

# AN EMPIRICAL INVESTIGATION INTO THE RELATIONSHIP BETWEEN COMPUTER SELF-EFFICACY, ANXIETY, EXPERIENCE, SUPPORT AND USAGE

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## ABSTRACT

Organizations make significant investments in information technology. However, if individuals do not use information system applications as anticipated, successful implementation can be hard to achieve. In order to investigate some key factors thought to affect an individual's use of information technology, this study draws on Bandura's Social Cognitive Theory (SCT), Triandis's Theory of Interpersonal Behavior (TIB), and the computer anxiety literature to develop its conceptual model and research hypotheses. An empirical investigation (n=978) found support for the majority of the hypotheses. As suggested by SCT, experience and support were positively related to computer self-efficacy, and computer self-efficacy was negatively related to anxiety and positively related to usage. As suggested by TIB, experience was positively related to usage. Furthermore, computer anxiety was negatively related to experience. By providing insight into these important relationships, this research can help further understanding of their role in the acceptance and use of information technology.

Keywords: computer self-efficacy, computer anxiety, computer experience, computer support, Social Cognitive Theory, Theory of Interpersonal Behavior

## INTRODUCTION

Organizations make significant investments in information technology (IT). However, if individuals do not use information system applications as anticipated, successful implementation can be hard to achieve. Since the 1970s, information systems researchers have investigated a number of factors that influence system usage and success (7, 22, 60), and a variety of theoretical and pragmatic explanations have been developed to help understand and improve the successful deployment of IT. Research on the factors that influence information systems usage continues to be the focus of intensive, ongoing research (39, 50).

In order to investigate some key factors thought to affect an individual's use of information technology, this study draws on Bandura's Social Cognitive Theory (SCT), Triandis's Theory of Interpersonal Behavior (TIB), and the computer anxiety literature to develop its conceptual model and research hypotheses. An empirical investigation (n=978) found significant support for most of the hypothesized relationships between computer self-efficacy, anxiety, experience, support

and usage. By combining key constructs from SCT and TIB into one conceptual model, along with additional key relationships addressing computer anxiety, this study makes a contribution to the growing literature in this area. This study provides insight into key constructs and relationships, and adds to the understanding of the role they play in the acceptance and use of information technology.

This paper is organized as follows. First, background is given on the two theoretical perspectives, Social Cognitive Theory and the Theory of Interpersonal Behavior, that underlie the research. In addition, the literature on computer anxiety is briefly reviewed. Then, the study's conceptual model and research hypotheses are presented. Next, details are provided on the method and the analysis that support the study's empirical investigations and its results. Finally, the outcomes and implications of the study are discussed and conclusions are drawn.

## THEORETICAL BACKGROUND

In order to investigate some key factors thought to affect an individual's use of information technology, this study draws on two major theories from social psychology: Bandura's Social Cognitive Theory and Triandis's Theory of Interpersonal Behavior. In addition, the literature on computer anxiety provides support for the study's conceptual model and hypotheses. This section provides a brief overview of the relevant theoretical and empirical literature that informs this study.

### Social Cognitive Theory

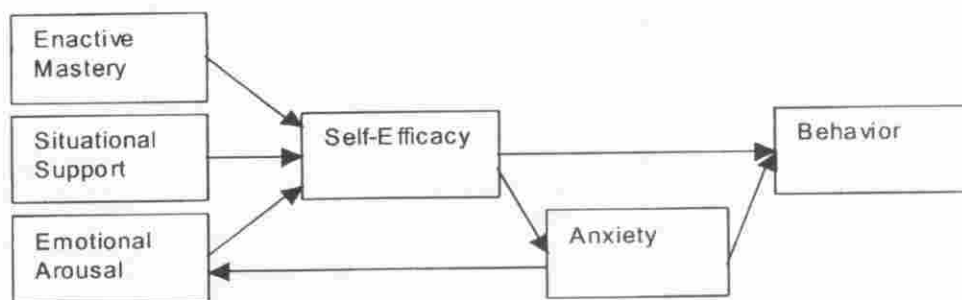
Social Cognitive Theory (SCT) is a "theoretical framework for analyzing human motivation, thought, and action" that "embraces an interactional model of causation in which environmental events, personal factors and behavior all operate as interactive determinants of each other" (10, p. xi). A key concept in SCT is perceived self-efficacy which refers to the belief an individual has in his/her ability to successfully perform a certain behavior (8). Self-efficacy is conceptualized by Bandura as varying across tasks and situations, and has a number of determinants (27). Research that has measured self-efficacy in regard to specific tasks has proven to have more predicative power (12). Research has shown that an individual's

self-efficacy has a direct influence on his/her choice of task and persistence in achieving the task. Low self-efficacy beliefs, for example, have been found to be negatively related to subsequent task performance (8).

In developing an integrative framework for research on computer self-efficacy, researchers found that Bandura and others had identified over twenty-three antecedent and consequent factors that are theoretically related to computer self-efficacy (40). Figure 1 is a model of a subset of the factors related to self-efficacy. As the model illustrates, enactive mastery should be related to self-efficacy since, as SCT posits, these experiences "are the most influential source of efficacy information because they provide the most authentic evidence of

whether one can muster whatever it takes to succeed" (8, p. 80). Situational support should also be related to self-efficacy, since, as SCT posits, "people who are socially persuaded that they possess the capabilities to master difficult situations and are provided with provisional aids for effective action are likely to mobilize greater effort" (9, p. 198). Emotional arousal is expected to have a negative effect on self-efficacy, resulting in increased levels of anxiety (11). If increased anxiety leads to subsequent increases in emotional arousal then a potentially debilitating cycle of anxiety can be created (40). Finally, high levels of anxiety can affect behavior, leading to lowered performance (8).

**FIGURE 1**  
**Self-efficacy Model [Adapted from Marakas, Yi and Johnson (40)]**



In the late 1980s and early 1990s a number of Information Systems (IS) researchers investigated the relationship between self-efficacy and computer-related behaviors and attitudes. The relationship between self-efficacy and software training behavior was explored (28, 59) as well as the relationship between computer self-efficacy and the adoption of high technology products (31). In addition, the concept of self-efficacy plays a key role in the Technology Acceptance Model (TAM). In his discussion of the theoretical foundations of model's constructs, Davis indicated that TAM's perceived ease of use concept is similar to Bandura's definition of self-efficacy (21). Subsequent research has investigated whether a person's perceptions of ease of use are anchored to their computer self-efficacy (33, 56). In 1995, SCT was used explicitly as the basis for a research model that tested the relationship of computer self-efficacy and seven other factors including support, anxiety, and usage (20). Additional research has explored the determinants of computer self-efficacy (26) and the relationship between general and specific computer self-efficacy (1). Two lines of ongoing research may be seen in the IS arena now: 1) research building upon the TAM literature that views computer self-efficacy as an determinant of TAM's perceived ease of use construct, and 2) research based upon SCT that posits a central role for computer self-efficacy as a direct determinant of behavior.

### Theory of Interpersonal Behavior

Triandis developed a Theory of Interpersonal Behavior (TIB) that posits that habits, intentions and facilitating conditions predict the probability that an act will be performed (55). Also, in the TIB, affect, social factors, and perceived consequences of performing the behavior are postulated to determine intention. TIB is a model of behavioral intention that

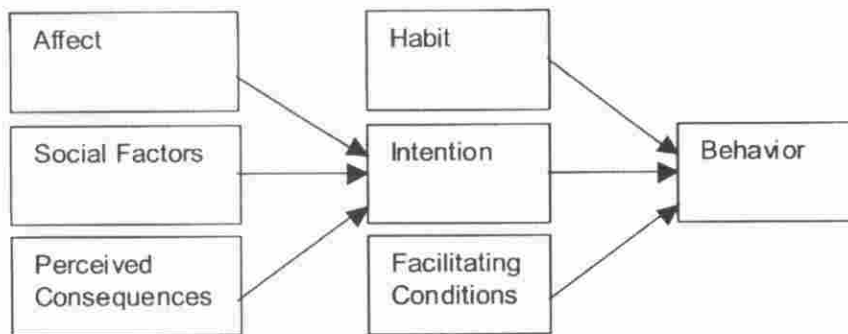
provides a theoretical alternative to Ajzen's Theory of Planned Behavior (TPB) (3). A model that shows the key factors in the TIB is provided in Figure 2 [adapted from (55)].

IS researchers have used all or part of the TIB as a basis for studying individual IT acceptance and usage behavior (4, 13, 16, 17, 44, 51, 52). In particular, two factors have been utilized extensively in IS research: 1) habit (often operationalized as prior computer experience) and 2) facilitating conditions (often operationalized as various forms of organizational/computer support). According to Triandis, habit strength is "measured by the number of times the act has already been performed by the person" (54, p. 9) and, thus, as performance of a behavior increases, its effect on later behavior is expected to increase. And, although past behavior plays no theoretical role in TPB, Ajzen found, after a review, that "researchers may want to include a measure of prior behavior in our models to improve predictability of later action" (2, p. 120). Similarly, Triandis's conception of facilitating conditions has influenced IS research. Facilitating conditions includes access to time, people, money, or other resources needed to perform a behavior, and is similar to the perceived behavioral control construct in TBP (3). Thus, researchers have investigated the role that habit/computer experience and facilitating conditions/organizational support play in IT usage both within models based upon TIB and when using models based on other approaches such as TPB.

### Computer Anxiety Literature

Bandura states that "self-efficacy theory suggests an alternative way of looking at human anxiety" (10, p. 439). Self-efficacy theory, as described above, postulates relationships between emotional arousal, self-efficacy, anxiety, and behavior. Many other factors have been also explored in relation to anxiety within the larger theoretical and empirical literature.

FIGURE 2  
Triandis Model (Adapted from Triandis)



Within the IS research area, a number of researchers have explored anxiety, or even fear, that some people may experience when they confront the possibility of using a computer. Computer anxiety is viewed as a negative emotional reaction or effect (53) and has been studied as part of a larger research stream often termed technophobia or computerphobia (46, 47). Computer anxiety has been shown to have a significant relationship to key IT constructs such as attitudes toward computers, usage intention, usage behavior, and performance (14, 18, 23, 30, 57). IT research has also explored computer anxiety's role as a determinant of perceived ease of use, a key variable in the Technology Acceptance Model [56]. While computer anxiety is recognized as an important factor, much remains to be understood about its role from a theoretical perspective. For example, in his review Marakas concludes: "somewhat counterintuitive, however, is the apparent lack of global recognition by the CSE [computer self-efficacy] literature of the importance of the anxiety relationship and by the computerphobia literature of the potential value of CSE manipulation and enhancement in reducing anxiety," and he argues that the complementary relationship between the computerphobia and computer self-efficacy research calls for further research (40, p. 148). A recent article that examined the individual traits that are antecedent to computer anxiety and computer self-efficacy has begun to address this research gap (50).

### CONCEPTUAL MODEL AND RESEARCH HYPOTHESES

This study's conceptual model and research hypotheses build upon the SCT, TIB and the computer anxiety literature. Based upon the SCT literature, the authors expect 1) computer experience and organizational support to be positively related to computer self-efficacy, 2) computer self-efficacy to be negatively related to computer anxiety and positively related to computer usage, and 3) computer anxiety to be negatively related to usage. Based upon the TIB literature, the authors expect computer experience and organizational support to both be directly and positively related to computer usage. Finally, based upon the computer anxiety literature, the authors expect negative relationships between computer anxiety and two determinants: experience and support. The study's conceptual model is depicted in Figure 3. (Note: each of the hypotheses are designated by a label that is referenced later in the text and annotated with a (+) to indicate a positive hypothesized relationship and a (-) to indicate a negative one.) The remainder

of this section provides an overview of the IS literature related to each construct in the model, and lays out the study's hypotheses.

#### Computer Self-Efficacy

SCT expects that an individual's self-efficacy has a direct influence on his/her choice of task and their persistence in achieving the task. In the computer acceptance literature, a number of studies have found that perceived high computer self-efficacy is related to the use of a variety of technologically advanced products (15, 20, 31). Thus, the following is proposed:

H1: Computer self-efficacy will be positively related to computer usage.

Researchers have also hypothesized that computer self-efficacy and computer anxiety are inversely related, and studies have found that individuals with lower levels of anxiety will have higher levels of computer self-efficacy (36, 37, 50, 58). Thus, the following is proposed:

H2: Computer self-efficacy will be negatively related to computer anxiety.

#### Computer Anxiety

Anxiety is an unpleasant emotional reaction experienced by individuals in threatening situations and the use of a computer appears to provide a fertile environment for such reactions (19, 41). Since anxiety will often cause people to avoid situations that trigger these feelings, researchers typically expect an inverse relationship between computer anxiety and computer use. Many studies have found support for the expected relationships (20, 33, 34, 37, 41, 58). Thus, the following is proposed:

H3: Computer anxiety will be negatively related to computer usage.

#### Computer Experience

In SCT, enactive mastery is posited to predict self-efficacy. In IS research, prior computer experience has been shown to be a key individual difference variable that predicts computer self-efficacy in a variety of IT applications (1, 20, 33, 40). Researchers have found, for example, that prior Internet experience was the strongest predictor of Internet self-efficacy (24). Thus, the following is proposed:

H4: Computer experience will be positively related to computer self-efficacy.

Vician and Davis report that the most consistent finding of studies of correlations with computer anxiety is that prior computer experience has a negative relationship with computer anxiety (57). In general, people with less experience are more likely to be anxious when confronted with IT with which they are unfamiliar (34, 46). Thus, the following is proposed:

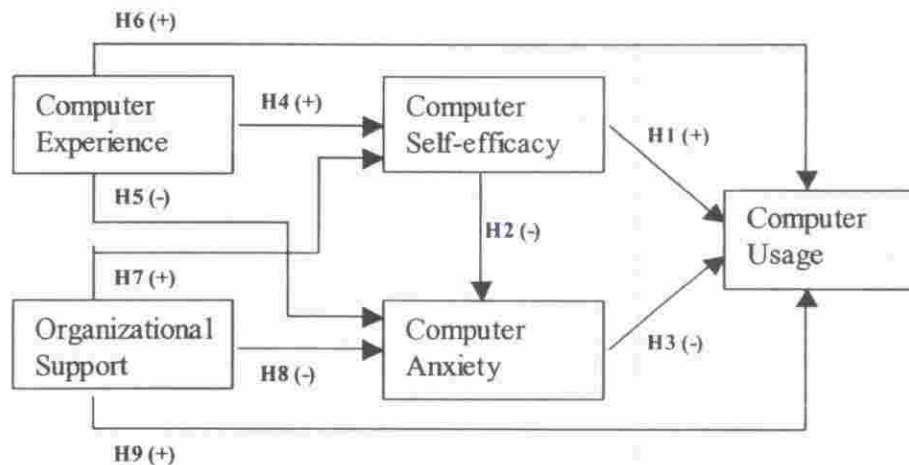
**H5:** Computer experience will be negatively related to computer anxiety.

Furthermore, the TIB proposes that past behavior, especially in the form of habit, can be a primary determinant of

behavior (49). In the IS discipline, a number of studies have found support for a direct relationship between prior experience and computer usage (20, 35, 40, 48, 52). One study that hypothesized no direct effect of computer experience on computer usage, based upon the expectation that other variables would mediate the relationship, found, in fact a significant relationship between computer experience and computer usage (33). Thus, the following is proposed:

**H6:** Computer experience will be positively related to computer usage.

**FIGURE 3**  
**Research Conceptual Model**



(+) indicates a positive hypothesized relationship and (-) a negative one

### Organizational Support

SCT posits that situational support is one of the factors that affect self-efficacy. A number of IS researchers have found support for the proposition that support, of various types, increases the ability of end-users and thus results in increased self-efficacy (20, 33). Thus the following is proposed:

**H7:** Organizational support will be positively related to computer self-efficacy.

Many of the approaches used to reduce computer anxiety involve making sure that situational support is provided so that an individual perceives there is somewhere to turn for help (18, 46, 53). For an individual who is very anxious about interaction with a particular computing technology, further exposure to the technology alone may not result in reduced anxiety. As an example, Vician and Davis expect that "developing an appropriate learning environment for a computing intensive course will be key to providing a beneficial situation for all learners" (57, p. 47). Thus, the following is proposed:

**H8:** Organizational support will be negatively related to computer anxiety.

A number of researchers have also recognized the role organizational support can play in computer usage, and many of these studies build upon the TIB to conceptualize the role that facilitating conditions have in information systems usage (55). A recent study found a significant positive relationship between facilitating conditions and computer usage (17). However, the results of other studies have been mixed. One study found the relationship to be non-significant (52) while another found a negative relationship (51). Building upon the work of Triandis

and others, the following is proposed:

**H9:** Organizational support will be positively related to computer usage.

### THE STUDY

#### Subjects

The sample consists of 978 business school students attending a major Southeastern university. Data was collected over a one-week period, and during this timeframe the survey was distributed in all business classes. Students were not given extra credit to respond to this survey and therefore they had no incentive to respond to more than one survey. This study's questions were embedded in a larger survey on the overall evaluation of the entire business school. The survey had a response rate of 48%. While the use of students in research is not without controversy (29, 32, 42), the authors believe that business students are an appropriate population for this research. Hughes and Gibson (32) suggest that the use of students needs to be reviewed for each study for applicability and since the behavior that was measured in this study was the usage of the college computer lab, business students are appropriate subjects.

#### Measures and Validation

A questionnaire was developed for this study. Most of the measures were adapted from existing scales that had demonstrated validity and reliability in other studies: a) computer self-efficacy (42), b) computer anxiety (19) and c) computer usage (21). The scale measuring computer

organizational support was developed specially for the study's computer lab environment based upon measures used in a number of prior studies, and its development has been documented extensively elsewhere (6).

The questionnaire was distributed during class, and thus the survey length was a key issue in the design. The survey needed to be able to be completed within 20 minutes, and therefore many of the scales had to be reduced in length. This reduction in length of the scales took place during an extensive pretest stage.

## RESULTS

### Measurement Model Results

As recommended by Anderson and Gerbing (5), a two-step approach was adopted. The measurement aspect of the model was estimated prior to testing the structural aspect to prevent any interaction between the two models due to measurement error.

To assess the unidimensionality, the covariance matrix of a five factor model - Computer Experience, Organizational Support, Computer Self-Efficacy, Computer Anxiety, and Computer Usage - was evaluated using LISREL VIII (38). The fit statistics and internal consistency were examined to assess model fit, discriminant validity and reliability.

Fit statistics and internal consistency estimates for the five factor model are reported in Table 1. Due to the sensitivity of  $\chi^2$  to sample size, the root mean square error of approximation is reported as an assessment of overall fit. The model is in the acceptable range (.05 to .08) at .052. The goodness-of-fit (GFI) and the adjusted-goodness-of-fit (AGFI) are .94 and .92, respectively. Because of inconsistencies due to sample characteristics, the Tucker-Lewis index (TLI) and the comparative fit index (CFI) are reported. For the five factor model, the indices are near the .90 range (.94 and .95, respectively) which is deemed acceptable.

TABLE 1  
Measurement Model Estimates

Fit Statistics						
$\chi^2$	df	RMSEA	GFI	AGFI	TLI	CFI
655.4	17	.05	.94	.92	.94	.95
2	9					

Internal Consistency Measures		
	Comp. $\alpha$	AVE
Computer Experience	.70	.46
Organizational Support	.82	.48
Computer Self-Efficacy	.93	.74
Computer Anxiety	.85	.54
Computer Usage	.75	.50

Note: df = degrees of freedom; RMSEA = root mean square error of approximation; GFI = goodness-of-fit index; AGFI = adjusted-goodness-of-fit index; TLI = Tucker-Lewis index; CFI = comparative-fit index; Comp  $\alpha$  = composite alpha; AVE = average variance extracted

To ensure that the model is measuring distinct constructs, it was also assessed for discriminant validity. The most stringent test was performed by checking if the square of the parameter estimate between two constructs ( $0^2$ ) is less than the average AVE between any two constructs (25). In all cases, discriminant validity was supported.

To assess internal consistency, items demonstrating high within/across factor correlated errors (standardized residual > 2.57) were examined as candidates for removal. Before deletion from the study, each indicator was first examined for its conceptual contribution and if deemed negligible was removed from the study. In all, seven items were removed from the study due to high standardized residuals. As further evidence of internal consistency, the composite reliability estimates are examined (see Table 1). The reliability estimates ranged from .70 to .93, indicating acceptable reliability for the constructs. Also, all items have significant t-value loadings for their respective constructs ( $p < .01$ ). Average variance extracted estimates are also reported (Table 1). AVE estimates of .45 or higher are an indication of validity for a construct's measure (43). Each construct meets these criteria.

### Structural Model Results

To assess the structural model, three criteria were used: (1) the fit indices, (2) the significance of the completely standardized path estimates, and (3) the amount of variance explained in each of the endogenous constructs. Table 2 reports the correlations among the latent constructs in the structural aspect of the model.

The same indices used to evaluate the measurement model (RMSEA, GFI, AGFI, TLI, and CFI) were estimated for the structural portion and assessed using the same criteria. The results in Table 3 indicate adequate fit for the five-factor model.

The structural equation modeling results indicate there is no empirical relationship between Organizational Support and Computer Anxiety (H8) or between Organizational Support and Computer Usage (H9). As indicated in Table 3, seven of the nine paths are significant ( $p < .05$  or better). One hypothesis (H3) is statistically significant, but not in the hypothesized direction. Figure 4 shows the hypotheses that were supported with a solid line, along with their path estimates.

Additionally, the structural equations account for 38% of the variance in Computer Self Efficacy, 58% of the variance in Computer Anxiety, and 4% of the variance in Computer Usage. The failure of the model to account for greater variation in computer usage indicates a need to examine additional factors related to use.

## DISCUSSION

This study developed a conceptual model based upon the SCT, TIB and the computer anxiety literature. Six of the hypotheses drawn from this theoretical and empirical literature were supported and three hypotheses were not supported. The results are summarized in Table 4.

**TABLE 2**  
Correlations Among Constructs

Construct	1	2	3	4	5
(1) Computer Experience	1.00				
(2) Organizational Support	-0.09	1.00			
(3) Computer Self-Efficacy	0.44	0.04	1.00		
(4) Computer Anxiety	-0.39	0.02	-0.53	1.00	
(5) Computer Usage	0.01	-0.03	0.06	0.09	1.00

**TABLE 3**  
Structural Model Estimates

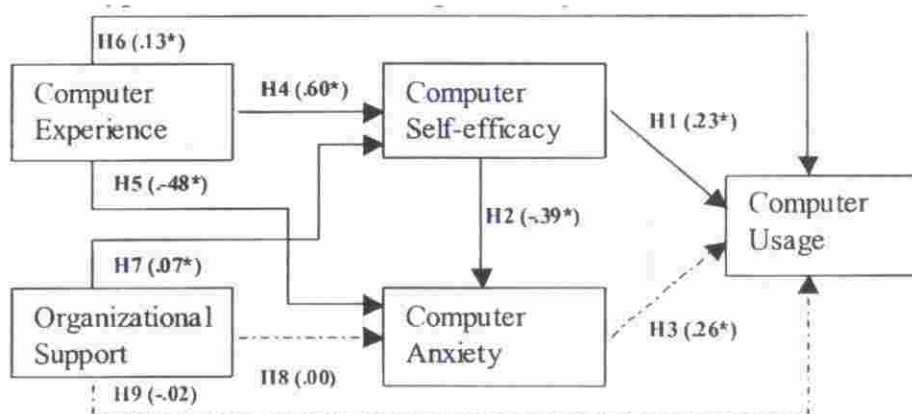
Fit Statistics						
$\chi^2$	df	RMSEA	GFI	AGFI	TLI	CFI
655.42	179	.052	.94	.92	.94	.95

Path	Path Estimates
Computer Experience → Computer Self-Efficacy: $\gamma_{11}$	.60*
Computer Experience → Computer Anxiety: $\gamma_{21}$	-.48*
Computer Experience → Computer Usage: $\gamma_{31}$	.13*
Organizational Support → Computer Self-Efficacy: $\gamma_{12}$	.07*
Organizational Support → Computer Anxiety: $\gamma_{22}$	.00 n.s.
Organizational Support → Computer Usage: $\gamma_{32}$	-.02 n.s.
Computer Self-Efficacy → Computer Anxiety: $\beta_{21}$	-.39*
Computer Self-Efficacy → Computer Usage: $\beta_{31}$	.23*
Computer Anxiety → Computer Usage: $\beta_{32}$	.26*

\*p < .05; n.s. = not significant

**FIGURE 4**  
Hypothesized Relationships Among Latent Constructs



As expected from SCT, both prior computer experience and organizational support had a positive relationship with computer self-efficacy (H4 and H7), and computer self-efficacy had a negative relationship with computer anxiety (H2) and a positive

relationship with computer usage (H1). As expected from TIB, computer experience had a positive relationship with usage (H6). As expected from the computer anxiety literature, computer experience had a negative relationship with computer

anxiety (H5).

The hypothesis drawn from SCT that posited that computer anxiety would have a negative relationship with usage was not supported (H3). In fact, computer anxiety had a positive and significant relationship with usage. The counterintuitive effect of H3 may be due to the fact that we measure amount of time in the lab. It may take anxious students more time to accomplish the task than a less anxious student (even when taking into account experience and computer self-efficacy). Also, our study did not

assess whether the participants usage behavior was voluntary or not. If participants were required to use computers (e.g., to do work for a class) then individuals would not be able to avoid computer use when anxious. Instead, one might find that their anxiety results in decreased performance, and even require more time spent using the computer. Students might be overcompensating to overcome their fear, especially if they must adopt the technology to succeed in their future career. Further research would have to explore these possibilities.

**TABLE 4**  
**Results of Hypotheses Tests**

Hypothesis	Results
H1: Computer self-efficacy will be positively associated with computer usage.	Supported
H2: Computer self-efficacy will be negatively associated with computer anxiety.	Supported
H3: Computer anxiety will be negatively associated with computer usage.	Not Supported
H4: Computer experience will be positively associated with computer self-efficacy.	Supported
H5: Computer experience will be negatively associated with computer anxiety.	Supported
H6: Computer experience will be positively associated with computer usage.	Supported
H7: Organizational support will be positively associated with computer self-efficacy.	Supported
H8: Organizational support will be negatively associated with computer anxiety.	Not Supported
H9: Organizational support will be positively associated with computer usage.	Not Supported

The hypothesis drawn from TIB that posited that organizational support would have a direct positive relationship with computer usage was not supported (H9). There are several possible explanations for these results. It may be, as Taylor and Todd suggest, that "the absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage; however the presence of facilitating resources may not, per se, encourage usage" (48, p. 153). Another possible reason for the non-support of this hypothesis might be the items that were used to measure organizational support. The organizational support items were developed specifically for this study (6), and it could be that items used in other studies to measure individual's perceptions of facilitating conditions (33) would have yielded different results. This rationale might also explain why the hypothesis from the computer anxiety literature that posited that organizational support would have a negative relationship with computer anxiety was not supported (H8). Further research would have to explore this possibility.

The results of this study provide support for key hypotheses drawn from Bandura's SCT. Practical implications of these findings support the training literature that encourages efforts to build computer self-efficacy. When individuals have experiences that build their mastery of IT applications and are in an environment with positive situational support, they tend to have higher levels of computer self-efficacy. High computer self-efficacy, in turn, is associated with usage. The findings that support Triandis's TIB also indicate that prior experience may be a direct determinant of usage. One possible implication from this result may be to suggest that computer self-efficacy is particularly important when a new IT application is being adopted. However, in a situation when IT application usage has become routine or habitual (e.g., checking one's e-mail) then prior experience may become more important in usage behavior. The study's other findings suggest that organizational support influences usage indirectly, through its relationship with self-efficacy, but not directly, and not through any influence on anxiety. Overall, the study's results suggest that organizations and educators focus their efforts on building computer self-

efficacy, and on modifying the determinants of computer self-efficacy in order to achieve higher levels of user acceptance of computer technology.

## CONCLUSIONS

Organizations are making significant investments in IT. However, if individuals do not use information system applications as anticipated, successful implementation can be hard to achieve. Theoretical and empirical literature in the IS field continues to investigate the factors that influence the adoption of IT, and this study contributes to that growing body of literature. This study combines SCT, TIB and computer anxiety literature into one conceptual model and then tests the related hypotheses using a field survey approach. The results provide partial support for hypotheses derived from SCT, TIB and the computer anxiety studies that served as the research foundation for the study. The theoretically based research model and the support obtained for the majority of the hypotheses represent a contribution to this area of study.

The results lend support to the research literature that suggests that computer self-efficacy plays a key role in user acceptance of technology. For example, in training environments, one could potentially reduce computer anxiety and increase computer usage by interventions designed to improve computer self-efficacy. In the future, longitudinal research could be designed to test causal hypotheses regarding computer self-efficacy and the other key factors involved in computer usage. By providing insight into the important relationships between computer self-efficacy, anxiety, experience, support and usage, this research can help further work that explores their role in the acceptance and use of information technology.

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#### SCALE ITEMS

##### Computer Usage (items standardized before running CFA)

- |        |  |
|--------|--|
| usage1 | How often do you work in the CEBA Micro-Lab?   |
| usage2 | Currently on average how many hours a week do you use the lab?                         |
| usage3 | Of your computer work for class assignments, what percentage is done in the Micro-Lab? |

##### Computer Self-Efficacy

- |         |  |         |
|---------|--|---------|
| effica1 | I feel confident calling up a data file to view on the monitor screen    |         |
| effica2 | I feel confident using the computer to write an essay or a letter        | Removed |
| effica3 | I feel confident entering and saving data (numbers or words) into a file |         |
| effica4 | I feel confident moving the cursor around the monitor screen             | Removed |
| effica5 | I feel confident making selections from an on-screen menu                | Removed |
| effica6 | I feel confident escaping/exiting from a program or software             |         |
| effica7 | I feel confident working on a personal computer (micro computer)         |         |
| effica8 | I feel confident using a printer to make a "hardcopy" of my work         |         |

### Computer Anxiety

anxiety1	I am confident in my ability to use computers [REV]	Removed
anxiety2	I try to avoid using a computer whenever possible	
anxiety3	I worry about making mistakes on a computer	
anxiety4	I enjoy working with computers [REV]	Removed
anxiety5	I feel overwhelmed whenever I am working on a computer	
anxiety6	I feel anxious whenever I am using a computer	
anxiety7	I feel tense whenever working on a computer	
anxiety8	I feel comfortable with computers [REV]	Removed

### Computer Experience (items standardized before running CFA)

zexper01	Indicate your overall computer literacy
zexper02	How many years ago did you first begin using computers?
zexper03	How knowledgeable are you about computer and software?

### Organizational Support

Second-order factor comprised of five dimensions: assistance, access to equipment, hours of operation, quality of printed output, atmosphere, and reliability (**print dimension removed**)

access1	Availability of equipment when needed	
access2	Waiting time for a computer	
access3	Total number of computers	
access4	Balance of Pentiums to 386/486 computers	
assist1	Assistance in equipment use	
assist2	Attitude toward students	
assist3	Support in assisting with problems	
assist4	Knowledge about software	
assist5	Knowledge about lab operation	
assist6	Response time to problems	
assist7	Student orientation	
atmo1	Ability to concentrate on work	
atmo2	Quiet working environment	
atmo3	Confidentiality of work	
hours1	Number of hours open	
hours2	Evening hours/closing time	
hours3	Open when needed	
hours4	Hours of operation on weekends	
print1	Printer quality	Removed
print2	Satisfy your printing needs	"
print3	Printers' output quality	"
print4	Printer speed	"
relia1	Full/complete software functionality	
relia2	Working order of computers	
relia3	Maintenance of equipment	
relia4	Reliability of equipment	
relia5	Reliability of software	
relia6	Dependability of hardware	

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