more international research
- B) review current legal polices
- C) develop more in-house pollution control equipment
- D) review current methods of segmentation
- E) none of the above

Relative to product concentration on the intangible product factors i.e., those product factors that are not part of the product that can be evaluated with the senses, which stage of the PLC focuses most on intangibles?

- A) Introduction
- B) Growth
- C) Maturity
- D) Decline
- E) All stages focus on intangibles

Vertical integration deals with channel integration upstream and downstream from the producer. Given this information which of the following is the best example of vertical integration?

- A) a oil depot buying a service station
- B) Exxon buying Shell
- C) Sears moving to internet marketing
- D) Best Buy buying Sears
- E) None of the above are good examples

Globalization is said to proletarianized communication, this means that:

- A) Globalization is made communication more socialistic
- B) Globalization is more acceptable
- C) Globalization has brought communication to the common man
- D) Globalization has brought communication to the working man
- E) none of the above are correct

Penetration pricing deals with starting with a low price at product introduction. Logically, what is a critical element of penetration pricing:

- A) a inelastic demand curve
- B) a elastic demand curve
- C) price is not related to costs
- D) high barriers to entry
- E) All of the above

Logically, why are forecasting techniques required in the formulation of functional strategies:

- A) the need to evaluate changes as a result of mission goals
- B) goals are not always clear
- C) firms must forecast future sales revenue
- D) marketers forecast as a part of market research
- E) total company involvement

According to Hofstede, masculinity is the role expected for the different genders in society. Given this knowledge all of the following countries would be considered to be masculine except:

- A) Spain
- B) England
- C) United States
- D) Sweden
- E) Italy

Eskimos have many names for snow due to environmental adaptation. Logically, this language adaptation emanates from:

- A) Cultural divergence
- B) Norms
- C) Whorfian Hypothesis
- D) Cultural convergence
- E) Values

If we make the assumption that marketing influences the demand curve. Therefore, relative to demand, the goal of marketing is to:

- A) shift the curve parallel to the current axis
- B) elastic demand
- C) move down the curve
- D) shift the curve up and to the right
- E) move the curve

In economics demand is a function of price and quantity demanded. Marketing expands the concept of demand to include more variables. Therefore, the best place to start with a demand calculation is

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- A) market profile
 - B) geographic segmentation
 - C) population of total market
 - D) population of target market
 - E) none of the above are correct

When watching a television commercial, a good marketer should evaluate it based on which of the following criteria?

- A) sales promotion value
- B) promotion value
- C) publicity value
- D) effective communication
- E) whom to sell to and why

The Selling concept deals with increasing demand via increased market communication. Logically, selling philosophies are most involved with product promotion.

- A) True
- B) False

Foster developed the Foster curve in response to observations about how changes in technology influence performance and efficiency. Logically, the Foster curve measures all the following except:

- A) Technology effect on performance
- B) product performance
- C) diffusion of technology
- D) product innovation
- E) time