COMPUTER SELF-EFFICACY AND OUTCOME EXPECTATIONS AND THEIR IMPACTS ON BEHAVIORAL INTENTIONS TO USE COMPUTERS IN NON-VOLITIONAL SETTINGS

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A structural equations model of outcome expectancy and computer self-efficacy and their effects on behavioral intentions to use computers was developed for a non-volitional setting. The model was tested using subjects who are managers and executives across organizations and organizational levels. Several of the paths in the model were statistically significant at a 1% level. The significant paths to the computer self-efficacy measure were ease of system use and previous computer experience. Computer self-efficacy had significant paths to both work-related and personal outcome expectancies. Further, both outcome expectancies had significant influences on behavioral intentions to use computers.

INTRODUCTION

In recent years, there have been a number of articles modeling the effects of computer self-efficacy and outcome expectancy (Henry, 1989; Henry & Stone, 1995; Henry & Stone, 1997; Hill, Smith, & Mann, 1987;(Venkatesh & Davis, 1996). Most of the models presented in these articles have been variants of the Theory of Reasoned Action (TRA Fishbein & Ajzen, 1975) and employed computer usage as the dependent variable (Hill, Smith, & Mann, 1987). However, as computer use has become, for the most part, mandatory in the workplace, inconsistency problems with attitude scales, which are a key component of models such as the TRA, have begun to appear in the literature (Gattiker & Hlavka, 1992; Gutek, Winter, & Chudoba, 1992; LaLomia & Sidowski, 1991; Pope-Davis & Twing, 1991; Safayeni, Purdy, & Higgins, 1989). For example, Gutek, Winter, and Chudoba, (1992) posit that these inconsistencies may be due to the increase in non-volitional information technology (IT) use. Doll and Torkzadeh (1996) also state that "the realization that, where use is mandatory, measures of system-use may indicate only compliance, not effectiveness" (pp. 1-2). Further, self-efficacy is related to "choice" behavior, not mandatory behavior (Bandura, 1986). These problems are likely to escalate as IT use becomes increasingly non-volitional. Thus, the inclusion of self-efficacy and attitudes in models that are variants of the

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TRA are not appropriate when computer use is mandatory. These studies suggest that intentions, not actual usage, may better capture the effects of computer self-efficacy, outcome expectations and their antecedents, and the "true" success of an information technology.

THE THEORETICAL FRAMEWORK

This research is founded in Bandura's self-efficacy theory (Bandura, 1982; Bandura, 1986) which provides a sound theoretical basis for examining the determinants of self-efficacy and outcome expectancy and the subsequent effect on an individual's behavioral intentions. Self-efficacy theory emphasizes the impact of the individual's cognitive state on outcomes such as loss of control, low self-confidence, lowered achievement motivation, and perceptions of future outcomes (Bandura, 1986; Meier, 1985; Seligman, 1990). It also provides a theoretical basis for describing behavioral and affective reactions to information technology (IT) (Martinko, Henry, and Zmud, 1995; Rafaeli and Sutton, 1986; Carey, 1992, Kahn and Robertson, 1992). Self-efficacy theory is part of a larger group of psychological theories described as expectancy-value theories (Maddux, Norton, and Stoltenberg, 1986). Self-efficacy theory proposes that an individual's expectations are the primary determinants of affective and behavioral reactions in numerous scenarios involving motivation, performance, and feelings of frustration associated with repeated failure. Specifically, self-efficacy theory states that environmental and personal factors such as verbal (i.e., social) persuasion, actual experience (enactive mastery), and emotional arousal influence expectations that subsequently affect individual outcomes (Bandura, 1986; Lent, Lopez, and Bieschke, 1991. Bandura, 1982 and 1986) separated expectations into self-efficacy and outcome expectancy and posits that these expectancies affect individual behavioral and affective outcomes. Self-efficacy refers to an individual's belief in their ability to accomplish a task (Bandura, 1986). Self-efficacy affects persistence and influences the individual's perception of future outcomes. Outcome expectancy refers to an individual's belief that task accomplishment (i.e., a satisfactory level of performance) leads to desired outcomes. It has been shown that this outcome expectancy is actually two distinct constructs, one related to personal outcomes and the other to work outcomes (Henry & Stone, 1993). Self-efficacy theory posits that these expectancies are directly or indirectly a result of inactive mastery, vicarious experience, verbal persuasion and emotional arousal. The value of expectancies lies in the notion that not only is there a direct relationship between expectancies and behavioral and affective outcomes, but that the relationship is causal (Sadri and Robertson, 1993). Some success has been achieved in the identification and operationalization of the antecedent constructs of computer self-efficacy and outcome expectancy in the IT literature. Perhaps the most salient factors derived from this body of research are management and peer support (Leonard-Barton & Deschamps, 1988; Zmud, 1984), ease of system use (Davis, 1989 Franz, 1991 Guimaraes, Igbaria, & Lu, 1992) and previous experience; (Glass & Knight, 1988). Such a notion implies that self-efficacy and outcome expectancy actually serve as mediating variables (Shell, Bruning and Murphy, 1989; Lent et al., 1991).

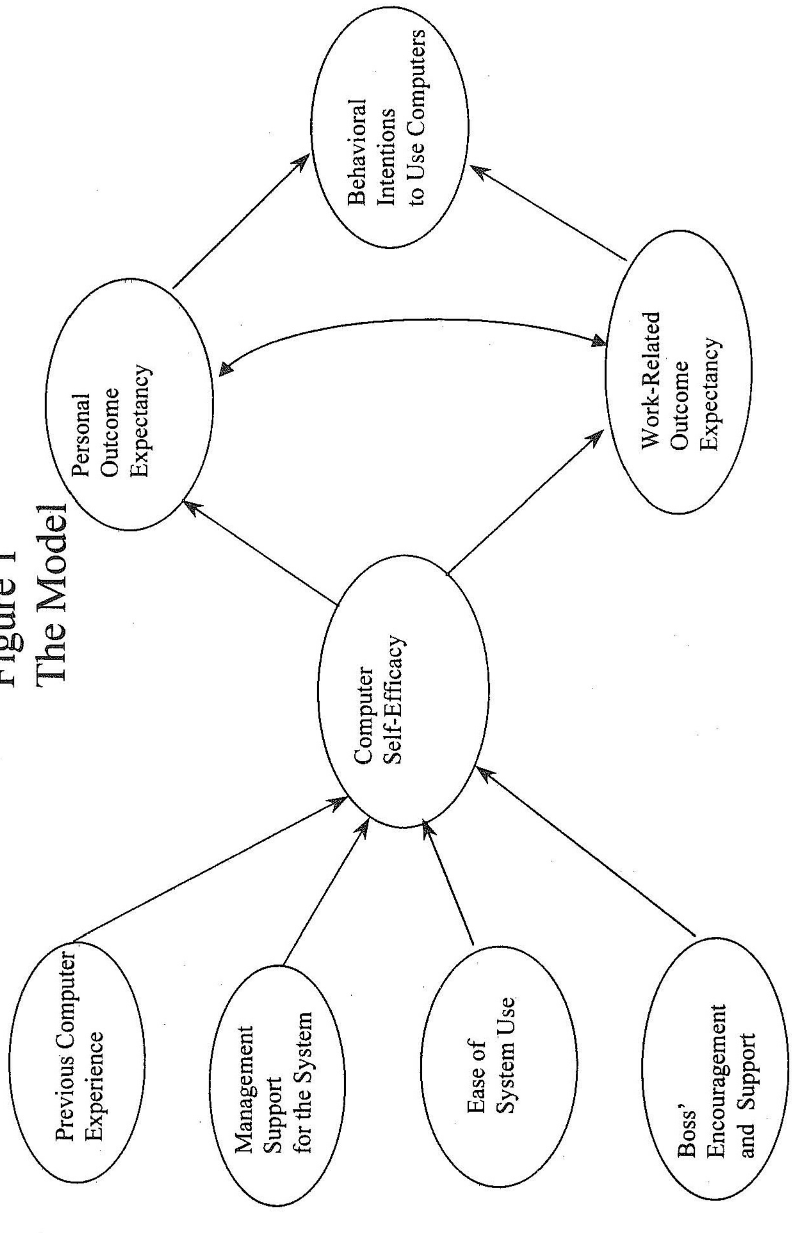
A review of the IT literature suggests that constructs similar to enactive mastery, verbal persuasion, and emotional arousal appear repeatedly as independent variables (e.g., DeSantis, 1983; Nelson, 1990; Davis, Bagozzi and Warshaw, 1989). These constructs are often implicitly and sometimes explicitly operationalized as antecedents to the reactions of IT end-users, but these distinctions are not often clearly made. However, there has been some IT research that has explicitly used measures of self-efficacy. A review of the studies making use of various measures of computer self-efficacy revealed moderately consistent findings. For example, Hill, Smith and Mann (1987) reported that self-efficacy influenced an individual's decision to use computers. Gist, Schwoerer and Rosen (1989) found that self-efficacy influenced an individual's decision to learn a computer language. In a study devoted to gender differences Miura (1987) found that men rated themselves higher than women on computer self-efficacy. In addition, numerous computer self-efficacy scales have been developed (Henry and Stone, 1997; Murphy, Coover, & Owen, 1989, Hill, Smith and Mann, 1987).

However, there is a lack of studies which directly measure outcome expectancy in the IT literature. These studies include Davis, Bagozzi and Warshaw (1989) who found that subjects developed behavioral intentions about using a wordprocessing program based on expectations that it would improve their performance in a MBA program. Hill, Smith, and Mann (1987) found that "outcome beliefs" influenced subjects' attitudes and decisions about learning a computer language. Rafaeli and Sutton (1986) found that clerical personnel using word processors showed a decrease in their certainty about how using word processors would affect their job in the future.

The purpose of this research is to integrate the expectancies and their antecedents as described above in a model of IT use with behavioral intentions as the dependent variable. The examined model depicts the functional relationships among the antecedents, computer self-efficacy, outcome expectancies, and behavioral intentions. The model hypothesizes that outcome expectancies have direct impacts on the individual's behavioral intentions to use computers. The expectancies are influenced by computer self-efficacy. Finally, the antecedents of previous computer experience, ease of system use, boss' encouragement and support, and management support for the system are proposed to impact computer self-efficacy.

Enactive mastery skills are operationalized as computer experience (Gist et al., 1989; Hill et al., 1987). Emotional arousal is represented by ease of system use (Martocchio and Webster, 1992; Carey, 1992; Davis, Bagozzi and Warshaw, 1989). Ease of system use, in this study, refers to the degree to which the end-user likes the system and finds it easy to use, (i.e., the functionality of the system). Since support comes from many sources, the review of the IT literature showed that management and "boss" support were most relevant. Support represents the notion of verbal (i.e., social) persuasion. Management's message of support, although not explicitly stated in many studies, can be found in actions such as the development of training sessions, continuous updating of systems and re-training, and providing mechanisms for helping IT users solve problems. Thus, the theoretical model shown in Figure 1 examines how the impacts of support, computer experience, and system ease of use affect the end-user's behavioral intentions to use computers mediated by computer self-efficacy and outcome expectancy.

Figure 1
The Model



RESEARCH METHODOLOGY

The Sample

The examination of these relationships began with the development of a questionnaire. The target population was business executives and managers who are computer users in their work. Questionnaires were mailed to 3000 of these executives selected randomly from a purchased, national mailing list. A total of 411 usable returns were received producing approximately a 14% response rate. Among the questions on the survey was an item allowing respondents to self-report whether or not their work-related computer use was voluntary or mandatory. Using the responses to this question, the sample was partitioned. The 105 individuals who reported volitional use were excluded from the sample leaving 306 respondents who were nonvolitional computer users. These nonvolitional respondents formed the sample that was used in the analysis.

Response bias was studied by comparing late respondents to early respondents. Late respondents were defined as the upper quartile of responses when ordered by response date. Early respondents were captured in the lower quartile of the ordered responses. The early respondents were used to simulate the respondents in the sample while the late respondents simulated nonrespondents. These two groups were then compared using t-tests for differences in the demographics (Armstrong and Overton, 1977). The results from the t-test found no meaningful differences. The specific t-values were: age -0.03; years worked for the current organization 0.74; gender 1.38; level in the organization 0.71; percentage of time using the system 0.25; and the number of employees in the organization -1.01. Thus, response bias should not present a problem in the study.

The Measures and Their Psychometric Properties

In order to evaluate the measurement part of the model (i.e., quality of the measures), the first step of a two-step method was used (Anderson and Gerbing, 1988). The first step evaluates the measurement model (i.e., the measures and their properties) and the second the structural model (i.e., the paths among the constructs). The measurement model was evaluated using a confirmatory factor analysis where all measures were exogenous (standard deviations set to one) and allowed to pairwise correlate. Each indicant had its path to its measure free to vary and a disturbance term that was also free to vary. The estimation used CALIS (i.e., Covariance Analysis of Linear Structural Equations) in PC SAS version 6.11 and maximum likelihood estimation. The standardized path coefficients between the indicants and the measures were used to evaluate the psychometric properties of the measures. The questionnaire items, the measures, and the psychometric properties are shown in Table 1.

TABLE 1

The Questionnaire Items, Standardized Path Coefficients, Reliability Coefficients, and Shared Variances

Questionnaire Items	Factor Loading	Composite Reliability Coefficient	Percentage of Shared Variance
Previous Computer Experiences		0.86	68%
1. I have a great deal of experience using computer systems.	0.70		
2. I have used computer systems throughout my career.	0.83		
3. I have used computer systems over a long period of time.	0.93		
Management Support		0.76	52%
4. There is always a person to who, I can turn for help with computer system problems.	0.62		
5. Training courses are available for employees at my company to improve computer skills.	0.71		
6. Management helps employees effectively use the computer system.	0.82		
Ease of System Use		0.87	69%
7. The computer system is easy to use.	0.79		
8. The computer system is user friendly.	0.88		
9. Tasks are easy to perform using the computer system.	0.83		
Boss' Encouragement and Support		0.77	63%
10. My boss uses computers a great deal.	0.74		
11. Other managers (bosses) in my company use computers a great deal.	0.84		
Work-Related Outcome Expectancy		0.82	69%
12. If I am able to use the computer system I will have more time for other work.	0.77		
13. The computer system makes it easier to perform other duties at work.	0.89		
Computer Self-Efficacy		0.85	66%
14. Knowing how to use the computer system makes me feel more self-sufficient.	0.88		
15. Working with the system leads to a feeling of accomplishment.	0.84		
16. Knowing how to use the computer system makes me feel confident.	0.70		
Personal Outcome Expectancy		0.87	70%
17. Knowing how to use the computer system enhances my chances of promotion.	0.75		
18. Knowing how to use the computer system will help advance my career.	0.96		
19. Knowing how to use the computer system will increase the types of jobs for which I am qualified.	0.78		
Behavioral Intentions to Use Computers		0.87	70%
20. I intend to spend more time at work using the computer system.	0.76		
21. I intend to learn how to use the computer system more fully in my job.	0.87		
22. I intend to integrate the computer system into my work more.	0.87		

The fit of the confirmatory factor analysis was good, as indicated by several statistics. The goodness of fit index was 0.87 and this index adjusted for degrees of freedom was 0.82. The root mean square residual was 0.13. Bentler's comparative fit index was 0.92 and Bentler and Bonett's non-normed index was 0.90 and the normed index was 0.87. Similarly, Bollen's normed and non-normed indexes were 0.84 and 0.92, respectively. The factor loadings (i.e., standardized path coefficients) ranged from 0.62 to 0.96. The lowest composite reliability coefficient was 0.76 and the highest was 0.87. Similarly, the percentages of shared variance for the measures ranged from 52% to 70%.

Discriminant validity was also examined. Discriminant validity focuses on whether or not the items composing a measure can differentiate between their own measure and all other measures in the study. A method evaluating discriminant validity is if the squared correlation between pairs of measures is less than the average percentage of shared variance for both measures. The shared variance represents the correlation among the items within the measure. The comparison of the shared variance to the squared correlation examines the between measure and within measure strengths of these correlations. Comparing the estimated squared correlations to the average percentage of shared variance for each measure indicated that all the measures satisfy discriminant validity (Fishbein & Ajzen, 1975). These squared correlations (computed from the confirmatory factor analysis) include 0.00 for the relationships between management support-previous computer experience; boss= encouragement and support-work-related outcome expectancy; boss=encouragement and support-computer self-efficacy; management support-personal outcome expectancy; ease of system use-personal outcome expectancy; and previous computer experience-behavioral intentions to use computers. The relationships with squared correlations of 0.01 were: previous computer experience-ease of system use; previous computer experience-boss= encouragement and support; previous computer experience-work-related outcome expectancy; management support-behavioral intentions to use computers; and boss= encouragement and support- behavioral intentions to use computers.

The relationships between boss=encouragement and support-ease of system use; previous computer experience-computer self-efficacy; management support-computer self-efficacy; previous computer experience-personal outcome expectancy; and work-related outcome expectancy-personal outcome expectancy all had squared correlations of 0.02. All the following relationships had squared correlations of 0.05. These relationships are management support-ease of system use; boss=encouragement and support-personal outcome expectancy; and ease of system use-behavioral intentions to use computers. The remaining squared correlations were: 0.25 for management support-boss=encouragement and support; 0.07 for management support-work-related outcome expectancy; 0.27 for ease of system use-work-related outcome expectancy; 0.27 for ease of system use-computer self-efficacy; 0.11 for work-related outcome expectancy-behavioral intentions to use computers; and 0.30 for computer self-efficacy-behavioral intentions to use computer system. All of these squared correlations are less than the shared variances reported in Table 1. Thus, discriminant validity is satisfied.

In summary, the psychometric properties of these measures were satisfactory. This statement is based upon the following observations. First, item reliability was satisfied since all the factor loadings (i.e., standardized path coefficients) were larger than 0.61 (Fornell & Larcker, 1981). Second, because all the composite reliability coefficients were 0.76 or higher, reliability was satisfied (Nunnally, 1978). Third, since the average percentage of shared variance for each measure was 52% or larger, these measures display satisfactory values of shared variance (Igbaria & Greenhaus, 1992). From these results, it can be concluded that the measures display satisfactory convergent validity (Quick & Quick, 1984). With convergent validity and discriminant validity satisfied, it is implied that the measures possess construct validity (Quick & Quick, 1984).

Estimation of the Model

The proposed model was examined, in the second step of the two-step process, using the previously discussed questionnaire items and responses. The technique of structural equations with latent variables was used to estimate the model. The measures of previous computer experience, management support for the system, ease of system use, and boss' encouragement and support were exogenous in the model. These measures had standard deviations set equal to one. The remaining measures were endogenous and scaled by setting a path between an indicant and its measure to one. All other indicants had paths between their measure and themselves free to vary. Each indicant and measure were impacted by a stochastic disturbance term. The estimation procedure used was CALIS in PC SAS version 6.11 and maximum likelihood estimation.

THE RESULTS

The overall fit of the model to the data is illustrated by several measures. The goodness of fit measure was 0.87 and this same measure corrected for the degrees of freedom in the model was 0.83. The root mean square residual was 0.07. The normed Chi-square statistic was 1.88. Bentler's comparative fit index was 0.94 while the incremental fit indexes ranged from 0.86 to 0.94. For all the fit indexes, the closer its value is to one the better the fit between the model and the data. A rule of thumb for acceptable or good fit is for these indexes to be 0.90 or higher. However, for models with a large number of observations (i.e., greater than 200), values less than 0.90 can still indicate an acceptable fit. This is particularly true when the normed chi-square statistic is 2 or less (Hair, Anderson, Tatham, and Black, 1992). These results indicated that the fit of the model is acceptable (Henry & Stone, 1995). These statistics are displayed in Table 2.

Table 2
The Summary Statistics of the Model=s Fit to the Data

Summary Statistic	Value
Goodness of Fit	0.87
Adjusted Goodness of Fit	0.83
Root Mean Square Residual	0.07
Normed Chi-Square	1.88
Bentler's Comparative Fit Index	0.94
Bentler & Bonett's Non-normed Index	0.93
Bentler & Bonett's Normed Index	0.88
Bollen's Normed Index	0.86
Bollen' Non-normed index	0.94

Each indicant had a significant path from its latent variable, using a 1% significance level. Similarly, the disturbance terms for each indicant and latent variable were statistically significant at a 1% level. Additionally, the exogenous measures were allowed to pairwise correlate. Three of the six correlations were statistically significant at a 1% level. These significant correlations were between ease of system use and management support for the system; boss' encouragement and support and management support for the system; and boss' encouragement and support and ease of system use.

Several of the paths in the structural model were statistically significant at a 1% level. The significant paths to computer self-efficacy were from ease of system use and previous computer experience. The paths from computer self-efficacy to personal outcome expectancy and work-related outcome expectancy were also statistically significant. The significant paths to behavioral intentions to use computers were from both outcome expectancies. Thus, the antecedents of previous computer experience and ease of system use had significant, indirect impacts on behavioral intentions to use computers mediated by computer self-efficacy and the outcome expectancies. The details of these results are shown on Figure 2.

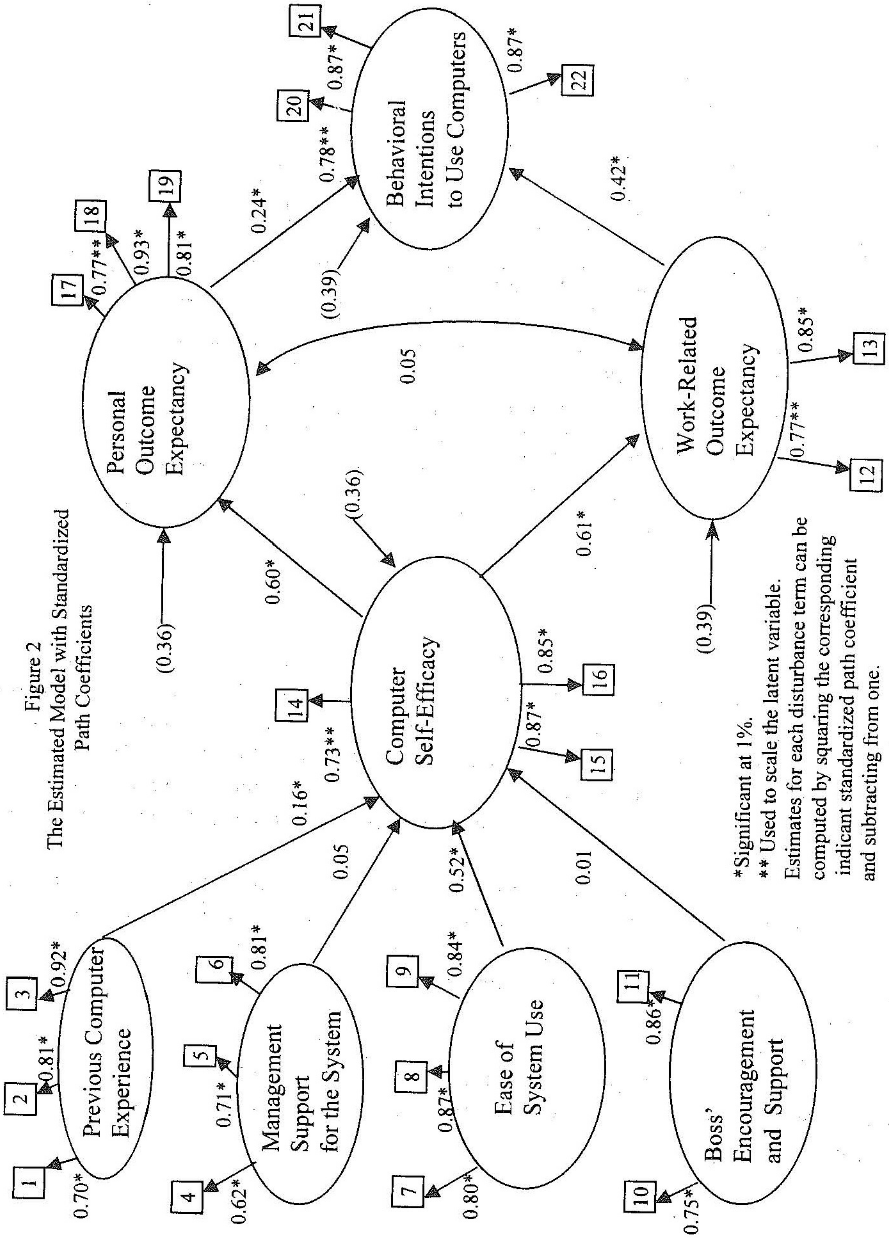


Figure 2
The Estimated Model with Standardized Path Coefficients

*Significant at 1%.
** Used to scale the latent variable.
Estimates for each disturbance term can be computed by squaring the corresponding indicant standardized path coefficient and subtracting from one.

DISCUSSION AND CONCLUSIONS

As mentioned above, previous experience and ease of system use both had positive impacts on computer self-efficacy. As predicted, computer self-efficacy had positive effects on both work-related and personal outcome expectancy. Moreover, work-related and personal outcome expectancies had positive effects on behavioral intentions to use computers. As stated by Boyd and Vozikis (1994, p. 65), "Self-perception, or the way in which a person perceives his or her abilities and tendencies, plays a role in the development of intentions. Similarly, self-efficacy affects a person's beliefs regarding whether or not certain goals may be obtained." Intention is more closely related to a "state of mind" that reflects a perceived value in performing a certain behavior that cannot be captured in variables such as "computer usage", especially in a nonvolitional context.

Furthermore, intentions are determined by rational/analytic thought (e.g., goal directed behavior) and vision (Boyd & Vozikis, 1994), suggesting that individuals who intend to use technology may be more innovative and creative than the individual who uses technology because such use is mandatory. This is extremely important in today's business climate with the emphasis on new product development and reengineering of business processes. Thus, individuals who possess intentions to use technology may demonstrate higher degrees of initiation, persistence, and performance.

The study also indicates that managers should examine intentions as well as actual computer usage when evaluating the success of any system. The notion of intentions is often overlooked since it is not a concrete measure of usage (e.g., time on system), but may be a more valid indicator of the extent of actual usefulness of the system. The identification of individuals who intend to use technology may be useful in determining success and performance, particularly in mandatory settings.

REFERENCES

Anderson, James C. and Gerbing, David W. (1988). "Structural Equation Modeling in Practice: A Review and Recommended Two-step Approach," ***Psychological Bulletin***, 103, 411-423.

Armstrong, J. Scott and Terry S. Overton. (1977). "Estimating Nonresponse Bias in Mail Surveys," ***Journal of Marketing Research*** 14 (August), 396-402.

Bandura, A. (1982). "Self-efficacy Mechanism in Human Agency," ***American Psychologist***, 37, 122-147.

Bandura, A. (1986). ***Social Foundations of Thought and Action: A Social Cognitive Theory***. New Jersey: Prentice-Hall, Inc.

Boyd, N. G., and Vozikis, G. S. (1994). "The Influence of Self-efficacy on the Development of Entrepreneurial Intentions and Actions," ***Entrepreneurship Theory and Practice***, Summer, 63-77.

Carey, J. M (1992). "Job Satisfaction and Visual Display Unit (VDU) Usage: an Explanatory Model," ***Behaviour & Information Technology*** (11:6), , pp. 338-344.

Davis, F. D. (1989). "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," ***MIS Quarterly***, 13: 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," ***Management Science***, 35(8), 982-1003.

DeSantis, G. (1983). Expectancy Theory as an Explanation of Voluntary Use of a Decision-support System. ***Psychological Reports***, 52, 247-260.

Doll, W.J., & Torkzadeh, G. (1996). "Measuring How Information Technology Is Used in an Organizational Context," Unpublished Manuscript.

Fishbein, M. & Ajzen, I. (1975). ***Belief, Attitude Intentions and Behavior: An Introduction to Theory and Research***. Addison Wesley, Boston, Mass.

Fornell, C. & Larcker, D. F. (1981). "Evaluating Structural Equation Models with Unobservable Variables and Measurement Errors," ***Journal of Marketing Research***, (18), pp. 39-50.

Franz, C. R. (1991). "Descriptive Model for End-user Acceptance of Information Centers," ***Information Resources Management Journal***, 10: 14-27.

Gattiker, U. E & Hlavka, A. (1992). "Computer Attitudes and Learning Performance: Issues for Management Education and Training," ***Journal of Organizational Behavior***, 13, 89-101.

Gist, M. E., Schwoerer, C., & Rosen, B. (1989) "Effects of Alternative Training Methods on Self-Efficacy and Performance in Computer Software Training," ***Journal of Applied Psychology*** (74), , pp. 884-891.

Glass, C. R., & Knight, L. A. (1988). "Cognitive Factors in Computer Anxiety," ***Cognitive***

Therapy and Research, 12: 351-366.

Guimaraes, T., Igbaria, M., & Lu, M. (1992). The Determinants of DSS Success: An Integrated Model. ***Decision Sciences***, 12: 409-430.

Gutek, B. A., Winter, S. J, & Chudoba, K. M. (1992). "Attitudes Toward Computers: When Do They Predict Computer Use?" ***Proceedings of the Fifty-second Annual Meeting of the Academy of Management***. Las Vegas, NV.

Hair, Joseph F., Anderson, Rolph E., Tatham, Ronald L., and Black, William C. (1992). ***Multivariate Data Analysis with Readings, third edition***, MacMillian: New York.

Henry, J. W. (1989). "Learned Helplessness: A Factor Moderating the Impact of Technology in the Workplace," Unpublished Doctoral Dissertation.

Henry, J. W., & Stone, R. W. (1993). "The Development and Validation of Computer Self-efficacy and Outcome Expectancy Scales". ***Proceedings of The Twenty-ninth Annual Meeting of The Institute of Management Sciences Southeastern Chapter***, 139-141.

Henry, J. W. & Stone, R. W. (1995). "A Structural Equation Model of Job Performance Using a Computer-based Order Entry System," ***Behaviour & Information Technology***, 14 (3), 163-173.

Henry, J. W. & Stone, R. W. (1997) "The Development and Validation of Computer Self-Efficacy and Outcome Expectancy Scales in a Non-Volitional Context," ***Behavior, Research Methods, Instruments, & Computers***, 29 (4), 45-53.

Hill, T., Smith, N. D., & Mann, M. F. (1987). "Role of Efficacy Expectations in Predicting the Decision to Use Advance Technologies: The Case of Computers". ***Journal of Applied Psychology***, 72, 307-313.

Igbaria, M. and Greenhaus, J. H. (1992). "Determinants of MIS Employee's Turnover Intentions: A Structural Equation Model," ***Communications of the ACM***, 35, 35-49.

Kahn, H., & Robertson, I. T. (1992) "Training and Experience as Predictors of Job Satisfaction and Work Motivation When Using Computers," ***Behaviour and Information Technology*** (11:1), pp. 53-60.

Kanter, R. M. "Managing the Human Side of Change," ***Management Review*** (74), 1985, pp. 52-59.

LaLomia, J. J., & Sidowski, J. B. (1991). "Measurements of Computer Attitudes: A Review," ***International Journal of Human-Computer Interaction***, 3(2), 171-197.

Lent, R. W., Lopez, F. G., and Bieschke, K. J (1991). "Mathematics Self-Efficacy: Sources and Relation to Science-Based Career Choice," ***Journal of Counseling Psychology*** (38:4), pp. 424-430.

Leonard-Barton, D., & Deschamps, I. (1988). "Managerial Influence in the Implementation of New Technology," ***Management Science***, 34: 1252-1265.

Maddux, J. E., Norton, L. W., & Stoltenberg, C. D (1986). "Self-Efficacy Expectancy, Outcome Expectancy, and Outcome Value: Relative Effects on Behavioral Intentions," ***Journal of Personality and Social Psychology*** (51:4), pp. 783-789.

Martinko, M. J., Henry, J. W., and Zmud, R. W. (1996). "An Attributional Explanation of Individual Resistance to the Introduction of Information Technologies in the Workplace," ***Behaviour & Information Technology***, 15(5), 313-330.

Martocchio, J. J., and Webster, J. (1992). "Effects of Feedback and Cognitive Playfulness on Performance in Microcomputer Software Training," ***Personnel Psychology***, 45, 553-578.

Meier, S. T. (1985). "Computer Aversion," ***Computers in Human Behavior***, 1, 171-179.

Miura, I. T. (1987) "The Relationship of Computer Self-Efficacy Expectations to Computer Interest and Course Enrollment in College," ***Sex Roles*** (165/6), pp. 303-311.

Murphy, C. A., Coover, D., & Owen, D. V (1989) "Development and Validation of the Computer Self-Efficacy Scale," ***Educational and Psychological Measurement*** (49), 893-899.

Nelson, D. L (1990). "Individual Adjustment to Information-Driven Technologies: A Critical Review," ***MIS Quarterly*** (14), pp. 79-98.

Nunnally, J. (1978). ***Psychometric Methods*** (2nd ed.). New York: McGraw-Hill.

Pope-Davis, D. B., & Twing, J. S. (1991). "The Effects of Age, Gender, and Experience on Measures of Attitude Regarding Computers," ***Computers in Human Behavior***, 7, 333-339.

Quick, J. C., and Quick, J. D. (1984). ***Organizational Stress and Preventive Management.*** New York: McGraw-Hill.

Rivard, S., & Huff, S. L (1988). "Factors of Success for End-User Computing," ***Communications of the ACM*** (31), pp. 552-561.

Sadri, G., & Robertson, I. T (1993). "Self-Efficacy and Work-Related Behaviour: A Review and Meta-Analysis," ***Applied Psychology: An International Review*** (42), pp. 139-152.

Safayeni, F.R., Purdy, R.L., & Higgins, C.A. (1989). "Social Meaning of Personal Computers for Managers and Professionals: Methodology and Results," ***Behaviour and Information Technology***, 8(2), 99-107.

Seligman, M. E. P. (1990). ***Learned Optimism.*** New York: Alfred A. Knopf, Inc.

Shell, D. F., Bruning R. H., & Murphy, C. C (1989). "Self-Efficacy and Outcome Expectancy Mechanisms in Reading and Writing Achievement," ***Journal of Educational Psychology*** (81:9), pp. 91-92.

Tannenbaum, S. I., Mathieu, J. E., Salas, E., & Cannon-Bowers, J. A (1991). "Meeting Trainees' Expectations: The Influence of Training Fulfillment on the Development of Commitment, Self-Efficacy, and Motivation," ***Journal of Applied Psychology*** (76:6), pp. 759-769.

Venkatesh, V., & Davis, F. D. (1996). "A Model of the Antecedents of Perceived Ease of Use: Development and Test," ***Decision Sciences***, 27(3), 451-481.

Walton, R. E. ***Up and Running***. Harvard Business School Press, Boston, 1989.

Zmud, R. W. (1984). "An Examination of 'Push-Pull' Theory Applied to Process Innovation in Knowledge Work," ***Management Science***, 30: 727-738.