Using the Technology Acceptance Model for Outcomes Assessment in Higher Education

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ABSTRACT

This study employs the Technology Acceptance Model (TAM) in an educational setting to determine the usefulness of deploying the theory as an outcomes assessment instrument to assist in the accreditation process. The study of 131 college students found that the adoption of Internet usage is positively related to TAM constructs of perceived ease of use, perceived usefulness, behavioral intention to use, and subject's attitude towards use. Negative attitudes were negatively related. External variables of gender, student major, full-time/part-time status, presence of four-year college graduate in family, and overall technology literacy all have impact on usage. The usage of the TAM instrument provides flexibility and a copy of the version employed is included. A toolkit for potential adopters is presented to assist educators and administrators in using the Technology Acceptance Model in their institution.

Keywords: technology acceptance model, outcomes assessment, Internet, information technology, higher education

1. INTRODUCTION

Development of new assessment tools for student usability of technology is an important component of accreditation. Faculty and administrators require methods to close the loop in assessment. The American Assembly of Collegiate Schools of Business (AACSB) Manual (2005) speaks to the relevance of this research. The directive from the management standards section refers to the relevance of business school graduates obtaining competence in using information technology in the applications required for organizational operations. The AACSB requests that each school of business develop the appropriate curriculum necessary to carry out the mandate of addressing information technology literacy. This research attempts to fulfill that mandate by developing a measurement tool by adapting previous instruments and applying them to the business school environment.

Employers seek business school graduates with the technology skills required in today's business environment (Bikson, 1996; Tanyel et al, 1999; Kaminski et al, 2003; Batholomew, 2004; Vuotto, 2004; Raybould and Sheedy, 2005; Wagner et al, 2005). The graduating senior that is comfortable with disparate aspects of information technology needs less training and represents a serious cost saving over the employee that requires extensive technology training. The AACSB Standards Manual (2005) addresses the need for technology skills in numerous ways. Use of information technology is one of the six general knowledge and skills required for assurance of learning standards (p. 18). Support systems for student and faculty technology use require documentation for accreditation review (p. 30). Campus based institutions are required to document the extent of technology access and assistance (p. 30).

2. TECHNOLOGY ACCEPTANCE MODEL

The Technology Acceptance Model (TAM) was developed by Fred Davis (1989) as a method to measure and predict the adoption and usage of technology. Viswaneth Venkatesh (1999) elaborated on the model and linked training aspects. Articles on the theory are

numerous with 454 journal articles (Burton-Jones & Hubona, 2005) written on the subject. Davis and Venkatesh are cited most frequently. The original TAM model (Davis et al., 1989) found four stages in the decision to use an aspect of information technology. The first stage involves the user considering external variables to evaluate the perceived usefulness (PU) and the perceived ease-of-use (PEOU) of a particular aspect of IT. The PEOU will affect the PU in this stage. The second stage finds the PEOU and PU affecting the attitude of the user towards usage. The third stage involves the attitude combined the PU determining the extent of the IT usage intention. The fourth stage is the user intention to use or not use the IT involved (Burton-Jones & Hubona, 2005).

The majority of the TAM studies were used in the workplace to measure employee acceptance of new technology or systems. The literature on student TAM studies (Table 1) indicates that none were ever used in conjunction with outcomes assessment. Variables that measured trust (Gefen et al., 2003), cognitive absorption (Agarwal and Karahanna, 2000), and perceived ease of use (Moon and Kim, 2001) all concentrated on Internet usage by students.

Table 1: Selected Previous Studies Using TAM with College Students

Author/Year	Subject	Notes
Agarwal and Karahanna, (2000)	World Wide Web	Cognitive absorption
Alshare et al., (2004)	Computer usage	Variable of computer literacy
Fusilier and Durlabhji, (2005)	Internet usage	Sample consists of college students in India
Gefen et al., (2003)	Online shopping	Online trust
Jiang et al. (2000)	Internet usage	Anticipated consequences near-term and long-term
Klopping and McKinney, (2004)	Online shopping	Added task-technology fit (TTF) to TAM Model
Selim, (2002)	Course Web sites	Course Website Acceptance Model used (CWAM)

Alshare et al. (2004), conducting research involving 166 students from a Midwestern University, added variables to the TAM model to evaluate computer literacy. The study found that gender, traditional vs. non-traditional students, business majors versus non-business majors, and full time students versus part-time students had no significant differences in usage or literacy. However, significant differences arose on the variables of the degree of computer knowledge, the perceived ease of use, the perceived usefulness, and the attitudes towards computers. The authors stressed the importance of combining the Theory of Planned Behavior (TPB) with TAM to predict adoption and usage of information technology. In TAM, the perceived ease of use (PEU) and perceived usefulness (PU) represent the major determinants for usage of information technology. The essential conclusion for business finds that the more computer literate, then the more likely one will be a user.

Other studies have examined different variables and their effect on the TAM model. Burton-Jones and Hubona (2005) evaluated the TAM model for Internet-based applications and studied the effects of staff seniority, level of education, and age with 106 professionals in a manufacturing setting. The authors suggest that social variables have a significant effect on usage. Gender differences were explored in a study of knowledge workers (Gefen et al. 1997) with unusual results. The findings indicated different perceptions with women having a higher perceived usefulness while there was no effect on actual usage. The examination of the variable of perceived adequate user resources (Mathieson et al. 2001) utilized a ten question additional instrument to determine general and specific resource perceptions on a small group of part-time students with full-time jobs from a variety of industries. The result was an extended TAM model that could be used when resource limitations are involved. The instrument can be modified.

Research using TAM when IT usage is mandated (Rawstorne et al. 2000) combined the theory of planned behavior (TPB) and the theory of reasoned action (TRA) with TAM. This created a preferred method of predicting and explaining usage behavior when voluntariness is not an option. A longitudinal study was employed in a hospital environment where the dependent variable of actual behavior was determined. The results indicated that those subjects that perceived usage as mandatory adopted usage more readily than those subjects that perceived usage as voluntary.

A university setting was employed by Segrest et al. (1998) to determine whether organizational culture (collegial and managerial) affected adoption of distance learning technology (DET). TAM was used on faculty and administrators to find that collegial culture was not related to usage. Another higher education study involved 403 university students (Selim, 2002) that used TAM analysis on usage of course websites. This study confirmed that the variables of usefulness and perceived ease of use determined acceptance and usage by the students. Similar to numerous other studies, Selim (2002) uses the theory of reasoned action (TRA) originally put forward by Fishbein and Ajzen (1975) in addition to TAM. In this study, Selim investigates the World Wide Web usage by college students in the context of course Web sites. The research looked at Web site usefulness and ease of use. Understanding student acceptance of course Web sites is of value to instructors and course designers. The result is the Course Website Acceptance Model (CWAM). The instrument includes six questions to measure ease of use, six questions for perceived usefulness, and four questions for usage. All sixteen questions employed seven point Likert-type scale items. Pre-testing was conducted on a random sampling of 50 students. Factor analysis was employed to examine the three measurement models. The study found that ease of use affected perceived usefulness which affected acceptance and usage. The four critical factors were interactivity, multimedia modules, 24 hour availability, and allowing for student productively to complete course materials quickly and effectively.

Venkatesh et al. (2003) presented a unified theory of acceptance and use of technology (UTAUT) that combined the eight prominent models of user acceptance. The eight models used were as follows: 1. the theory of reasoned action (TRA), 2. the technology acceptance model (TRA), 3. the motivational model (MM), 4. the theory of planned behavior (TPB), 5. the combined theory of TAM and TPB (TAM2), 6. the model of PC utilization (MPCU), 7. innovation diffusion theory (IDT), and 8. social cognitive theory (SCT). Testing of the new model found that it outperformed the eight individual models by combining all the variables. The authors suggest that employers that use the new model (UTAUT) would be more likely to correctly assess the success of new technology introduced into the workplace. Employers would be able to design training programs for users that may be reluctant to adopt new systems.

3. EMPLOYERS AND TECHNOLOGY LITERATE BUSINESS STUDENTS

Business schools have been reaching out to employers to determine their needs for student education. What skills should students possess upon graduation that would make them into productive employees? A survey of employers in the state of Utah (Bartholomew, 2004) found spreadsheet skills the most desired of technology skills. Bartholomew surveyed faculty within the school of Business at Utah Valley State and found that presentation skills (PowerPoint) were highly reinforced while spreadsheet and database skills were not reinforced. The twelve Utah Higher Education units developed a mandatory computer literacy examination. Students were required to score 80% on the exam considered to be a minimum literacy level.

Examination of how colleges are doing preparing students for the workforce in a global environment (Bikson, 1996) may be stated in economic terms. Employers are the demand side and colleges are the supply side of the equation. Bikson found that employers were looking for domain knowledge from applications at entry level, but generic skills of learning how to learn were the most important in the long run. Examination into whether there is a disconnect in communication between employers and

higher education was studied by Tanyel et al., (1999) where attributes of university faculty of students skills needed for employment were compared to those chosen by prospective employers. The results indicated significant differences between the two groups in rank ordering of attributes.

Technology literacy of college students was researched by Kaminski et al. (2003) through a survey of 2102 college freshmen. An interesting point in the study was the refusal of some faculty to allow the survey of their students. The preferred method of the respondents to learning technology was one-to-one instruction. The authors stressed that information technology literacy worked best when "woven into the curriculum's content structure", (Kaminski et al., 2003). This concept was put into action at the University of Massachusetts in Boston (Wagner et al., 2005) in a new curriculum design that integrates information technology with other management courses. The new curriculum is based on the concept that business and IT have become intertwined and pervasive. IT has become ubiquitous in virtually all organizations to the extent that formation of new concentrations incorporating technology allows for the business curriculum to be more in tune with employers. Increased IT skills add value to employers. Raybould and Sheedy (2005) surveyed employers near Birmingham, UK and found that the most desired qualities were "vital soft skills" rather than degree specific knowledge. Employers outlined these skills as 1. communication and IT skills, 2. the ability to cope with uncertainty, 3. the ability to work under pressure, 4. the ability to function in teams, 5. the willingness to learn. The program that resulted from the research, Graduate Advantage, is an intensive program for real-world knowledge to prepare graduates for the workforce.

4. PROBLEM STATEMENT

What variables affect student acceptance and usage of technology and more specifically acceptance and usage of the Internet

Research questions

The specific research questions to be examined are listed as follows:

Ha1 There will be a gender difference in internet computer usage.

Ha2 There will be a difference between full-time and part-time students in internet computer usage.

Ha3 There will be a difference between accounting/finance majors and management majors in internet computer usage.

Ha4 There will be a difference between those students with a four year college graduate in the immediate family and those students that do not in internet computer usage.

5. METHODOLOGY

Sampling strategy

Students in their senior year taking the capstone course in the School of Business are asked to voluntarily complete the instrument. The students will be majoring in accounting, finance or management. The instrument will be voluntary. The sampling will be conducted at the start of each capstone class for a total of 130 possible subjects. The survey instrument will be in paper form. The subjects will be individually handed the six page survey, asked not to sign their names, and the surveys will be collected when all are completed. This method of data collection follows the procedures employed by Fusilier and Durlabhji (2005).

Variables

The dependent variable in this study is computer usage, while the independent variables include the TAM constructs of perceived ease of use, perceived usefulness, behavioral intention to use, and attitudes towards computing. Perceived satisfaction with subject's preparation for future career is an independent variable. Gender, full-time vs. part-time status, college graduate in subject's family, computer literacy, and selected major are all external variables.

Reliability and Validity

The reliability of the TAM model originally proposed by Gardner and Amoroso (2004) will be tested primarily using Cronbach's

alpha. The validity of the TAM model has been proved through the studies of researchers previously mentioned, but more recently by Alshare et al. (2004). A more thorough treatment of this subject is found in Table 2.

Table 2: Previous TAM Reliability Testing in Studies with Students

Author	Reliability (Cronbach's Coefficient)
Agarwal and Karahanna, (2000)	From .64 to .93 on five scales
Alshare et al., (2004)	From .76 to .91 on four scales
Fusilier and Durlabhji, (2005)	Report "high reliability" similar to previous studies
Gefen et al., (2003)	From .76 to .90 on six scales
Jiang et al. (2000)	From .79 to .92 on five scales
Klopping and McKinney, (2004)	From .78 to .90 on five scales
Selim, (2002)	Three scales at .91.

Values and key limits

Previous studies of TAM components have found ease of use and perceived usefulness related to information technology use (Anandarajan et al., 2000; Alshare et al. 2004). The use of the Pearson coefficient to find a value greater than .23 in factors computer literacy, perceived ease of use, perceived usefulness, and attitude (positive or negative) in the student computer usage would compare with findings by Alshare et al (2004) and Fusilier and Durlabhji (2005).

Scale reliabilities of .80 would be consistent with previous studies although Selim (2002) reported scale reliabilities higher than .90 while Klopping and McKinney, (2004) reported reliabilities as low as .70. Argawal and Karahanna (2000) found .70 to be the cut-off point for reliability.

Using factor analysis, indicators should load higher in their own construct than in other constructs (Argawal and Karahanna, 2000) Factor analysis by Klopping and McKinney, (2004) found five factors with eigenvalues higher than 1.0 that accounted for 68.4% of the total variance. This study would be seeking similar results.

Table 3: Frequency Distribution of Key Variables

Variable	Number of Respondents	Percent (%)
Gender:		
Male	51	46.4
Female	59	53.6
Classification:		
Full-time	97	88.2
Part-time	13	11.8
Major:		
Management	80	72.7
Accounting/finance	30	27.3
Family		
Four year grad present	67	60.9
No four year grad present	43	39.1

Survey subjects were 53.6% female and primarily full-time students. Management students were 72.7% of the total, while accounting/finance majors were 27.3%. Students were asked if they were the first in their family to graduate from a four-year college. A full 60.9% indicated that they were not the first, while 39.1 indicated that they were the first in their family to graduate from a four year college. Of the 16 subjects that did not complete the survey, twelve were absent the week the survey was conducted and four refused to complete the voluntary survey. The demographic characteristics of the survey population were similar to surveys taken of capstone students in 2004 and 2005.

A reliability analysis utilizing Cronbach's alpha was conducted on the TAM constructs (Table 4) which resulted in Cronbach's coefficient values that met or exceeded 0.70.

Table 4: Reliability Analysis (Cronbach's alpha)

Construct	Cronbach's Coefficient

Perceived Usefulness (6 items)	0.89
Perceived Ease of Use (5 items)	0.92
Attitude (3 items, positive attitude)	0.91
Behavioral Intention (3 items)	0.72
Perceived Complexity (3 items, negative attitude	0.70

Construct Validity

Factor analysis (Appendix B) with varimax rotation was employed to determine whether the TAM constructs of perceived usefulness (PU), perceived ease of use (PE), attitude towards using (AT), behavioral intention to use (BI), and perceived complexity of use (PC) were distinct. The results indicated that there were five component factors with eigenvalues in excess of 1.0 accounting for 72.036% of the total variance. There were six items for perceived usefulness, five items for perceived ease of use, four items for attitude towards usage, three items for behavioral intention to use, and three items for perceived complexity. All constructs proved to be distinct and comparative to previous Technology Acceptance Model research.

The Technology Acceptance Model adapted for this study (Appendix B) demonstrates the adaptation of the TAM relationships originally proposed by Davis (1989). The models used by Alshare et al. (2004). Klopping and McKinney (2004), and the proposed model by Gardner and Amoroso (2004) all required the development of external variables for measurement of their effect on perceived usefulness (PU) and Perceived Ease of Use (PEOU). The model suggests that PU and PEOU affect the subject's attitude towards use (AT) and the behavioral Intention to use (BI) moderated by perceived complexity (PC) leading to actual system use.

Means of the twenty-one TAM items were based on a five-point Likert-type scale where strongly agree, agree, neither agree nor disagree, disagree, strongly disagree represented the five values in descending order. All of the positive items received a mean of 4.1 or higher with "continued use of the Internet in the future" receiving the highest mean of 4.7182.

After factor analysis, the twenty scale items were transformed into five factors representing the five constructs of the TAM model (Table 5).

Table 5: Factor Means

Factor	Mean	Standard Deviation
Perceived Usefulness (6 items)	4.5242	.46915
Perceived Ease of Use (5 items)	4.4982	.57581
Attitude (3 items, positive attitude)	4.2833	.79613
Behavioral Intention (3 items)	4.4106	.51614
Perceived Complexity (3 items, negative attitude)	2.4667	.88733

Prior to the creation of the five factors, the twenty scale items were tested using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO test of the twenty scale items resulted in measure of .890. This statistic ranges between the values of 0 and 1. Andy Field (2005) states that a statistic closer to 1 indicates "that patterns of correlations are relatively compact" and accordingly will yield factors that are reliable. The low significance of the Bartlett test of 0.000 indicates that there are relationships between the variables. Both tests support the validity of the sample size and the probability of significant relationships.

Test of hypotheses

Hypothesis one: Ha1 There will be a gender difference in Internet computer usage

There was little gender difference to the question asking to self-report Internet usage on a five point Likert-type scale where 5=strongly agree and 1=strongly disagree.

Self-reported years of internet experience (Tables 6 and 7) indicated a slightly higher level of experience for males at 9.24 years compared to females at 8.7544 years of experience.

Table 6. Cross Tabulation Gender by Experience

Gender	Have a Lot of Experience	Years of Internet Experience
Male Mean	4.5490	9.2400
N	51	50
Female Mean	4.4932	8.7544
N	59	57
Total Mean	4.5727	8.9813
N	110	107

Table 7: Chi-Square Gender and Experience

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.440[a]	2	.487
Likelihood Ratio	1.480	2	.477
N of Valid Cases	110		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.85.

There is scant evidence for gender differences in computer usage. There is no support for the hypothesis that there will be a gender difference in Internet computer usage.

Hypothesis two: Ha2 There will be a difference between full-time and part-time students in internet computer usage

Full-time students reported 9.5385 years of Internet experience compared to 8.9043 years for full-time students, but full-time subjects rated their experience slightly higher (see Table 8).

Table 8. Means for Full-time and Part-time Students

Full or Part-time	Have a Lot of Experience	Years of Internet Experience
Full-time Mean	4.5773	8.9043
N	97	94
Std. Deviation	.57437	2.21951
Part-time Mean	4.5385	9.5385
N	13	13
Std. Deviation	.51887	3.79946
Total Mean	4.5727	8.9813
N	110	107
Std. Deviation	.56599	2.44943

In all factors, the correlation was higher for part-time students compared to full-time students (see Appendix C). There is support for the hypothesis that there will be a difference between full-time and part-time students in internet computer usage.

Hypothesis Three: Ha3 There will be a difference between accounting/finance majors and management majors in internet computer usage

The Pearson correlation with the usage statement "I have a great deal of experience using the Internet" with other TAM factors is shown in Appendix D. Survey responses were separated into two groups. The management major group (n=78) and the accounting/finance major group (n=30) were analyzed separately using Pearson correlation. The accounting and finance majors displayed far higher correlations to TAM factors with usage with the one exception of attitude.

Comparing the mean scores of the two majors (Tables 9 and 10) reveals that four of the five TAM factors are higher for the management majors with the fifth, perceived usefulness, higher for accounting and finance majors. Usage item "have a lot of experience using the Internet" was higher for accounting

and finance majors. Differences do exist for the majors, thus there is support for the hypothesis that there will be a difference between accounting/finance majors and management majors in internet computer usage.

Table 9. Comparison of means by major, Management

	Mean	Std. Deviation	N
Have a lot of experience	4.5432	.57117	81
Perceived usefulness	4.5556	.43381	81
Perceived ease of use	4.4765	.56175	81
Attitude	4.2675	.75170	81
Behavioral intention	4.4115	.50901	81
Perceived complexity	2.5226	.89278	81

Table 10. Comparison of means by major, Accounting/Finance

	Mean	Std. Deviation	N
Have a lot of experience	4.6667	.54667	30
Perceived usefulness	4.4500	.55043	30
Perceived ease of use	4.5733	.61416	30
Attitude	4.3500	.91429	30
Behavioral intention	4.4167	.53739	30
Perceived complexity	2.3111	.85291	30

Hypothesis Four: Ha4 There will be a difference between those students with a four year college graduate in the immediate family and those students that do not in internet computer usage.

The Pearson correlation with the statement "I have a great deal of experience using the Internet" with TAM factors is shown in Table 11. Survey responses were separated into two groups. The subjects with an immediate member of the family having graduated with a four-year degree group (n=67) and the subjects with no immediate family member having graduated college with a four-year degree group (n=43) were analyzed separately using Pearson correlation. Significant correlations were found in four of the five TAM factors for those with a graduate of a four year college in their immediate family, while those without a family member with a four year college degree had three out of five TAM items with a significant correlation. However, the key difference between the two groups being the factor of perceived usefulness.

Table 11. Comparison of Pearson Correlations for Family Graduate Status

	Yes Grad in Family		No Grad in Family	
Factor	Correlation	Significance	Correlation	Significance
Perceived Usefulness	..435	.000	.262	.089
Perceived Ease of Use	.662	.000	.654	.000
Attitude	.510	.000	.456	.002
Behavioral Intention	.537	.000	.588	.000
Perceived Complexity	-.191	.121	-.332	.029

6. SUMMARY AND CONCLUSIONS

In this study, the TAM model was deployed in examining how external variables affected Internet usage. The variables of gender, student status (full-time and part-time), family status (four year graduate in family), computer literacy, and college major were all examined.

While gender had no effect on Internet usage, it did have an effect on perceived Internet usefulness. These results proved consistent with those of Alshare et al. (2004) where no difference were found in usage,

but differences were found in perceived ease of use and perceived usefulness leading to differences in attitude towards computing. Earlier, Gefen et al. (1997) found similar gender results where usage was not affected, but attitudes towards usefulness were different. This study found similar results towards Internet usage. Gender differences in perceptions towards usage occurred in the responses to numerous TAM items. While both males and females equally rejected the statement that "using the Web bores me", males were far more likely to agree with the attitude statements of "I have fun interacting with the Internet" and "using the Web provides me with a lot of enjoyment." Yet, usage differences by gender did not materialize.

The differences between student majors were particularly interesting. Accounting and finance majors had stronger positive views towards usefulness, ease of use, and behavioral intention to use, while management majors had stronger attitudes towards use. Items "have a lot of experience using the Internet" and "number of years using the Internet" were both higher for accounting and finance majors. Whether these skills and attitudes were a function of surviving the accounting and finance majors into senior year is not known.

The use of the family college graduate variable in this study may prove important for those researchers examining family structure as a variable in computer literacy and usage. Therefore, this hypothesis is somewhat related to cultural and social external variable usage. Perceived usefulness of using the Internet was stronger amongst those students with a family member who had completed a four year college degree. The use of this external variable is important for those institutions that also cater to students who might be the first in their family to ever graduate with a four-year college degree. However, there was no difference in usage.

Differences were found between full-time and part-time students. All the constructs of the TAM model were found to have higher correlations to part-time students than to full-time students leading to the implication of this external variable requiring additional study. One problem for proper analysis is the lack of part-time seniors available for the study making any conclusion suspect.

Conclusions

Adoption of Internet usage is positively related to Technology Acceptance Model (TAM) constructs of perceived ease of use, perceived usefulness, behavioral intention to use, and subject's attitude towards use. Negative attitudes were negatively related. External variables of gender, student major, full-time/part-time status, presence of four-year college graduate in family, and overall technology literacy all have impact on usage. Females responded differently than males to the constructs, but were equal as to usage. Part-time students were more positive in all aspects of the TAM survey than their full-time counterparts. Those students with no four-year college graduates in their family were more likely to rate their experience with the Internet higher and their years of experience lower than those students who had a member in the family that graduated from a four year college.

Limitations

The nature of the student population at the target college may not be representative of student populations at other colleges. The business school studied may have more access to technology than other business schools. The population is drawn primarily from one geographical area. The students may work outside the campus more than most college students nationally. The population may be more representative of four year public colleges than of universities or private colleges.

One serious limitation in TAM studies involves the use of self-reporting and not the use of actual measurement. Self reporting may inflate correlations (Fusilier & Durlabhji, 2005) and create false validity (Klopping & McKinney, 2004). The self-reporting of computer literacy components is particularly suspect. However, testing and observation will not measure behavioral intention to use or gauge attitude towards use.

Recommendations for Future Research

Although this study utilized external variables that were deemed important to the institution

including the presence of a family member with a completed four-year college degree, other appropriate variables should be employed for other institutions including income, cultural differences, and student employment levels.

College student Internet usage acceptance studies compared to employee Internet usage acceptance studies would allow for training adjustments in the workplace and potential additional skill training adjustments for academia.

In categorizing the full-time student as traditional and the part-time student as non-traditional, what are the unknown variables that create a difference in almost all TAM items? The higher scores in all items incurred by the part-time indicate a need to discover whether age, work experience, or some other factor requires examination.

Several TAM studies have used access to resources as an external variable. The subjects of this study rated computing availability with a mean of 3.836 on a five point Likert-type scale with 5=excellent and 1=failure. The college has a mandatory wireless laptop program with all buildings wireless. However, the mean score was surprisingly low for this environment and further analysis found differences in responses by gender, major and perceived computing ability. Access to resources would have been a valuable subject for study.

Toolkit for Adoption by other Schools of Business

The actual instrument employed in Appendix A combines several outcomes assessment questionnaires and a version of the Technology Acceptance Model to produce a wealth of information for analysis. Other schools of business could create their own customized version to suit their needs. In this effort, the following steps are recommended:

- Determine scope of research
- Obtain backing of stakeholders
- Decide which demographic questions are appropriate.
- What additional outcomes assessment instruments could be attached?
- Determine focus of Technology Acceptance Model
- Design Technology Acceptance Model appropriate for focus
- Determine methodology for research
- Disseminate results to stakeholders

The scope of the research follows along two lines. The first is to decide who will be the subjects of the research. In this study, capstone students in their final semester of study were the subjects. However, it might be useful to compare first-year students to graduating seniors. The second aspect involves whether the research will be longitudinal.

The backing of stakeholders in the conducting of this research is essential. Faculty and administrators need to buy-in on the importance of the assessment project. Faculty assistance in the sampling effort may be required. Administrators may need to provide the resources required including release time for faculty conducting the research.

Demographic questions must be carefully developed especially in the case of a study that will be longitudinal in nature. Questions that identity the peculiar aspects of the business school to be examined should be included. Students working off campus, cultural differences, income differences, part-time versus full-time, campus housing versus commuting, access to technology, degree of distance education, and length of matriculation are examples of demographic questions that may be appropriate for one school, but not for another.

Attaching additional assessment instruments allow for added research opportunities and may prove to be more efficient then using them separately. Student satisfaction surveys are one example of an instrument that could be appended to the Technology Acceptance Model instrument.

The focus of the Technology Acceptance Model instrument requires the examination of which aspect of technology should be examined. For some schools, course technology related to distance learning may be more appropriate than Internet usage.

One of the key methodology considerations involves the sampling technique of surveying within the classrooms, on-line surveys, or

mail surveys. Individual researchers must decide which is more appropriate for the sample in question.

The dissemination of the results of the research to stakeholders constitutes the major contribution of the effort undertaken. Administrators and faculty obtain a glimpse through the window of quality assurance of their efforts.

Summary

The instrument combined a TAM assessment of a crucial technology component (Internet usage), with demographic components, overall self perceived satisfaction levels of business education variables and effective teaching methods. The product of this effort delivers an outcomes assessment tool and methodology capable of assisting higher education institutions in their pursuit of accreditation and survival in a world driven by technology. Finally, a toolkit is presented for other practitioners providing guidance for the construction and deployment of similar efforts for other business schools.

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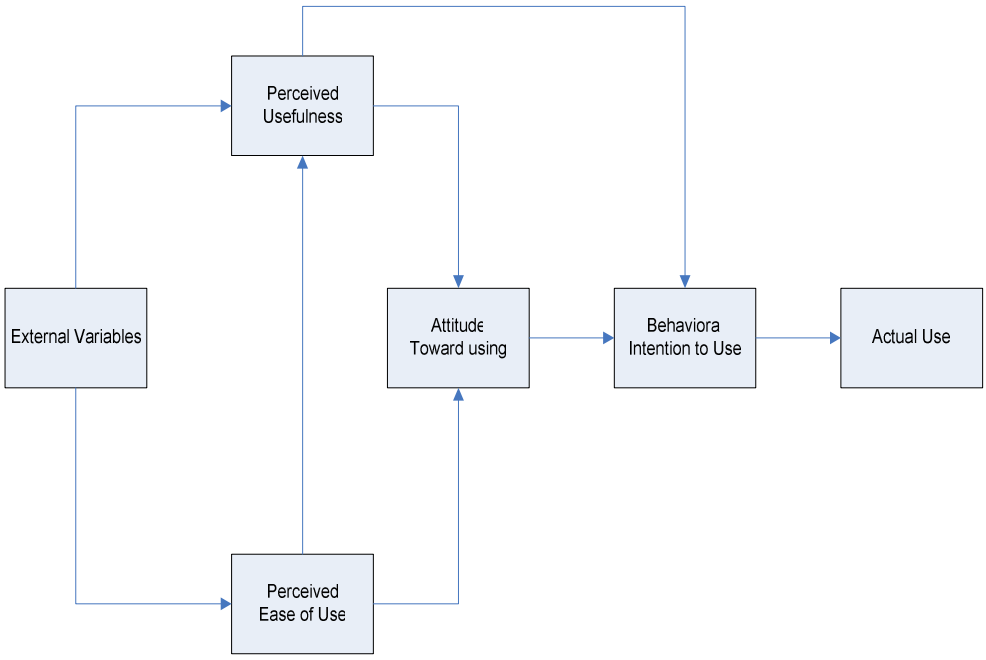
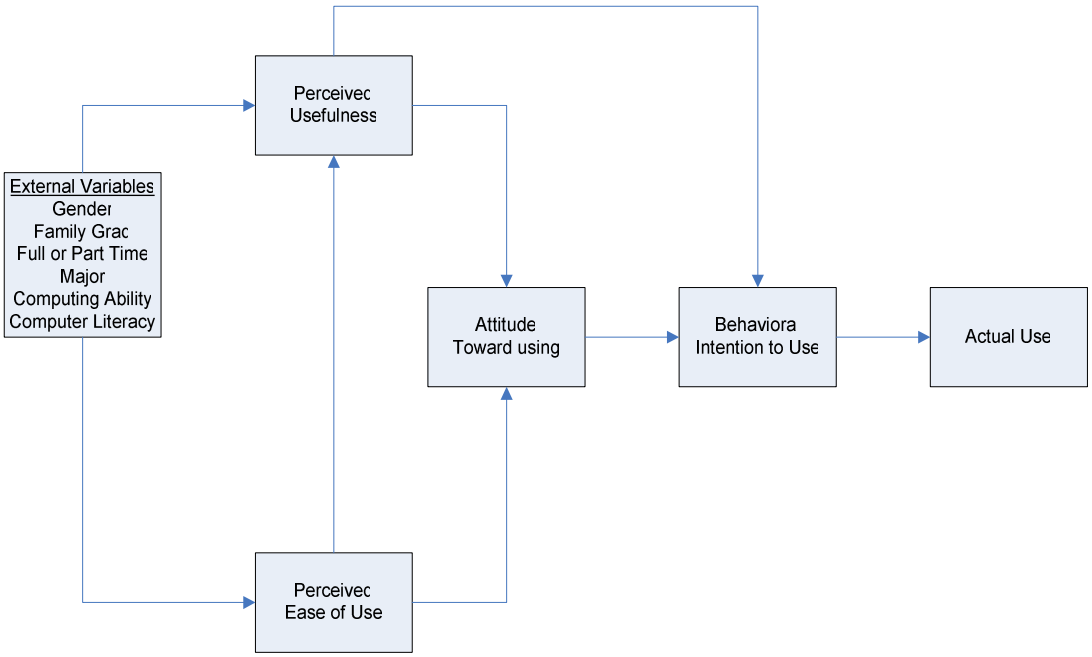
APPENDIX A: TECHNOLOGY ACCEPTANCE MODEL (TAM)



Appendix B: TAM Model Employed in Study



Appendix C: Pearson Correlations by Full-time/Part-time Status of TAM Factors				
	Full-time		Part-time	
Factor	Correlation	Significance	Correlation	Significance
Perceived Usefulness	.315	.002	.910	.000
Perceived Ease of Use	.644	.000	.858	.000
Attitude	.457	.000	.945	.000
Behavioral Intention	.501	.000	.914	.000
Perceived Complexity	-.207	.042	-.624	.023

Appendix D: Pearson Correlations by Major				
	Management		Accounting/Finance	
Factor	Correlation	Significance	Correlation	Significance
Perceived Usefulness	.322	.003	.573	.001
Perceived Ease of Use	.648	.000	.712	.000
Attitude	.502	.000	.483	.007
Behavioral Intention	.497	.000	.685	.000
Perceived Complexity	-.180	.109	-.362	.050

APPENDIX E: TECHNOLOGY ACCEPTANCE MODEL

5 = Strongly Agree
4 = Somewhat Agree
3 = Neither Agree or Disagree
2 = Somewhat Disagree
1 = Strongly Disagree

1. Using the Internet can enable me to accomplish tasks more quickly_____
2. Using the Internet can improve my performance_____
3. Using the Internet can make it easier to do my tasks_____
4. Using the Internet in my job/school can increase my productivity_____
5. Using the Internet can enhance my effectiveness_____
6. I find the Internet useful in my job/school_____
7. Learning to use the Internet is easy for me_____
8. I find it easy to get what I need from the Internet_____
9. My interaction with the Internet is clear and understandable_____
10. I find the Internet to be flexible to interact with_____
11. It is easy for me to become skillful at using the Internet_____
12. I have fun interacting with the Internet_____
13. Using the Web provides me with a lot of enjoyment_____
14. I enjoy using the Web_____
15. Using the Web bores me_____
16. I always try to use the Internet to do a task whenever it has a feature to help me perform it_____
17. I always try to use the Internet in as many cases or occasions as possible_____
18. I expect my use of the Web to continue in the future_____
19. Using the Internet can take up too much of my time when performing many tasks_____
20. When I use the Internet, I find it difficult to integrate the results into my existing work_____
21. Using the Internet exposes me to the vulnerability of computer breakdowns and loss of data_____
22. I have a great deal of experience using the Internet_____
23. Number of years using the Internet_____

APPENDIX F: FACTOR ANALYSIS OF TAM CONSTRUCTS

Scale Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
PU1		0.721			
PU2		0.687			
PU3		0.810			
PU4		0.755			
PU5		0.724			
PU6		0.696			
PE1	0.873				
PE2	0.778				
PE3	0.795				
PE4	0.763				
PE5	0.755				
AT1			0.642		
AT2			0.808		
AT3			0.848		
AT4			0.681		
BI1				0.765	
BI2				0.751	
BI3				0.629	
PC1					0.785
PC2					0.725
PC3					0.689
Eigenvalues	9.105	1.969	1.683	1.316	1.054
Cumulative % of variance	43.359	52.736	60.752	67.018	72.036