A USABILITY STUDY OF INTERACTIVE WEB-BASED MODULES

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ABSTRACT
This research advances the understanding of the usability of marketing case study modules in the area of interactive web-based technologies through the assignment of seven interactive case modules in a Principles of Marketing course. The case modules were provided for marketing students by the publisher, McGraw Hill Irwin, of the *Marketing* textbook by Grewal and Levy (2010). Using a survey instrument, the study examines student perceptions of how useful the interactive modules are in students' learning of the selected marketing concepts, how difficult/easy it is for students to use the modules, and how helpful the module assignments were in receiving a better course grade. The results indicated that students perceived that the modules were easy to use and useful in learning of the marketing concepts. The number of completed modules increased students' actual course grade and module assignment grade. On an average, students indicated that the ideal number of interactive modules was seven in a semester. In addition, students' class attendance was positively correlated with their grades. Lastly, females achieved a higher average module assignment grade than males did.
Keywords: Interactive modules, Web-based technology, Usability

INTRODUCTION

The latest demographic research suggests that the current student is multi-task oriented and has a short attention span (Cluskey, Elbeck, Hill, & Strupeck, 2011). As educators experience changing student demographics, it is important to consider whether or not Web-based pedagogical methods enhance student learning, and how Web-based interactive technology can aid in learning important concepts. Given such trends, educators need to promote constructive discussions regarding ways to update existing pedagogies and add new learning activities to or modify existing ones to meet the needs of a changing student profile that reflects different learning styles.

Studies about student perceptions in traditional classrooms (face-to-face courses) that use computer-mediated communications (CMC) are limited (An and Frick 2006). Computer-aided interactivity appears to be a method that can be used in marketing courses as a tool that incorporates student's aptitude and comfort with computer technology into traditional marketing pedagogies to learn marketing concepts. Jaffee (1997, p. 268) defines interactivity as "regular interaction between teacher and students, among students, and between students and the learning environment." Computer-aided interactivity uses computer programs to enhance learning with activities that users can respond to (Pickett et al. 2000). Although much has been written about how computer-aided interactivity enhances the students' learning process, there is little empirical evidence about how students learn with technology (Close, Dixit, and Malhotra 2005). Furthermore, Achenreiner (2001) suggests that more studies are needed that match existing pedagogies with technology interfaces.

Because marketing educators may typically not be trained to develop web-based, computer-aided case study assignments, they may choose to use the web-based interactive case study modules that accompany textbooks to supplement their lecture-based teaching methods. However, it may be difficult for educators to combine traditional pedagogical (face-to-face) methods with interactive technology tools (O'Connor and Girard 2006). The authors believe that computer-aided teaching methods are useful in student learning if implemented effectively. CMC may be preferred by diverse learners because students can interact with case study materials online and have time outside of the classroom to review and comprehend the materials. Given the changing and diverse student profiles, it has been suggested that CMC may be useful in helping students focus on the case study information at hand more effectively (Berge and Collins 1993; Harasim 1990; Leasure, Davis, and Thievon 2000).

With this concern, this study reports student outcomes and perceptions of Principles of Marketing case studies in a web-based format for individual students. It advances the understanding of the value of technology as a tool for learning marketing concepts by describing the student perceptions of using web-based interactive case study modules.

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LITERATURE REVIEW

Case studies are typically used by marketing educators to help students gain real world knowledge and learn marketing concepts (O'Connor and Girard 2006) and are important tools for students to develop their analytical thinking and problem-solving skills through applied construction of reality (Henson, Kennett, and Kennedy 2003). In a Principles of Marketing course, for the first time many students are faced with the challenge of having to organize, understand, and solve the problems presented in case studies, and might even be overwhelmed with the process (O'Connor and Girard, 2006). Particularly, Newell, Titus, and West (1996) find that marketing students perceived that their quantitative skills are lacking. In a study, Krentler and Willis-Flurry (2005) demonstrate that the use of technology enhances student learning but also this relationship is moderated by variables such as the students' major and amount of their Internet use.

"Marketing educators are challenged with how to integrate technology into their courses to enhance student learning of marketing concepts and prepare them for careers in marketing" (O'Connor and Girard 2006, p 375). Most educators have integrated technology into traditional courses (Hannaford, Erffmeyer, and Tomkovick (2005). Researchers reported that technology created gateways for learning and enhanced the learning experience (Clarke III, Flaherty, and Mottner 2001). Technology and the Internet not only "facilitate" and "enhance learning" (Close, Dixit, and Malhotra (2005, p. 91) but also help develop skills needed in marketing careers (Strauss and Frost 1999).

Still, the number of published studies on how and how much students learn with technology and technology's effectiveness in the marketing classroom are limited (Krentler and Willis-Flurry 2005; Close, Dixit, and Malhotra 2005). Achenreiner (2001) points out that only a few studies have focused on how technology interfaces with different approaches to learning, and comments that case studies including problem solving are one area that needs further examination. Marshall and Michaels (2001) suggest educators use the type of technology that is focused on the course's emphasis and content. Priluck (2004) investigates student satisfaction level for two technologically different teaching methods in two sections of a Principles of Marketing course. Students were more satisfied with a traditional method of teaching using lectures, in-class discussions, assignments, and exams in developing their skills and course knowledge compared to a web-based method that integrated 7 out of 14 class meetings online. On the other hand, O'Connor and Girard (2006) find that students did not perceive that technology increased their learning but it made their learning process more interesting. The mixed findings from different studies suggest that educators need to maintain a balance between traditional and electronic methods (Malhotra 2002; Priluck 2004; Marshall and Michaels 2001; Close et al. 2005; Clarke et al 2001; O'Connor and Girard 2006). Studies also show that using technology generates a positive response by students if they are real world based (Karns 2005).

Picciano (2002) reports from the literature that interaction is important for a successful course. "Web-based delivery systems are popular electronic tools that have been effectively used in diverse marketing courses" (O'Connor and Girard 2006, p. 375). However, the nature and extent of the Web-based interaction and its effects on student performance remain unanswered (Picciano 2002). Overall advantages of Web-based learning over traditional course methods for students include Web-based interactivity, real-time communication, and self-motivated learning (O'Connor and Girard 2006). Web-based delivery systems can support multiple data formats including audio, video, and graphics, and can be updated if necessary (Kaynama and Keesling 2000; O'Connor and Girard 2006). Nevertheless, the question still exists regarding whether technology actually helps student learning of the marketing concepts (Close et al. 2005).

Therefore, this study aims to explore whether interactive case study modules for Principles of Marketing students are easy to use, and whether the number of interactive case study modules completed lead to a higher overall course grade, and an overall module assignment grade. In addition, the study examines whether students' semester standing and class attendance percentage are positively correlated with their perceptions of ease of completing the modules; lastly, the study investigates whether gender and student's option make significant difference in the overall module assignment grade and course grade. The research objectives are to find out whether:

> **RO1:** Students will find that web-based interactive case studies are easy to use. More specifically, their perceptions will be higher than being neutral.
>
> **RO2:** The number of modules completed will positively correlate with students' course grade and overall module assignment grade.

RO3: Students' semester standing and class attendance percentage will positively correlate with their overall course grades and module assignment grades.

RO4: Differences exist in the overall module grades based on gender and student's option. More specifically, females and students of marketing/management option will receive higher module assignment grade and course grade.

METHODOLOGY

The web-based marketing case modules were provided for marketing students by the publisher, McGraw Hill Irwin, of the *Marketing* textbook by Grewal and Levy (2010) at the publisher's web site: https://cms.psu.edu/section/content/default.asp?WCI=pgDisplay&WCU=CRSCNT&ENTRY_ID=C3869829D49C48829AE1E2EF3B4FD375. The students were asked to complete seven module assignments as part of their course requirement throughout a semester at a large university in the north-eastern part of the United States. After the completion of seven interactive case modules, voluntary participation in a survey was offered to the students in order to investigate the objectives of the study. A total of 96 students who registered for a Principles of Marketing course in a semester participated in the study. As an incentive, one bonus point credit was offered for a voluntary participation in the survey and was counted toward students' in-class participation grade.

In order to test the usability of the web-based interactive case modules, fourteen scaled-questions were asked. In addition, actual course grade, overall module assignment grade, number of modules completed by each student, student's class attendance percent, and student's semester standing were captured from the students' course grade sheet for the analyses.

FINDINGS AND DISCUSSIONS

The sample profile indicated that 69.5 percent of the students were males and 30.5 percent were females. Students of the marketing/management option comprised 48 percent of the sample, finance 12 percent, accounting 17 percent, entrepreneurship 3.4 percent, and other options 11 percent. Almost 8 percent of the students were undecided regarding their option.

A Principle Component Analysis with Varimax rotation revealed three dimensions with 60 percent variance explained. The item, "How clear was the language?" loaded on two dimensions. Because this item did not show clear measurement of a specific dimension, it was removed. The loadings are shown in Table 1.

To examine RO1, one sample t-test with the test value of 3 (mid-point) is used and the means and standard deviations of the statements measured on a 5-point scale were examined. All of the means of the statements were significantly higher than the mid-point at $p < .01$ level (Table 1). This indicates that students overall perceived that the modules were easy to use and useful in learning of the marketing concepts. The reliability analysis revealed Cronbach's Alphas ranging from .61 to .86.

Table 1: Usability and Usefulness of Modules

Usability Items	**Measurement Scale**	**Mean**	**S. D.**	**t-value**	**Loadings**		
					CA=.86	CA=.74	CA=.61
1.While completing the modules, did you:	1= Feel completely lost; 2= Feel a little lost; 3= Neutral; 4= Know what to do most of the time; 5= Always know what to do next	3.78	.81	**9.3*** **		**.59**	
2.Compared to what you expected, did the tasks go:	1= Much slower; 2=Slower; 3=Neutral; 4=Faster; 5=Much faster	3.6	.76	**7.7*** **			**.82**
3. How easy/difficult was it to understand the tasks asked of you?	1= Very difficult; 2=Difficult; 3=Neutral; 4Easy; 5=Very easy	3.74	.84	**8.5*** **		**.81**	
4. Overall, how easy/difficult was it for you to complete required phases?	1= Very difficult; 2=Difficult; 3=Neutral; 4Easy; 5=Very easy	3.78	.81	**9.3*** **		**.61**	
5. How easy/difficult was understanding the information presented in the modules?	1= Very difficult; 2=Difficult; 3=Neutral; 4Easy; 5=Very easy	3.64	.77	**8.1*** **		**.55**	

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6. How relevant were the graphics to the content?	1= Very irrelevant; 2=Irrelevant; 3=Neutral; 4=Relevant; 5=Very relevant	4.01	.89	**11.0*** **	**.57**		
7. How clear was the language?	1=Very unclear; 2=Unclear; 3=Neutral; 4=Clear; 5=Very clear	3.97	.83	**11.4*** **		.47[a]	
8. Overall, how easy/difficult was using the modules?	1= Very difficult; 2=Difficult; 3=Neutral; 4=Easy; 5=Very easy	3.99	.75	**12.8*** **			**.71**
9. Overall, how useful was the modules' content to your learning?	1=Very useless; 2=Useless; 3=Neutral; 4=Useful; 5=Very useful	3.47	.85	**5.3*** **	**.81**		
10. I completely understood the material:	1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree	3.46	.89	**5.0*** **		**.71**	
11. Working with the interactive modules was fun	1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree	3.37	.96	**3.8*** **	**.68**		
12. How helpful were the modules for you in learning specific course materials?	1=Not helpful at all; 2=Not helpful; 3=Neutral, 4=Helpful; 5=Very helpful	3.46	.89	**5.0*** **	**.79**		
13. Completing the modules helped me get higher grades on exams	1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree	2.72	.92	**-2.9*** **	**.77**		
14. Would you recommend the modules be used in future Principles of Marketing classes	1=Definitely no; 2=No; 3=Neutral; 4=Yes; 5=Definitely yes	3.78	1.0	**7.6*** **	**.81**		

****** p <.01***

[a] Deleted

To investigate RO2, a Pearson correlation analysis was performed. The number of completed modules was significantly correlated with students' actual course grade (.63) and module assignment grade (.98) at $p < .01$ level. The actual course grade and the module assignment grade was also significantly correlated (.66) at $p < .01$ level. On an average, students indicated that the ideal number of interactive modules was seven in a semester. In addition, the number of completed modules was not significantly correlated with any of student perceptions regarding the usefulness and ease of use of the modules.

In examining RO3, student's attendance record was positively and significantly correlated with both module assignment grade (.30) and overall course grade (.62) at $p < .01$ level. However, while students' semester standing (how far the student is in the degree program) was not correlated with module assignment grade, it was negatively and significantly correlated with their actual course grade (-.30) and their class attendance record (-.33) at $p < .01$ level.

For RO4, a t-test was performed to see whether females scored a significantly higher course and module assignment grade than males did. The course grade was not significantly different; however, females' module assignment grades (mean=93, n=29) were significantly higher than those of males (mean=86, n=66) with t= -2.17 at $p < .05$ level. Student's field of study (option) did not have significant relationship with their module assignment grade; however, the students with an option in finance (mean=93.7) had significantly higher course grades in the Principles of Marketing course than those with other options such as Accounting (86.5), and Entrepreneurship (80.9) option.

LIMITATIONS

This study used a convenience sample, and was limited to two sections of Principles of Marketing taught in a semester at one large university in the north-eastern region of the United States. Therefore, the study cannot be generalized to all Principles of Marketing students. Student's comfort level with technology and prior experiences or expertise with Web-based tools were unknown. Furthermore, some of the students had technical difficulties using the modules during the submission process (incompatibility between Mac vs. Windows-based programs), which might have biased the survey responses.

Time constraints also limited this study. If students underestimated the amount of time they needed and waited until the last minute to complete the module, this might have biased both student performance and survey results. Indeed, there were a few students who submitted their answers at the last minute, right before the deadline. Future research may include providing greater interactivity such as working in groups rather than individually and allowing students to collaborate and discuss the case while working on the module to improve the learning experience.

CONCLUSIONS

The findings from this study correspond with Pickett et al. (2000) that computer-aided interactivity enhances learning. Overall, students' feelings about the interactive case modules were positive; however, they did not feel that the modules helped increase their grades on exams. This is expected because the modules focus on specific concepts while exams assess a broad area of knowledge. This study found an interactive web-based case module helped the learning marketing concepts and were easy to use. Clarke III, Flaherty, and Mottner (2001) state that although there is no empirical evidence that it helps students learn, electronic interaction between students should be encouraged. The findings of this study are also consistent with those of O'Connor and Girard (2006) study that indicated modules made learning of the marketing concepts easier.

The number of completed modules was positively correlated with the module assignment grade and the course grade. This means students are encouraged to complete as many modules as possible to better their course grade. Student's attendance record was also positively and significantly correlated with both module assignment grade and overall course grade. However, while students' semester standing (e.g., freshman, sophomore) was not correlated with module assignment grade, it was negatively and significantly correlated with their actual course grade and their class attendance record. This finding warrants further research to understand why students with a higher semester standing have difficulty receiving higher course grade and attending the classes more frequently than their counterparts with a lower semester standing.

The study also found that the course grade was not significantly different between males and females; however, females' module assignment grades were significantly higher than those of males. This may result from the differences in learning styles between male and female students as documented in the literature (Karns 2006). Student's field of study (option) did not have significant relationship with their module assignment grade; however, the students with an option in finance had significantly higher course grades in the Principles of Marketing course than those with other options such as Accounting, and Entrepreneurship option. This finding should be verified by looking at a larger sample and in various courses to be generalized.

In conclusion, marketing educators are encouraged to use tools that will motivate students to engage in the marketing process and learn the marketing concepts. If marketing education is to continue to effectively prepare students for employment and life, educators must understand the ways that technology and other educational methodologies inspire students (Clarke III, Flaherty, and Mottner, 2001). Therefore, infusing traditional pedagogy with technological advancements through survey methods and experiments and making the results available to educators can only advance the research on this topic.

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