Can Using Individual Online Interactive Activities Enhance Exam Results?

Dr. Lydia MacKenzie
Professional Adjunct Professor
College of Continuing Education
University of Minnesota
St. Paul, Minnesota 55108 USA
mackenzie.lydia6@gmail.com

Dr. Kim Ballard
Academic Technologist
College of Continuing Education
University of Minnesota
St. Paul, Minnesota 55108 USA
balla007@umn.edu

Abstract

It has been suggested that the use of active learning instructional strategies, both in traditional face-to-face classrooms as well as online courses, enhances learning and results in better learning outcomes. Recently, an asynchronous online Principles of Marketing course offered by a large, public Midwestern university was revised to include the use of a publisher's individual online interactive activities including multiple choice, "drag and drop" matching exercises, and video and traditional case discussions, as active learning strategies to reinforce course concepts. This study examines whether the inclusion of these activities significantly improved learning outcomes as measured by performance scores on two required exams.

Key words: active learning strategies, asynchronous, community of inquiry learning effectiveness, online education.

Introduction

After several years of offering students an extended-term, asynchronous Principles of Marketing course through its Online and Distance Learning (ODL) program, a large, public Midwestern university decided to revise it to a semester, term-based course. In the original ODL program, an online extended-term course allowed students to work asynchronously and set their individual schedule to complete the course within nine months of initial enrollment. Although this schedule allowed students flexibility, the extended-term course design model did not build a community of inquiry (CoI) or provide social and learning support through student-student interaction (Moore, 1989). Thus, a decision was made to revise the course design to build a CoI, use active-learning strategies, use authentic, real-world learning activities, and use the publisher's individual online interactive (IOI) activities to reinforce core Marketing concepts.

Many textbook publishers now provide interactive online activities for students on their websites. After reviewing a concept, students complete activities such as online quizzes, matching exercises, interactive exercises requiring calculations, video and case discussions, and video tutorials. This study examines whether the inclusion of these types of individual online learning activities improve learning outcomes as measured by increased exam scores when correlated with online usage scores.

Growth of Online Learning

Online learning has continued to grow in the last decade largely driven by wider acceptance by students and academic leaders. The Sloan Consortium reports in the fall of 2011, 6.7 million higher education students took at least one online course (Allen & Seaman, 2013). Aslanian and Clinefelter (2013) report

the growth rate of online enrollment is three-to-four times that of classroom enrollment. Factors contributing to student acceptance of online learning include reputation of the institution (accreditation, quality of faculty, and acquaintance with other attendees), price, no specific class meeting times, liberal credit-transfer policies, and efficient admission processes.

Online learning is also gaining wider acceptance by academic leaders. The proportion of chief academic leaders who say online learning is critical to their long-term strategy rose to 66% in 2013; that number was less than 50% in 2002 (Allen & Seaman, 2014). One factor in the acceptance of online learning is evidence to suggest that there is no significant difference in learning outcomes between face-to-face and online instruction (Russell, 2005). Moreover, a 2010 U. S. Dept. of Education report, Evaluation of Evidence-based Practices in Online Learning, a meta-analysis and review of 50 studies conducted between 1994 and 2006 comparing online to face-to-face, found online students performed modestly better than those receiving the traditional face-to-face instruction (U.S. Dept. of Education, 2010). "The percent of academic leaders rating learning outcomes in online education as the same or superior to those in face-to-face instruction grew from 57% in 2003 to 77% in 2012, with a drop to 74% in 2013" (Allen & Seaman, 2014, p.4). According to Allen & Seaman (2014), it is believed that the number of online students will continue to grow.

Publisher's Online Activities

Textbook publishers are investing in the enhancement of online education by providing interactive, online activities to accompany their texts. Many have online versions of textbooks, e-books, and website access bundling options for students. These websites typically provide video tutorials, multiple-choice, "drag and drop," and interactive exercises for students, video and traditional case discussions, and instructor resources. The role these interactive, online resources play in improving learning outcomes is beginning to be studied.

According to Kozma (1991), computer-assisted instruction is effective because it can deliver individualized instruction while providing extensive practice and immediate feedback, similar to what a tutor working one-on-one with a student can provide, but an instructional strategy which is highly impractical for most college courses due to their enrollment. Interactive exercises on publisher's websites for practice of core concepts by individual students serve the same function. In addition to individual practice, well-designed online courses can support the development of a Community of Inquiry (CoI) which provides multiple types of interactions for students. Students interact with the content and ideas presented in the course materials such as the text (Student-Content interaction), interact with instructors through formative and summative feedback on assignments and in discussion forums (Student-Instructor interaction), and interact with their peers (Student-Student interaction) through debate, discussion, and collaboration on assignments and projects (Swan, 2003).

Recently, a textbook publisher hosting a site of online resources provided the results from 18 case studies completed by instructors who used the online resource in their courses ("Evaluating the all," 2014). Instructors report that using the publisher's online resources associated with their courses in various disciplines improved students' overall performance as evidenced by improvement in test scores and course grades, increased engagement, attendance, and/or retention rates. A majority of the case studies showed an average grade increase of more than five points, often equal to half a letter grade; in addition, several of the studies highlighted an average increase of student retention rates by nearly 23% ("Evaluating the all," 2014).

The Old vs New Course

For several years, the university offered an asynchronous, extended-term online Principles of Marketing course through its Online and Distance Learning program. The old version of the course consisted of 14 modules and the learning activities included reading, case discussions, a final marketing plan, and two proctored exams. The only online interaction students had was with the instructor. Once a student submitted their assignments, the instructor reviewed and graded each assignment and mailed them back to the student. After completion of the course, the proctored exams were mailed to the instructor, who mailed the graded exam back to the university. In essence, the course design was for a "classroom of one" (Maeroff, 2003).

In late 2010, a decision was made to revise the online course format from extended-term course to a traditional 16-week semester term-based online course for Fall 2011. While still asynchronous, two major changes were made in the course design. The goal of the new course design was to include more real-world activities (i.e., the types of activities that actual Marketing managers do day-to-day), and the addition of the publisher's IOI activities in the course to provide practice and feedback on core Marketing concepts. Part of the rationale behind the new course design was based on the development of an online community, a Community of Inquiry (CoI) (Swan, 2003), to replace the old "classroom of one" (Maeroff, 2003). The redesigned course includes student-content interaction through the reading the text, other readings, and publisher's online resources such as interactive online exercises and video cases; student-student interaction through a student team final marketing plan project which uses private group forums to facilitate student-student interaction, and student-instructor interaction through formative and summative feedback on assignments and in the discussion forums.

These changes overlapped because the IOI required students to practice and perform the types of activities that marketing managers do, i.e., calculate the sales per square foot of a particular location, compare it to five similar retail spaces, compare and calculate the sales percentage differential between year one and two for the same stores and create a Marketing dashboard to present their findings.

For their final project, each team of four students is required to develop a Marketing plan for a product, service or idea. In the development of their team Marketing plan students use the private forum to interact. Individually, students use the publisher's IOIs to learn and test core concepts. These IOIs allow students to come to their team meetings prepared to discuss and collectively grapple with the problems that Marketing managers face day-to-day. For example, student teams were required to research and develop a Facebook page to market their product, service or idea. This intersection of IOI and team activities provided a dual approach to content presentation and learning.

Interactive Online Activities

The IOI activities on the publisher's website for this course included multiple choice questions, video and traditional case discussion questions, and "drag and drop" matching exercises used to measure student comprehension of core concepts. Learning concepts in the IOI were scaffolded for students through a concept and formula review, problem-solving and applying the solutions of one problem set to the solution of the next problem set. Students received feedback on their answers including the ability to receive hints as they worked through the IOIs. Students completed IOIs which required them to construct a Marketing dashboard. After an introductory brief concept review, several interactive exercises required students to apply core Marketing concepts by calculating, for example, the sales per square foot of a retail space, by comparing the sales of five similar retail businesses within the area, and to calculate and compare the sales per square foot between years 1 and 2.

Students did not collaborate on the publisher's website activities. All activities presented and completed on the publisher's website were individual. Students were allowed unlimited tries in the exercises to gain mastery of concepts. However, the number of points they could receive for these activities were limited to a set percentage of their overall course grade.

Method

The purpose of this study is to determine whether the inclusion of individual online interactive activities from the publisher's website is related to improved student learning outcomes. In order to investigate this, Pearson's Product Moment Correlation Analysis was conducted to measure the relationship between the total combined scores on two exams and the total individual online interactive semester scores.

Participants

The study included scores from 133 students from a large Midwestern university enrolled in five online sections of an Introduction to Marketing Principles course from Fall of 2012 through Summer of 2013. In addition to case discussions and a team marketing plan, the students were required to complete weekly individual online interactive (IOI) activities over a total of 12 weeks and to take two exams.

Online Interactive Activities and Exams

The IOI activities included multiple choice questions, video and traditional case discussion questions, and "drag and drop" matching exercises used to measure student comprehension of core concepts. Each week included four questions, 10 points each; a calculation was then made as to what percentage was earned. For example, if a student earned 30 out of 40 points, a grade of 3.75 was recorded (30/40 x 5) in the gradebook. Students were allowed unlimited attempts to improve their scores. The total possible IOI score for the semester was 60 points.

The two exams required for the course, a midterm and a final, covered core Marketing topics and were worth 100 points each for a total possible exam score for each student of 200 points. The midterm exam covered content presented the first half of the semester and the final exam covered content presented the second half of the semester.

Data Analysis and Results

Pearson's product moment correlation analysis was used to measure the relationship between exam scores and IOI activities overall and then by section, as presented in Table 1 and Table 2. Table 1 demonstrates that overall there is a positive and significant correlation between total exam scores and IOI activities scores for all sections combined ($r=.585$). Thus, the more students engaged with the supplemental publisher online activities, the better their overall exam performance was for the semester. When analyzing this relationship in individual sections, similar significant results resulted, as reported in Table 2. In each of the five sections, a significant and positive correlation emerged between total exam scores and scores for the IOI activities.

Table 1.

Correlation Between Individual Online Interactive Totals and Exam Totals for All Sections

Measure	IOI Total	Exam Total	Mean	SD
IOI Total	__	.585*	49.6	14.8
Exam Total	.585*	__	156.6	25.3

p < .01.

Table 2.

Correlation Between IOI Totals and Exam Totals, by Section

Section	Measure	IOI Total	Exam Total	Mean	SD
1	IOI Total	__	.388*	54.08	10.53
	Exam Total	.388*	__	162.07	20.09
2	IOI Total	__	.387*	50.00	12.69
	Exam Total	.387*	__	157.48	20.37
3	IOI Total	__	.629*	49.25	15.75
	Exam Total	.629*	__	162.58	19.75
4	IOI Total	__	.475*	47.08	15.81
	Exam Total	.475*	__	153.77	20.53
5	IOI Total	__	.738*	46.85	18.89
	Exam Total	.738*	__	146.60	39.87

*p < .01

Furthermore, analysis of the means and standard deviations revealed an interesting finding, particularly in Section 5. Section 5 had the highest correlation between exam scores and IOI scores (r=.738); however, the exam scores in Section 5 had the lowest mean and the broadest standard deviation (mean = 146.60, SD = 39.87).

Discussion and Further Research

The findings that emerged from this study support the research cited by one textbook publisher that suggests that online interactive tools used as an adjunct to a course can enhance student performance ("Evaluating the all," 2014). Not only are the correlations consistently significant overall and by section, but also a review of the means and standard deviation, particularly in Section 5, suggests that these types of online supplements hold promise for students who are not performing well in the course.

The results are also promising with regard to further study about the efficacy of online activities for students. Since the publisher offers online quizzes in addition to interactive activities, future research could seek to determine if one modality is more effective than another in improving learning outcomes. A future study could also compare student results when they are allowed unlimited attempts vs. single attempts of the interactive, online exercises (in the current study, students were allowed unlimited attempts). Lastly, student performance comparisons could be made between those sections of the course, both online and face-to-face, that include interactive activities and those that do not.

Limitations

The limitations of this study include the analysis of one course design and one set of IOIs on a singular publisher's website.

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