Faculty Motives and Outcome Expectations for Using Instructional Technology

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Abstract: Over the past decade, colleges and universities have encouraged faculty to adopt newer instructional technologies in the classroom. Despite the huge financial commitment by administrators, very little research demonstrates how these instructional technologies enhance pedagogical practices in the classroom from the perspective of faculty. The purpose of this study is to apply the Theory of Reasoned Action (TRA), and the Technology Acceptance Model (TAM) to explain faculty's use of instructional technology for teaching-related activities. Specifically, this research explores the relationship among faculty motives for using technology in the classroom, reported use of technology, and outcome expectations of instructional technology. The findings presented here indicate that the adoption of technology has moved beyond just using e-mail for teaching-related activities. Faculty have overcome initial trepidation toward technology, and do not appear reluctant or unwilling to use these resources for teaching-related activities. The conclusions of this research support the possibility that TRA and the original model of TAM are useful in determining user behavior and acceptance of instructional technology specifically related to faculty's adoption in the classroom.

Keywords: Instructional Technology, Pedagogy, Faculty Perspective, New Media in the Classroom, E-mail, Motives for using Technology, Outcome Expectations for using Technology, Technology in the Classroom, Technology Acceptance Model, Theory of Reasoned Action, Faculty adoption of Technology

Introduction
CONTINUING EXPANSION OF the Internet, email, and other forms of digital technology greatly dominate the way teachers and students communicate today. Online, web-based and supplementary website courses offer alternative communication channels to traditional modes of teaching. While technology appears to be transforming pedagogy, it is unclear how profound the changes are regarding the impact of technology on teaching-related activities. According to Bailey and Cotlar (1994) and McComb (1994), technology enables new forms and capabilities for learning beyond traditional classroom related activities. Scott and Rockwell (1997) note recent instructional technologies used for teaching-related activities in the classroom, or as a supplement to the classroom, have been email, listser, newsgroups, Internet relay chat (IRC), web, Internet searches, video conferencing, CDs, DVDs, word processing, LCD projection system, and personal computers. Typical activities incorporating these new technologies include: electronic lectures, readings for courses delivered in a hyper-text format in downloadable files, electronic guest lecturers participating in class via email, video conferencing, chat room, discussion list, email, listserv, newsgroups, or other type of message center is often used for course announcements, information, questions, a forum for discussion, online classes, WebCT, and smart classrooms.

Recent instructional technologies implemented in the classroom have explored the impact of technology mostly from students' perspectives (Chadwick, 1999; Cookman, 1998; Cruthirds & Hanna, 1997; Eveland & Dunwoody, 2001; Guerrero & Miller, 1998; Kulik, 1994; LaRose & Whitten, 2000; Magner, 1996; McHenry & Bozik, 1995; Phillips & Peters, 1999; Schacter, 1999; Sivin-Kachala, 1998; Spears & Martin, 1994). Little research exists from the perspective of faculty using instructional technology for teaching-related activities. Kuehn (1994) calls on scholars to provide a theoretical perspective on the study of computer-mediated communication in instructional settings. Although researchers have begun to investigate determinants of computer user behavior (Davis, Bagozzi, & Warshaw, 1989; Mathieson, 1991; Szajna, 1996; Taylor & Todd, 1995), much of this research has been in the areas of health communication, consumer behavior, and individual adoption of computers or computer software. The purpose of this study is to apply the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), and the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) to explain faculty’s use of instructional technology for teaching-related activities. Specifically, this research explores the relationship among faculty motives for
using technology in the classroom, reported use of technology, and outcome expectations of instructional technology.

Background and Literature Review

According to Witmer (1998), many academic institutions are pushing educators to adopt the latest instructional technologies in the classroom. For many educators, the challenge is effectively incorporating technology into existing modes of teaching and determining the appropriateness of using these technologies to enhance learning. Despite the substantial financial commitment by administrators, very little research demonstrates how these instructional technologies enhance pedagogical practices in the classroom from the perspective of faculty. While there have been numerous studies measuring traditional face-to-face and email interactions (Duran & Keaten, 2005; Mitra, Hazen, LaFrance, & Rogan, 1999; Panici, 1998), research focusing on the impact of instructional technologies on teaching and learning are relatively limited.

Researchers have called attention to the challenges of incorporating the latest instructional technology into the classroom (Lane & Shelton, 2001). Lane and Shelton argued for a better balance between new instructional technology and traditional modes of teaching. Overall, their research suggests that while the communication discipline by and large embraces new instructional technology, they do not have a clear understanding as to its place in the learning process. Lane and Shelton suggested that faculty develop both practical applications for instructional technology, as well as assess its proper place in curricula so technology does not overshadow the teaching and learning process. The question of how technology contributes to student learning is more important then just focusing on the bells and whistles of applying technology.

Panici (1998) surveyed faculty use of media technologies in introductory mass communication courses. Of the technologies adopted, Panici found that the World Wide Web, Internet searches, and email were most often used to prepare course materials. In the classroom, however, faculty relied more on traditional technologies for teaching such as videotape and audiotape, and to a lesser degree on the Web and email. Few teachers required newer and more sophisticated technologies to fulfill class assignments; instead they encouraged students to use the Web, Internet search engines, email, Newsgroups, and CDs to complete class requirements. Respondents also reported that their institutions were accommodating by providing technical support, workshops, seminars, and demonstrations with regards to using technology, although they wanted more support as they integrated additional technologies into their classroom.

Mitra, Hazen, LaFrance, and Rogan (1999) surveyed faculty to see if perceived expectations regarding the functionality of technology were related to their use of email. Overall findings suggested there was a correlation between expectations regarding the use of technology and email for communication between faculty and students. Data indicated that faculty who perceived technology to positively impact the learning process were more likely to use email to communicate with students as well as perceiving the use of email for communicating with students as a teaching activity.

Hoag, Bhattacharya, Helsel, Hu, Lee, Kim, Wharton, Park, Sager, Seo, Stark, and Yeo (2003) reviewed the adoption and pedagogical impact of computers, with implications for journalism and mass communication educators. The literature was divided into four areas: course design and teaching, student attributes, learning outcomes, and faculty attitudes. According to Hoag et al., research on course design and teaching has found changes in both class format and pedagogical practices, but that the role of digitally enhanced pedagogy has yet to emerge.

Hoag, et al. (2003) report that research has examined newly attained skills based on the integration of technology and curricula. This research looks at acquired skills due to student involvement in online interaction, requiring access to information resources available through CD-ROMs, as well as distribution of class materials through the Internet. This research was mainly concerned with faculty attitudes and motivational factors for using technology in the classroom. Faculty were generally positive and motivated using technology to help students prepare for the future, as well as reduce busy work communicating with students and colleagues via email and staying current with the latest professional developments.

Hoag, et al. (2003) indicate that some faculty remained skeptical due to lack of computer access, reduced awareness of technology resources, fear of computers, and the unwillingness to spend time learning technology. Regarding administrative support, lack of resources and time commitment to learn and implement technology were still concerns affecting faculty attitudes and motivations to use technology. Although some research found faculty were concerned that students may rely on technology to do their thinking, other educators believe technology might encourage a wider learning community, and still others felt computers would not live up to the promise of a better education. Although this was a comprehensive look at computers and pedagogy, Hoag, et al.’s research does not indicate specific technology or how faculty utilized it.
Duran, et al. (2005) investigated faculty representing private and public university’s use of email to communicate with students. They examined general use, amount of emails received from students, and how much faculty responded to students. They specifically addressed faculty-initiated email with students, perceptions of students’ motives for using email, and overall feelings toward using email to stay connected with students. Duran and his colleagues found that faculty generally received twice as many email messages as they initiated. Faculty on average received 15 emails from students weekly and responded to about 95% of those messages. Faculty also noted they initiated approximately seven messages weekly to students. Thus, students initiated twice as much interaction then faculty via email. Female faculty reported receiving more emails from students than male faculty, and were more likely to engage in email with students than their male colleagues. Open-ended questions revealed mixed feelings toward using email as a communication device. Numerous faculty were annoyed at the amount of emails received from students and the time it took to respond. While some faculty believe the quality of interactions with students improved – leading students to learn more about course content and faculty to learn more about their students – others felt these relationships have not improved.

According to Duran, et al. (2005), faculty also reported that email has added to their workday beyond regularly scheduled class time and office hours. Specifically, time was spent responding to messages received at all hours and students expecting faculty to be wired 24/7, indicating that students always assumed faculty would be available. These faculty likened email to being “on call” 24 hours a day noting that students had no concept of separation between home and work. This unrealistic expectation puts the burden on faculty to continuously check email to keep up with student demand. Faculty disagreed as to whether or not email had replaced face-to-face interactions. The overall findings, however, suggested that email was an effective means for faculty to communicate with students regarding course related content.

Theory of Reasoned Action and Technology Acceptance Model

One theory useful in explaining human behavior is the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980). Resulting from the broad nature of TRA, it is applicable in the study of behavior across a wide variety of domain – health communication, consumer behavior, computer adoption, and education (Ajzen & Fishbein, 1980; Davis et al., 1989; Greene, Hale, & Rubin, 1997; Sheppard, Hartwick, & Warshaw, 1988). Not only is TRA concerned with predicting human behavior, it is also interested in understanding human behavior, such as behavioral intention, attitudes toward behavior, and social norms (Ajzen & Fishbein, 1980).

Ajzen and Fishbein’s (1980) Theory of Reasoned Action “is based on the assumption that human beings are usually quite rational and make systematic use of the information available to them, ... and that people consider the implications of their actions before they decide to engage or not engage in a given behavior” (p. 5). According to TRA, a person’s intention depends on two basic determinants – attitude and subjective norm.

Ajzen and Fishbein (1980) suggest it is possible to predict and gain insight into an individual’s intention by measuring his or her attitude toward performing a specific behavior, as well as his or her subjective norm. Under TRA, attitude is a function of an individual’s belief system. Specifically, it is the evaluation of performing or not performing a specific behavior. Further, if performing a given behavior leads to a positive outcome, an individual will hold a favorable attitude toward that behavior; whereas, the belief of a negative outcome will lead to an unfavorable attitude. Thus, the more an individual believes that performing a behavior will lead to a positive outcome, the more favorable his or her attitude will be (Ajzen & Fishbein, 1980).

Just as attitudes are a function of beliefs so to are subjective norms. The belief underlying an individual’s subjective norm is defined as a normative belief. Subjective norm refers to an individual’s perception of social influences apparent to him or her as to whether or not to perform a particular behavior. More specifically, individuals perform a particular behavior when they evaluate a positive outcome and believe others important to them think they should also engage in that specific behavior (Ajzen & Fishbein, 1980; Taylor & Todd, 1993).

Davis, Bagozzi, and Warshaw (1989) introduced an adaptation to TRA, the Technology Acceptance Model (TAM). The Technology Acceptance Model adopts TRA as a theoretical basis for specifying the causal linkages between two key beliefs – perceived usefulness and perceived ease of use – along with an individual’s attitudes, intentions and actual computer adoption behavior. The Technology Acceptance Model, however, is a less general theory than TRA and is designed to apply more specifically to computer usage behavior. Researchers such as Davis, et al. (1989), use TAM to predict and explain individual and future behavior--such as acceptance and rejection of computer-based technology based on data from a brief period of interaction with technology. The primary goal of the TAM is to provide researchers with a parsimonious and theoretical set of factors of computer acceptance, as well as to explain user be-
behavior across a broad range of computing technologies and user populations (Davis, et al., 1989).

Davis, et al. (1989) revised TAM by investigating the ability to predict people’s computer acceptance from a measure of their intentions, and the ability to explain intentions in terms of attitudes, subjective norms, perceived usefulness, perceived ease of use, and other external variables. The general findings of Davis, et al. (1989) suggest perceived usefulness influenced intentions, and that perceived ease of use had a limited effect on intentions. However, subjective norms had no effect on intentions. These conclusions suggest the possibility that TRA and the original model of TAM are useful in determining user behavior and acceptance of instructional technology specifically related to classroom adoption.

Szajna (1996) provided empirical support for the original TAM. Graduate students participated in a longitudinal study of email use. Szajna (1996) measured ease of use, usefulness, and intentions at the pre-implementation stage. These variables were measured again at a post-implementation stage. Findings revealed that intentions in the pre-implementation state predicted intent to use. However, when behaviors were measured, intentions did not predict actual usage. In the post-implementation, usefulness had a direct effect on intentions. Szajna (1996) also confirmed Davis, et al. (1989) findings that ease of use does not have a direct effect on intentions. However, perceived usefulness influences intentions. The overall findings suggest that when a user becomes more experienced with technology, usefulness directly affects intentions to use and usage behavior. Consequently, users must first perceive technology to be useful, otherwise ease of use has no impact on intentions.

More recently researchers have revised and refined TAM to determine implications (Armitage & Christian, 2003; Cheung & Huang, 2005; Gong, Xu, & Yu, 2004; Ma & Liu, 2004; Saadé & Bahli, 2005; Shih, 2004; Venkatesh, Morris, Gordon, & Gordon, 2003; Wu & Wang, 2005; Yang & Yoo, 2004). Overall, the literature on TAM has found mixed results on whether perceived usefulness is more important to adopters than perceived ease of use when it comes to intention and actual use of technology. For example, Venkatesh, et al. (2003) examined competing models on user acceptance of technology – TRA, TAM, Motivational Model, Theory of Planned Behavior (TPB), combination of TAM and TPB, mode of PC utilization, innovation diffusion theory, and social cognitive theory – to provide a unified model of TAM and the Unified Theory of Acceptance and Use of Technology (UTAUT). Synthesis of the literature presents UTAUT as a useful tool to predict success for new technology. Direct determinants of intention to use technology include performance expectancy, effort expectancy, and social influence. Organizational context, user experience, voluntariness (willingness to use technology), and demographic characteristics such as gender and age were also factors that lead to use of technology (Venkatesh, et al., 2003).

Gong, et al. (2004), included Social Cognitive Theory as a determinant for intention to use technology, and found it can significantly enhance perceived ease of use. Self-efficacy was also found to have a strong direct impact on ease of use influencing intention to use technology. Saadé and Bahli (2005) found perceived usefulness to be a stronger predictor for use than perceived ease of use. However, when perceived usefulness was combined with intention to use technology in a course, support for TAM was stronger in predicting intentions.

Yang and Yoo (2004) expanded research on TAM to include cognitive and affective attitude as determinants of technology use. They found that cognitive and affective attitudes were separate constructs that were often used interchangeably. Yang and Yoo operationalized cognitive attitude as “an individual’s specific beliefs related to the object” (p. 20), and affective attitude as “how much the person likes the object of thought” (p. 20). Only cognitive attitudes were found to have an influence on perceived usefulness and perceived ease of use; affective attitude did not influence use. Because previous research has found little support for intention to use technology, Yang and Yoo were more concerned with explaining and predicting usage behavior rather than intention. Consequently, intentions were not included in their research. Their findings suggest that future research apply TAM as a reciprocal model that expands how attitude influences use, which in turns influences cognitive and affective attitudes. Lastly, Yang and Yoo suggest that user satisfaction also be considered as a determinant for computer use behavior.

Cheung and Huang (2005) included individual factors such as Internet skills, complexity, social pressures, and enjoyment as possible effects on perceived usefulness combined with the Diffusion Process Model to determine how students use technology. Findings suggested that positive feelings and attitudes toward technology lead to use of technology. Skills are also important in predicting intention to use technology (users do not want to be bothered with the complexity of technology). Social pressure was found to have some influence on use of technology, along with the notion that learning how to use technology would lead to better job prospects. Although Cheung and Huang were primarily interested in Internet usage from the students’ perspective, their findings suggest that use of the Internet may lead to constructive learning beyond the classroom.
Research has emerged to examine computer user behavior – specifically, email – for pedagogical reasons (Cheung & Huang, 2005; Duran, et al. 2005; Gong, Xu, & Yu, 2004; Mitra, et al., 1999; Saadé & Bahli, 2005; Sanjna, 1996). Although email is only one type of technology, Duran, et al. (2005) suggests that future research investigate the impact of other technologies used by faculty for teaching, student communication, and their effectiveness as learning tools. For this reason, the current study extends previous research to investigate faculty use of instructional technology to determine if motivations to use technology are related to outcome expectations of learning.

Research Questions

- RQ 1: What instructional technologies are used in the classroom; and how are these instructional technologies used?
- RQ 2: What are faculty motivations for using instructional technologies for teaching-related activities?
- RQ 3: What is the relationship among faculty perceptions of technology use, extrinsic motivation, and outcome expectations?

Method

A self-administered survey was distributed to all faculty at a southeastern university. A total of 850 surveys were sent through the campus mail system; 192 were returned for a response rate of 22.5%. All information remained anonymous and participation in the study was voluntary.

A five-part questionnaire was adapted from previous research to measure the elements of using instructional technology in the classroom (see End Notes for definition of constructs). The first section contained items that assess what motivates faculty to use instructional technology. Items 1 to 23 measured extrinsic motivation (EM), which is operationalized using the same items as perceived usefulness and ease of use based on the TAM (Davis, et al., 1992; Venkatesh, et al., 2003). Items were measured on a Likert-type scale (1 = strongly disagree to 5 = strongly agree). Statements reflecting these items include, “Technologies enable students to have quick access to teachers;” and “Students ask questions or seek help from teachers using email.”

Section two asked faculty to indicate actual use (AU) of instructional technology from a list of ten technologies (see Table 1). Faculty indicated frequency of technology use in the classroom on a range from 0 (never) to 4 (very often).

Section three included items that were adapted from an internal survey of the University’s Instructional Advancement Center (IAC) and used for comparative analysis with IAC data. These items assessed faculty behavior with instructional technology, such as how much they used technology for teaching-related activities (0 = never to 4 = very often).

Section four included items that examined faculty’s outcome expectations (OE) to use instructional technology (1 = strongly disagree to 5 = strongly agree). The scale was defined by items such as, “The use of technology empowers students to have greater control over the learning process,” and “The use of technology in the classroom transforms the way I teach.”

Section five contained demographic information reflecting age, gender, college/school, highest degree earned, position, and type of class taught.

Results

Demographic variables of the sample indicated that the majority of respondents (42.9%) were in Arts & Sciences, 16% were in the Business School, 9.9% were in Marine Science, 7.3% were in the Communication School, and the remaining faculty (23.9%) were spread across the eight additional colleges and schools within the university. Almost half (44.3%) of the respondents were tenured, 22.9% were tenure-track, 21.4% were instructor/lecturer, and 11.4% were part-time faculty. The largest group of respondents (77.6%) earned a Ph.D. or Ed.D., 15.6% held at least a Master’s or professional degree, while 6.8% indicated a Bachelor’s or other degree. Faculty were asked to indicate the types of classes they generally taught. Respondents indicated teaching lecture classes most often (65.6%), followed by teaching a seminar or discussion type of class (43.8%). The average age of the respondents was 49; 64.1% were male and 34.4% were female.

Research question one sought to determine actual use of instructional technology and how faculty utilized this technology for teaching-related activities. From a list of ten technologies, faculty were asked to indicate frequency of use for teaching-related activities. Table 1 shows the actual use of instructional technology. The most widely adopted instructional technologies were word processing (93%) and e-mail (91%). A majority of the respondents also indicated using websites (68%) and online information searches (60%) for teaching-related activities.
Table 1: Frequency of Actual Use of Instructional Technology (AU)*

<table>
<thead>
<tr>
<th>Technology</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Processing</td>
<td>93%</td>
</tr>
<tr>
<td>Desktop Publishing</td>
<td>21%</td>
</tr>
<tr>
<td>Websites</td>
<td>68%</td>
</tr>
<tr>
<td>Online Information Searches</td>
<td>60%</td>
</tr>
<tr>
<td>Video Editing Software</td>
<td>6%</td>
</tr>
<tr>
<td>E-mail</td>
<td>91%</td>
</tr>
<tr>
<td>Instant Messaging</td>
<td>6%</td>
</tr>
<tr>
<td>PowerPoint</td>
<td>42%</td>
</tr>
<tr>
<td>Statistical Analysis Packages</td>
<td>20%</td>
</tr>
<tr>
<td>Course Web Site System</td>
<td>53%</td>
</tr>
</tbody>
</table>

n = 192

*Often and very often responses are reported.

Table 2 summarizes how faculty reported using technology for teaching-related activities. As indicated, there has been a steady increase in the application of instructional technology for teaching-related activities. The largest increase of utilizing technology over the years was faculty requiring students to have email access, which doubled from 36% in 1999 to 72% by 2003. Faculty providing course information online greatly increased from 34% in 1999 to 80% in 2003.

Table 2: Frequencies of Faculty Behavior Regarding Technology for Teaching-Related Activities

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>2003*</th>
<th>2000**</th>
<th>1999**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Include e-mail address on syllabus</td>
<td>96%</td>
<td>88%</td>
<td>84%</td>
</tr>
<tr>
<td>Require students to have access to e-mail</td>
<td>72%</td>
<td>49%</td>
<td>36%</td>
</tr>
<tr>
<td>Use e-mail to communicate with your students</td>
<td>97%</td>
<td>86%</td>
<td>83%</td>
</tr>
<tr>
<td>Use e-mail to facilitate discussion outside of the classroom</td>
<td>53%</td>
<td>42%</td>
<td>34%</td>
</tr>
<tr>
<td>Require students search for information and/or citations using electronic databases</td>
<td>69%</td>
<td>62%</td>
<td>58%</td>
</tr>
<tr>
<td>Require students retrieve information from the World Wide Web</td>
<td>69%</td>
<td>58%</td>
<td>58%</td>
</tr>
<tr>
<td>Provide course information online (e.g., lecture notes, assignments, practice exams)</td>
<td>80%</td>
<td>42%</td>
<td>34%</td>
</tr>
<tr>
<td>Require students create information to be posted online</td>
<td>28%</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>Use specialized computer programs</td>
<td>52%</td>
<td>54%</td>
<td>52%</td>
</tr>
<tr>
<td>Require hands-on laboratory activities as part of course</td>
<td>48%</td>
<td>35%</td>
<td>37%</td>
</tr>
<tr>
<td>Use a computer in the classroom during instruction</td>
<td>65%</td>
<td>44%</td>
<td>43%</td>
</tr>
</tbody>
</table>

n=192 n=255 n=164

*Often, very often, and occasionally responses reported for comparison with supplemental data.

**Responses reported based on University Instructional Advancement Center data provided in 1999 and 2000.

Research question two examined faculty’s motivations for using instructional technologies for teaching-related activities. An exploratory factor analysis of 23 items on a five-point Likert-type scale (1 = strongly disagree to 5 = strongly agree) resulted in a four-factor solution accounting for 50% of the common variance. Results were obtained for a series of three models assuming four, five, and six factors to estimate the factor model; however, a four-factor model with oblique rotation was selected to represent the relationship among the 23 items (see Table 3). This decision was based on a review of several considerations: Six eigenvalues larger than one were identified and variables were explained fairly well with communalities ranging from .108 to .866. Further, because it was anticipated that factors in the domain of interest should tend to be intercorrelated, an oblique rotation with a default parameter of 0 was
considered. The solution exhibits a simple structure with each variable dependent on only one factor, a clearer solution than the other factor models because the distance of high versus low loadings is even clearer showing a better separation of factors. Thus, it was concluded that the four-factor model with oblique rotation is a reasonable compromise between model parsimony and adequacy of fit. Five items failed to load highly (less than .4) on any of the four factors and were eliminated.

Table 3: External Motivation to Use Instructional Technology (EM)

<table>
<thead>
<tr>
<th>Factor 1: Availability</th>
<th>Primary Factor Loadings*</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Technologies increase the availability of instructors to students.</td>
<td>.905</td>
<td>4.00</td>
<td>.884</td>
</tr>
<tr>
<td>(2) Technologies enable students to have quick access to teachers.</td>
<td>.894</td>
<td>4.05</td>
<td>.776</td>
</tr>
<tr>
<td>(3) Technologies enable students to interact more with teachers.</td>
<td>.664</td>
<td>3.82</td>
<td>.930</td>
</tr>
<tr>
<td>(4) Instructors are more available to their students because of technologies.</td>
<td>.492</td>
<td>3.98</td>
<td>.945</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor 2: Use Technology</th>
<th>Primary Factor Loadings*</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5) If a student hears a teacher does not use the latest technology in class, then he/she will probably avoid taking the class.</td>
<td>.955</td>
<td>1.97</td>
<td>8.63</td>
</tr>
<tr>
<td>6. If a teacher does not use the latest technology in class, then the student will not believe what he/she is being taught.</td>
<td>.674</td>
<td>1.60</td>
<td>.799</td>
</tr>
<tr>
<td>(7) Students will not sign up for a class if the teacher is not using the latest technology.</td>
<td>.657</td>
<td>1.82</td>
<td>.756</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor 3: Good Teacher</th>
<th>Primary Factor Loadings*</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8) In order to be a good teacher, that person must always use the latest technology.</td>
<td>.778</td>
<td>1.90</td>
<td>.917</td>
</tr>
<tr>
<td>(9) Part of being a good teacher is using the latest technology in the classroom.</td>
<td>.765</td>
<td>2.52</td>
<td>1.170</td>
</tr>
<tr>
<td>(10) A teacher is more credible when he/she uses the latest technology in class.</td>
<td>.630</td>
<td>2.66</td>
<td>1.129</td>
</tr>
<tr>
<td>(11) If the teacher is not using the latest technology, chances are he/she is not a good teacher.</td>
<td>.516</td>
<td>1.53</td>
<td>.790</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor 4: Facilitate Communication</th>
<th>Primary Factor Loadings*</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(12) Technologies give instructors another means to keep in touch with students.</td>
<td>.711</td>
<td>4.43</td>
<td>.576</td>
</tr>
<tr>
<td>(13) Instructors respond to questions, issue directions, and/or guidance using e-mail.</td>
<td>.700</td>
<td>4.26</td>
<td>.614</td>
</tr>
<tr>
<td>(14) Students ask questions or seek help from teachers using e-mail.</td>
<td>.652</td>
<td>4.30</td>
<td>.674</td>
</tr>
<tr>
<td>(15) I encourage students to communicate with me about class using e-mail.</td>
<td>.650</td>
<td>4.11</td>
<td>.955</td>
</tr>
<tr>
<td>(16) Technologies give students another means for their voices to be heard.</td>
<td>.563</td>
<td>4.07</td>
<td>.674</td>
</tr>
</tbody>
</table>
Technologies are effective for communicating with students regarding class-work.  

Sending messages to instructors using e-mail requires students to think through ideas.

Teachers can be a good even if they are not using the latest technology in class.**

A teacher who does not integrate the latest technology into the class can still be effective.**

Instructors demonstrate caring about students when they are willing to communicate online.**

Students prefer to communicate with their instructors using e-mail.**

Students prefer to communicate with their instructors during office hours.**

*Factor loadings larger than .4 are shown in bold face.  
**Low primary factor loading dropped from scale.

Table 3 shows factor loadings for the four-factor model. The first factor had high loadings on statements that reflect faculty availability as a result of technology (26% variance explained). Factor 2 reflected statements regarding reasons for using or not using technology (14% variance explained). Factor 3 corresponded to statements regarding a good teacher uses technology (5.5% variance explained). Factor 4 had high loadings on statements about the functionality of technology to facilitate communication (5% variance explained). Internal scale reliability was checked for each dimension. The four dimensions achieved acceptable levels of Cronbach’s alphas, .90, .85, .83, and .83, respectively.

Research question three addressed the relationship between faculty perceptions of general technology use and outcomes expectations. Factor analysis of the 10-item scale resulted in a two-factor solution accounting for 41% of the common variance. The dimensional structure of these measures was determined by an exploratory factor analysis of factors loading above 0.40 and using 1.00 eigenvalue as criterion for factor selection. Results were obtained for varimax rotation, and were substantively meaningful. Alpha reliability was .87. The selected model fit results are summarized in Table 4.
Table 4*: Outcome Expectations (OE)

<table>
<thead>
<tr>
<th>Teaching/Learning Items</th>
<th>Primary Factor Loadings**</th>
<th>M</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of technology can accommodate different student learning styles.</td>
<td>.671</td>
<td>3.77</td>
<td>4</td>
</tr>
<tr>
<td>The use of technology empowers students to have greater control over the learning process.</td>
<td>.757</td>
<td>3.42</td>
<td>3</td>
</tr>
<tr>
<td>The use of technology helps students deal with learning anxieties.</td>
<td>.664</td>
<td>3.10</td>
<td>3</td>
</tr>
<tr>
<td>The use of technology allows students to take a more active role in their learning.</td>
<td>.757</td>
<td>3.52</td>
<td>4</td>
</tr>
<tr>
<td>The use of technology stimulates class discussion.</td>
<td>.732</td>
<td>2.96</td>
<td>3</td>
</tr>
<tr>
<td>The use of technology in the classroom transforms the way I teach.</td>
<td>.631</td>
<td>3.18</td>
<td>3</td>
</tr>
<tr>
<td>I encourage students to use technology outside the classroom for tutorials or self-paced study tools.</td>
<td>.468</td>
<td>3.36</td>
<td>4</td>
</tr>
<tr>
<td>The use of technology within the classroom increases student attention.</td>
<td>.701</td>
<td>3.09</td>
<td>3</td>
</tr>
<tr>
<td>The use of technology is too time consuming for students.***</td>
<td>-.521</td>
<td>2.15</td>
<td>2</td>
</tr>
<tr>
<td>I am hesitant to use technology in the classroom because it is too technical and difficult.***</td>
<td>-.327</td>
<td>1.69</td>
<td>1</td>
</tr>
</tbody>
</table>

*Teaching and learning items were adapted and modified from Panici (1998).
**Factor loadings larger than .4 are shown in bold face.
***Low primary factor loading. Dropped from scale.

Due to the exploratory nature of this research, the relationships were further tested by the computation of Pearson’s bi-variate correlation for the scales measuring overall frequency of using technology with outcome expectations and extrinsic motivation. All scales were found to have a significant relationship with overall frequency of use. Table 5 reports the correlation matrix. The results of this survey suggest that there is a moderate correlation (.58%) between outcome expectations and motivation regarding use of instructional technology. In addition, a moderate correlation was found between technology use and outcome expectations (.40%), and a slight correlation was reported between technology use and motivation (.34%).

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Table 5: Correlations Among Actual Use (AU) of Instructional Technology, Extrinsic Motivation (EM), and Outcome Expectations (OE)*

<table>
<thead>
<tr>
<th>Actual Use (AU)</th>
<th>Extrinsic Motivation (EM)</th>
<th>Outcome Expectations (OE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Use (AU)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Extrinsic Motivation (EM)</td>
<td>.338</td>
<td>1</td>
</tr>
<tr>
<td>Outcome Expectations (OE)</td>
<td>.400</td>
<td>.583</td>
</tr>
</tbody>
</table>

*All correlations significant at the 0.01 level (2-tailed).

Discussion and Conclusions

This study was an exploratory look at the effect of instructional technology on teaching and learning from the faculty’s perspective. Results from the current study suggest that the use of technology by faculty for pedagogical purposes is increasing within the context of this campus-wide implementation. Of the technologies adopted (i.e., online discussions, LCD projection, electronic lectures), a transformation has begun to emerge. This research indicates that the adoption of technology has moved beyond the use of email for teaching-related activities. Compared with the findings of Panici’s (1998) earlier research, the results of this current study show an overall increase in adoption behavior by faculty.
Although most respondents in the current study use computers for general word processing needs (93%), Herling, in 1996, found resistance to technology by some communication faculty. Three factors emerged that lead faculty to resist adoption of computer technology: (1) Did not perceive necessity or benefit of the innovation; (2) lack of willingness to change; and (3) lack of adaptability of the innovation. While faculty may have encountered resistance to technological innovation early in the adoption process, the findings presented here suggest that faculty have overcome initial trepidation toward technology, and do not appear reluctant or unwilling to use these resources for teaching-related activities.

According to the Theory of Reasoned Action (Ajzen & Fishbein, 1980), faculty adoption of instructional technology would be based, in part, on behavior leading to a positive outcome. In the current study, faculty perceived adopting technology as beneficial to both themselves and students. This finding was consistent with previous results found by Panici (1998) and Hoag, et al. (2003) where faculty believed technology enhanced courses by helping to accommodate different learning styles, improve student attention, and provide opportunities to become more engaged in the learning process.

It also seems reasonable that faculty would be influenced by subjective norms generated by today’s technology obsessed culture and multi-tasking students. While faculty indicate positive outcomes should result from adopting technology in their classrooms, these findings may reflect the assumption that a certain amount of technology-based activities are expected by students. The positive relationship found between faculty use of technology and expectations to improve student-learning outcomes should favorably influence faculty attitudes.

Through previous application of the Technology Acceptance Model (Davis, et al., 1989), perceived usefulness was found as a major factor influencing people’s intentions. While it was noted that intentions did not predict actual use of acceptance regarding technology, participants in the current study indicated a high degree of technology had already been adopted in their classes. Although many elements contribute to predicting future use of technology, the idea of faculty identifying technology as a useful component to enhance the classroom experience may lead to a greater understanding of its adoption.

These conclusions suggest the possibility that TRA and the original model of TAM are useful in determining user behavior and acceptance of instructional technology specifically related to faculty’s adoption in the classroom. Technology users must perceive positive outcome expectations, otherwise they will lack motivation to use these innovative technologies. Thus, by becoming more experienced with technology, usefulness directly affects intentions to use new innovations and actual usage behavior.

Hoag, et al. (2003) noted the advance role of digitally enhanced pedagogy has yet to emerge. Nonetheless, the majority of faculty surveyed at this university perceived new technology as a beneficial tool to augment the learning experience. The challenge for faculty is determining how technology fits into the pedagogical objectives of the class. More recently, Young (2004) reported that while a majority of universities and colleges have met the challenge of wired classrooms, pedagogical practices have not kept pace or have been adequately studied. Although faculty did not believe using technology for class-related activities were too time consuming for students, it is still unclear as to whether or not students agree with the classroom benefits of technology. In the study by Young, “Students say technology actually makes some of their professors less effective than they would be if they stuck to a lecture at the chalkboard” (p. 1).

This current research also suggests that measuring motivation to use technology and outcome expectations influenced by its use are important constructs. The scales utilized in this study provide a reliable measure of faculty outlook on the perceived impact of technology on pedagogy. Additional studies are needed to further test scale validity and reliability. Until such studies are completed, it is suggested that these instruments be used in conjunction with other methods of perception and attitude measurement. Future investigations, however, should continue to examine these constructs for their predictive validity.

As previously noted, little research has focused on the use of instructional technology from faculty’s perspective. Although the results of this study are not generalizable beyond the scope of those surveyed, the adoption of instructional technology is on the rise at many universities. While this study recognizes the growth of instructional technology as a valuable educational tool, what remains to be determined is effectively incorporating these technologies into the current curriculum to complement traditional modes of teaching. Further investigation in this area will provide a greater understanding on how technological tools can support educational elements to enhance the communication and learning process.

**Definition of Constructs**

**Actual Use (AU)** – The frequency of using instructional technology and approximate number of times faculty uses instructional technology in a specific period of time.

**Extrinsic Motivation (EM)** – The perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued
outcomes that are distinct from the activity itself, such as improved teaching and learning.

Outcome Expectations (OE) – The perception that faculty perceive individual esteem and sense of accomplishment from using instructional technology.

References


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