https://doi.org/10.48009/2_iis_2007_160-165

MEASURING FACULTY PERCEPTIONS OF BLACKBOARD USING THE TECHNOLOGY ACCEPTANCE MODEL

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ABSTRACT

Web-based education offers the combination of self-paced learning and interactivity. We are just now beginning to empirically assess the differences between online education and traditional classroom based instruction. The Technology Acceptance Model (TAM) has been widely used in Information Systems research to analyze user perceptions of technology. This paper describes the results of an empirical study of faculty perception of Blackboard usage, utilizing TAM as its theoretical basis.

Keywords: distance education, web learning, Blackboard, technology acceptance model (TAM)

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INTRODUCTION

Online learning or e-learning has become a vital facet of education initiatives in the last decade. Distance education surfaced as a model in the nineteenth century and was described as correspondence courses. It resurfaced as the open universities of the 1970s, and then as the videotape, broadcast, satellite and cable productions of the 1980s [15].

The advent of the Web and the Internet phenomenon profoundly affected online distance education. There has been striking developments in the platforms and systems that support online delivery [9][13]. Hill [12] suggests that Web-based teaching is an inventive resource tool and a feasible choice for all types of learners. Canning-Wilson [4], Jung [10], and Murihead [16] emphasize that Web-based learning is a convenient, functional and feasible solution that meets learners' educational desires.

With the progression to interactivity, designers of Web-based educational systems should take steps to determine how viable the technology is from the teacher and student standpoints and to uncover if teachers and students realize that interactive systems are functional and useful.

The primary objective of this study is to measure the faculty perceptions of Blackboard by utilizing the technology acceptance model (TAM). Our interest is to examine whether the faculty regard blackboard as valuable, useful and practical tool in assisting their teaching and whether their perceptions are related to Blackboard usage.

We begin by discussing web-based instruction. We follow this by a description of the technology acceptance model. A description of the survey that was the basis for our empirical investigation and the results of the statistical analysis follow. In the final section, we outline the implications of the results and present a future research agenda.

WEB LEARNING AND BLACKBOARD

Strong forces are pushing business schools toward embracing innovative instructional tools or technologies [8]. According to Bose [3], e-learning entails the usage of the Internet and additional related information technologies to generate experiences that promote and sustain the development of education. At some institutions, faculty members are expected to design distance education courses with minor or no assistance while other institutions offer technical support and faculty training [2]. Riley and Gallo [19] emphasized the significance of designing all facets of the instructional process of courses presented in distance settings. No matter what arrangement of training and support is provided to faculty members, adjusting to the new delivery format is still a challenge [18].

Blackboard was developed in conjunction with faculty members at Cornell University as a course management system for education. The platform has been improved noticeably. Blackboard is one of the chief market leaders for Virtual Learning Environments. Blackboard features functionality that supports student and teacher learning outcomes. For the purpose of this study, the term web learning will refer to the use of Blackboard in conventional classes in

ways which add up contents on the Internet to complement and not substitute the usual lecture.

TECHNOLOGY ACCEPTANCE MODEL (TAM)

The technology acceptance model (TAM) [5,6] is a modification of the theory of reasoned action (TRA) [1,5,6]. It was specifically designed to test user acceptance of information systems.. It theorizes that user's perceptions of usefulness and ease of use are major determinants of technology acceptance or adoption. According to Davis, positive perception of technology's ease of use, usefulness, and attitudes towards technology usage are significant determinants of the intention to use a technology.

Segars and Grover [20] provided definitions by establishing the determinants of perceived usefulness and ease of ease. According to their research, perceived usefulness is determined by the ability to: work more quickly, make jobs easier, make jobs useful, increased productivity, effectiveness, and job performance. The determinants of ease of use include: easy to use, easy to learn, easy to become skillful and clarity and understandability. Past usage impacts ease of use of an information system. Taylor and Todd [21] determined that the task acceptance model can be used to predict a users subsequent behavior after they have experience with a system.

The original TAM has since been extended and is recognized today as TAM2. Davis [7] mainly suggests that added external variables be utilized in future research using TAM. TAM2 (Figure 1) has been applied to investigate end-user acceptance of adopting a variety of information technology systems. TAM2 has been used to describe and predict technology use in a number of different disciplines such as decisions sciences, management sciences, information technology and management information systems. TAM2 has also been used to gauge technology acceptance across numerous diverse cultures. TAM2 noticeably explores and challenges the position of the end-user when new technology is instigated. In addition, it facilitates the assessment of added and external forces
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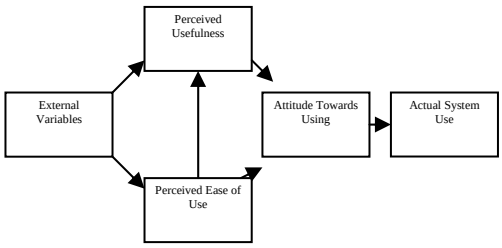
Figure 1 - TAM with External Variables – TAM2



Academic institutions are devoting substantial amount of money, resources and time into web enhanced teaching under the belief that adding Web substance to a class enhances the learning experience for student. However, there has been no comprehensive examination of faculty perceptions of and reactions to web based learning tools and in particular the use of Blackboard, its usefulness and ease of use.

RESEARCH QUESTIONS

This research seeks to answer the following questions: 1) Is there a relationship between the faculty perceptions of usefulness and usage of Blackboard?
2) Is there a relationship between faculty perceptions of ease of use and usage of Blackboard? And 3) Is there a relationship between faculty perceptions of usefulness and their perceived ease of use of Blackboard?

METHODOLOGY

Research participants were faculty teaching business classes at a southeastern, private university and northeastern private university. Both universities use Blackboard. Participation in the survey was based on the willingness of the professors who were using Blackboard to complete the questionnaire. Twenty eight faculty members representing all business school departments participated in the study. The sample consisted of 46% males and 54% females.

To investigate the perceptions of the faculty towards the use of Blackboard, we used a questionnaire developed by Landry [14]. The wording of the questions was adjusted to fit the study. The instrument was originally intended to test student's assessment of efficacy and significance of each of 10 course fundamentals

representing Blackboard. These fundamentals included: announcements, course documents, discussion boards, e-mail, external web-sites, faculty information, lectures, quizzes, and faculty tools and grades, and syllabus. Perceived usage was measured by 10 questions using a 5-point Likert-type scale. Perceived Usefulness was measured by two sets of 10 questions; one measuring perceived effectiveness and another measuring the perceived importance using a 5 point Likert-type scale. Ease of use was measured with 2 questions using a five point Likert-type scale. The final data inputs were loaded into a statistical package (SPSS 14.0) for analysis. Principal components analysis and maximum likelihood analysis using varimax was used. Cronbach's Alpha was calculated to determine the reliability of individuals scales and subscales.

TAM was used to provide the theoretical justification and results in the following hypotheses:
H1a: There is a positive relationship between faculty perception of usefulness and usage of Blackboard.
H2a: There is a positive relationship between faculty perception of ease of use and usage of Blackboard.
H3a: There is a positive relationship between faculty perception of usefulness and ease of use of Blackboard.

RESULTS

Thirty two faculty members participated in the study. There were four surveys with missing values and therefore were eliminated from the data set, leaving 28 valid responses.

Demographics

The population was comprised of 54% females and 46% males. 10.7% of the faculty were lecturers, 46.4% were assistant professors, 17.9% were associate professors, 17.9 % were full professors and 7.1% belonged to a different category. The majority of the faculty reported high level of computer comfort and usage. 67.9% of the faculty reported that they never took a certified computer course and only 32.1% took those certified courses.

Factor Analysis & Reliability

An exploratory factor analysis using principal components factor analysis with varimax rotation was administered to inspect the unidimensionality/convergent validity of each predefined multi-item construct. Hair, Anderson, Tatham and Black [11] contend that loadings greater than 0.50 are regarded extremely significant. An iterative approach was utilized to perform factor analysis. Items that did not make the loading cutoff and/or items that loaded on more than one factor were dropped from the analysis. This process continued until we obtained a meaningful factor structure.

The first index consists of ten perceived usage items. Six items did not make the cutoff and were dropped from further analysis. The results are presented in Table 1.

Component Matrix[a]

	Component
	1
Usage Faculty Info	.702
Usage Lectures	.911
Usage Quizzes	.894
Usage Discussion Board	.825

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

The second factor consists of ten effectiveness elements comprising the first aspect of perceived usefulness. Four items did not make the cutoff. The results are presented in Table 2.

Component Matrix[a]

	Component
	1
ER Annoucement	.852
ER Syllabus	.845
ER Lectures	.711
ER Communication	.768
ER Discussion Board	.592
Usage Quizzes	.751

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

The third factor consists of ten items relating to importance and comprising the second aspect of perceived usefulness. Four items did not make the cutoff and were dropped from further analysis. The results are presented in Table 3.

Component Matrix[a]

	Component 1
IR Annoucements	.893
IR Faculty Info	.864
IR Lectures	.821
IR Quizzes	.879
IR Course Docs	.635
IR Communication	.736

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

The fourth factor was of the two perceived of use items. The results are shown in Table 4.

Component Matrix[a]

	Component 1
User Friendly	.860
Blackboard Convenient	.860

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

The fifth factor consisted of 12 computer-background variables. Nine items did not make the cutoff. The results are presented in Table 5.

Component Matrix[a]

	Component 1
Comfortable with Tech.	.784
Comfortable with Web	.910
Enjoy Email	.821

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

The last factor consisted of nine items related to Blackboard experience. Five items made the cutoff. The results are shown in Table 6.

Component Matrix[a]

	Component 1
Precise Info Provided	.722
Teach Another Course	.774
Needs Met	.895
Output in right format	.923
Increase Involvement	.454

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

Reliability was evaluated by assessing the internal consistency of the indicator items representing each construct using Cronbach's Alpha. An alpha value of more than 0.7 is desirable, though this limit may be as low as 0.60 for exploratory research [17][11]. The reliability test conducted on all the factors resulted in the alpha values of .843, .857, .889, .632, .657, & .781 respectively.

Hypotheses Testing

Hypothesis 1 was observed for statistical significance. A regression analysis was conducted to observe the relationship between Usefulness and Usage which is the dependent variable. The coefficient of determination (R^2) was calculated to be .93. The independent variables account for 93% of the variation in Usage of Blackboard. The calculated F of 8 was significant at an alpha <0.01. Table 7 shows the ANOVA table of results. Hypothesis 1 was supported.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.357	12	2.113	8.0	.000[a]
	Residual	3.954	15	.264		
	Total	29.310	27			

a. Predictors: (Constant), IR Communication, ER Discussion Board, ER Lectures, IR Course Docs, IR Quizzes, ER Syllabus, ER Annoucement, IR Faculty Info, ER Quizzes, IR Lectures, IR Annoucements, ER Communication
b. Dependent Variable: Usage

Hypothesis 2 was observed for statistical significance. A regression analysis was conducted to observe the relationship between Ease of Use and Usage which is the dependent variable. The coefficient of determination (R^2) was calculated to be .253. The independent variables account for 25.3% of the variation in Usage of Blackboard. The calculated F of .858 was insignificant at an alpha <0.01. Table 8 shows the ANOVA table of results. Hypothesis 2 was not supported.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.883	2	.941	.858	.436[a]
	Residual	27.428	25	1.097		
	Total	29.310	27			

a. Predictors: (Constant), Blackboard Convenient, User Friendly
b. Dependent Variable: Usage

Hypothesis 3 was observed for statistical significance. A regression analysis was conducted to observe the relationship between Perceived Usefulness and Ease of Use which is the dependent variable. The coefficient of determination (R^2) was calculated to be .858. The independent variables account for 85.8% of the variation in Ease of Use of Blackboard. The calculated F of 4.047 was significant at an alpha <0.01. Table 9 shows the ANOVA table of results. Hypothesis 3 was supported.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.987	11	.726	4.047	.006[a]
	Residual	2.870	16	.179		
	Total	10.857	27			

a. Predictors: (Constant), IR Communication, ER Discussion Board, ER Lectures, ER Communication, IR Faculty Info, IR Annoucements, ER Syllabus, ER Annoucement, IR Lectures, ER Quizzes, IR Quizzes

b. Dependent Variable: Ease of Use

CONCLUSION

Universities are investing significant amounts of money, time, and resources into Blackboard to remain competitive. Universities don't know whether faculty perceive the same level of usage, usefulness and ease of use for all the Blackboard features and if using Blackboard can improve teaching and learning for the students.

This article provides further empirical justification of the strength of the TAM model and supports its appropriateness as a suitable and consistent measure of technology acceptance in educational settings. This study offers a continuing theme for researchers involved in the TAM model to examine user actions in these educational settings, in addition to creating a baseline for additional research concerning the effect of perceptions on the use and embrace of new technological innovations in educational settings. It is anticipated that the TAM model will continue to be investigated in different systems evaluations states.

This study demonstrates that faculty will use an online educational tool such as Blackboard if they perceive it to be useful to them and if they perceive that the technology is easy to use and supports their needs.

FUTURE WORK

This study analyzed perceptions of faculty in the United States. Perception of faculty internationally may differ as culture impacts the educational delivery system. We intend to extend this study to determine if significant differences exist in an international setting. Also, this study only looked at faculty perception of ease of use and perceived usefulness. We intend to extend this study to determine if significant differences exist in student perceptions as well.

An additional area for investigation is to determine if there are significant differences in the perception of usage and ease of use of the other major educational software packages. A cross-sectional analysis to study compare Blackboard results to the use of Web-CT and e-College is planned.

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