

# Using the Social Cognitive Model to Explain Vocational Interest in Information Technology

Sheila M. Smith

*This study extended the social cognitive career theory model of vocational interest (Lent, Brown, & Hackett, 1994, 1996) to the information technology domain. Participants were 278 undergraduate students who were asked to identify their sources of computer self-efficacy, computer self-efficacy beliefs, outcome expectations, and information technology interests. Consistent with theory, all the social cognitive variables were strongly related to information technology interest. Hierarchical regression analysis revealed that mastery experiences and affective states significantly predicted interest in information technology. Computer self-efficacy and outcome expectations significantly impacted information technology interest. Implications for practice and further research are considered.*

## Introduction

Proliferation of a digital society has heightened interest in knowing how to interact with information technologies. Becoming proficient with information technology is a critical factor in academic and career development. A seminal study conducted in 1987 by Miura that is still relevant today found undergraduate students who possessed a low sense of computer self-efficacy showed less interest in information technologies. Interest in information technology, in conjunction with self-efficacy, expands the range of career choices for individuals who use the computer as a problem-solving tool of choice. Individuals who display little interest in acquiring information technology competencies may limit career options; therefore, it is imperative that today's students interact with information technologies that prepare them for the technology-dependent careers of the future.

A decision to participate in learning activities emerges from interests. Interests, defined as a pattern of likes, dislikes, and indifferences regarding the selection of career-relevant activities and occupations (Hansen, 1984), encourage academic and career activity involvement and skill acquisition (Lent, Brown, & Hackett, 1994). Self-efficacy perceptions predict level of interest in different career pursuits as well as in specific academic subjects (Lent, Larkin, & Brown, 1989; Lent, Lopez, & Bieschke, 1991).

Extending Bandura's (1986) general social cognitive theory, Lent et al. (1994) developed the social cognitive career theory (SCCT) to encompass the academic and career domains. Although the term "career" is used in the title of SCCT, academic interest, choice, and performance are included as part of the theory. Social cognitive career theory views academic progress as a developmental complement to career initiation and growth. Interests and skills formulated during school years shape career-related selections. The theory explains three social cognitive variables through which individuals manage their own academic and career behavior: self-efficacy beliefs, outcome expectations, and personal goals. The three social cognitive variables operate within three interlocking but separate models: (a) interest development, (b) choice, and (c) performance.

## Study Problem and Purpose

The model of interest development embedded within social cognitive career theory could potentially contribute to information technology research and practice by providing insight into the factors related to vocational interest in information technology. Research predicting vocational interest

*Sheila M. Smith is Assistant Professor, Department of Business Information Technology, College of Business, Ball State University, Muncie, Indiana.*

in information technology using SCCT as the theoretical foundation does not exist, however. This study was designed to extend the application of social cognitive career theory using vocational interest in information technology as the specific domain. The purpose of this study was to explore the use of social cognitive career theory's model of interest development in the prediction of vocational interest in information technology. Specifically, the study analyzes the following hypotheses:

- H1: Social cognitive sources of computer self-efficacy variables (a) mastery experiences, (b) vicarious learning, (c) social persuasion, and (d) affective states predict interest in information technology.
- H2: Computer self-efficacy beliefs predict interest in information technology.
- H3: Outcome expectations predict interest in information technology.
- H4: Mastery learning is the most important computer self-efficacy source variable to predict interest in information technology.

## Review of Literature

The literature review is composed of two sections. The first section is an overview of the social cognitive career theory variables (four sources of self-efficacy, self-efficacy beliefs, and outcome expectations) and the SCCT's model of interest development. The second section presents research studies that have examined information technology within a social cognitive theory framework.

### *Social Cognitive Career Theory (SCCT)*

Sources of self-efficacy. According to Bandura (1977, 1982, 1986, 1995), personal efficacy beliefs can be developed by four major sources of influence: mastery experiences, vicarious learning, social persuasion, and affective states. For example, personal efficacy can be created and strengthened through vicarious learning experiences provided by social encounters. Observing successful role models enhances self-efficacy beliefs. Social persuasion (verbal encouragement) within realistic boundaries can persuade people to try harder, resulting in self-affirming beliefs that

lead to success. Affective states, another source of efficacy belief, are determined by perceived reactions to situations influenced by personal mental and physical conditions. Stress, anxiety, and physical characteristics affect judgments of capabilities. Mastery experiences are considered the most influential source of efficacy information for two reasons: (a) it is based on direct, personal experiences, and (b) mastery is most often attributed to one's own effort and skill.

According to Lent, Hackett, and Brown (1996) vocational interests are influenced by the four sources of self-efficacy (mastery experiences, vicarious learning, social persuasion, and affective states), self-efficacy beliefs, and outcome expectations. Individuals develop interest in activities based on the personal impact of the four source variables, perceptions of self-efficacy, and valued outcomes.

Self-efficacy. Bandura (1986) defined self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). Perceived self-efficacy is an individual's self-knowledge of his or her ability to initiate necessary steps to achieve situation specific goals. Self-knowledge exists in numerous forms (e.g., self-esteem, self-concept); however, Bandura (1986) has suggested that self-efficacy has the greatest impact on a person's belief of individual mastery.

Outcome expectations. Outcome expectations are personal beliefs about possible consequences of action ("If I do this, what will happen?"). Academic behavior may be directed by the expectancy of physical (e.g., monetary), social (e.g., approval), and self-evaluative (e.g., self-satisfaction) outcomes. Acquired through learning experiences, outcome expectations shape interests and motivate behavior (Lent et al., 1996).

Model of Interest Development. The social cognitive career theory model of interest development (Lent et al. 1994, 1996) emphasizes the contribution of social cognitive variables in the formation of interest. Interests may be developed through direct or vicarious exposure to a variety of activities. An affinity for certain activities is formed after practice, feedback, skill refinement, personal efficacy development, and expectation of satisfactory outcomes. Interest formulation has

been associated with positive self-efficacy beliefs and anticipated positive outcomes. Interest, self-efficacy, and outcome expectations combine to encourage the establishment of goals. Goals lead to experiential activities that result in goal accomplishments, which shape self-efficacy, outcome expectations, and, eventually, interest. Task specific self-efficacy beliefs and outcome expectations have a great impact on the creation of interest.

Aptitudes (or abilities) are central to the interest formation process, yet actual ability is secondary to perceived ability. Abilities affect self-efficacy, and self-efficacy affects interest. According to Lent et al. (1994) "interest in a particular academic or career-relevant activity depends, in part, on the outcomes that are anticipated to result from participation in the activity, along with the relative value or importance of these outcomes to the individual" (p. 91).

### *Information Technology*

Previous research has focused on the computer self-efficacy construct within the social cognitive model. The construct has been used to examine the decision to use information technology (Hill, Smith, & Mann, 1987; Kinzie, Delcourt, & Powers, 1994), software training and performance (Gist, Schwoerer, & Rosen, 1989; Martocchio, 1994; Webster & Martocchio, 1992, 1993, 1995), and the relationship to experience and performance (Karsten & Roth, 1998).

Compeau and Higgins (1995) compared two training models: (a) behavior and (b) traditional lecture to examine computer self-efficacy, outcome expectations, and performance. Word processing and spreadsheet applications were used to test the two models. The behavior model was more effective than the traditional lecture for training the spreadsheet application. A significant difference in the training models for the word processing application did not exist. Results from a path analysis concluded computer self-efficacy had a strong influence on performance in both models.

Zhang and Espinoza (1998) examined the relationship between self-efficacy, attitudes toward computers, and desire to learn computer skills. The results showed that computer anxiety predicted

confidence levels with computers. Attitudes toward computers were correlated with computer self-efficacy, and attitudes about the usefulness of computers predicted desire to learn computer skills. Computer self-efficacy was a strong predictor of willingness to learn advanced computer skills.

A path model to test the influence of computer self-efficacy, outcome expectations, affect, and anxiety on computer usage was developed by Compeau and Higgins (1999). Using longitudinal data collected over a one-year period from 394 business periodical subscribers, a significant relationship was found between computer self-efficacy and outcome expectations. Computer self-efficacy also had a positive influence on affect, anxiety, and computer use.

Smith-Weber (2000) investigated the relationship of the sources of computer self-efficacy and the impact of computer technology education. Examination of the four sources of computer self-efficacy before and after course instruction revealed computer self-efficacy was significantly related to mastery experiences and affective states. In addition, overall perceptions of computer self-efficacy increased after computer technology education.

## **Method**

This section discusses the participant demographics, study instruments, research procedure, and design.

### *Participant Demographics*

Participants were undergraduate students at a large Midwestern university. A background questionnaire determined demographic characteristics. Although 15 different academic majors were represented, the students were primarily (56%) business majors. The 278 students (126 female and 152 male) ranged in age from 17 years to 44 years old with a mean age of 20.23 (*SD* 1.63). Grade level classification was freshman (17%), sophomore (55%), junior (18%), and senior (10%). The ethnic composition of the students was: white (81%), African-American (13%), Hispanic (3%), Asian (1%), and other (2%).

## *Instruments*

Due to the emergent nature of social cognitive career theory, the instruments in this study were developed according to the prescribed scale development structure as outlined by social cognitive theory (Bandura, 1997). The Sources of Computer Self-Efficacy scale, Technology Outcome Expectations scale, and Information Technology Interest scale were adapted by replacing the word "mathematics" with "computer." Judgments of capability should be able to reflect different facets of the activity domain, types of capabilities required, and situational circumstances in which those capabilities are exercised (Bandura, 1997). The adaptations were made to reflect the specific activity domain examined in the present study.

Confirmatory factor analysis produced factor loadings of .30 or above on all the items in each of the scales with the exception of two items in the Sources of Computer Self-Efficacy scale. Three information technology specialists who had extensive experience in teaching and industry assessed content validity. The specialists were asked to examine each of the scales to determine whether they were reflective of the specific activity domain. Based on feedback from the specialists, the instruments were administered without removal of the two items with low factor loadings.

*Sources of computer self-efficacy.* The perceived sources of computer self-efficacy were assessed with a 40-item Sources of Computer Self-Efficacy scale (SCSE). The instrument is a modification of one originally developed by Lent, Lopez, and Bieschke (1991) to measure mathematics self-efficacy sources. The SCSE instrument was constructed to measure each of the four primary sources of efficacy information as described by Bandura (1986). Four scales, containing 10 questions per scale, examined mastery experiences (e.g., "I got a high grade in my last computer class"), vicarious learning (e.g., "Many of the adults I admire use computers"), social persuasion (e.g., "My parents have encouraged me to take computer courses"), and affective state (e.g., "I'm nervous when using a computer"). Participants responded by indicating their level of agreement with each statement on a 5-point Likert-type scale ranging from 1 strongly

disagree to 5 strongly agree. A Cronbach's  $\alpha$  of .85 was derived for this sample.

*Computer self-efficacy.* To assess computer self-efficacy this study used Torkzadeh and Koufteros' (1994) Computer Self-Efficacy scale (CSE). The 30-item CSE scale measures self-perception of information technology skills and knowledge. Each item, preceded by the statement, "I feel confident," was rated on a 5-point Likert-type response format ranging from 1 strongly disagree to 5 strongly agree. High scores indicated a high degree of confidence in one's ability to use computers. Torkzadeh and Koufteros (1994) produced a four-factor scale to measure (a) beginning computer skills, (b) mainframe computer skills, (c) advanced computer skills, and (d) file management and software skills. The overall scale Cronbach  $\alpha$  reliability for this sample was .96.

*Outcome expectations.* Outcome expectations were measured with the Technology Outcome Expectations scale (TOES), a 13-item measurement modified by the investigator. The instrument was adapted from the Usefulness of Mathematics scale developed by Fennema and Sherman (1976). The scale assessed students' perceptions of the importance of information technology to their future life and career. Positively and negatively worded items (e.g., "Taking computer courses will help me make better career decisions") were rated on a 5-point Likert scale ranging from 5 strongly agree to 1 strongly disagree. Negatively worded items were reversed scored so that the higher scores indicated stronger beliefs. A Cronbach  $\alpha$  of .84 was derived for this sample.

*Information Technology Interest Scale.* Information technology interest was assessed with a 20-item scale modified by the investigator. The Information Technology Interest scale (ITIS) instrument was based on the Math/Science Interest Activities scale developed by Lopez and Lent (1992). The scale reflected a variety of activities that might accrue from taking a computer applications course (e.g., using a computer to design databases), academic course intentions (e.g., taking a multimedia course), and leisure activities (e.g., playing computer games). Participants were asked to indicate their degree of interest in information technology activities based on a 5-point

Likert scale ranging from 5 like to 1 dislike. A Cronbach  $\alpha$  of .91 was derived for this sample.

### Procedure

Research measures were administered in seven sections of an introductory computer applications course. Data were collected in the 1999-2000 academic year from six sections during two sixteen-week sessions and one summer session. The same instructor taught all sessions. The research questions were not time-sensitive; therefore, different collection periods did not compromise the integrity of the data. The background questionnaire, sources of computer self-efficacy, computer self-efficacy, outcome expectations, and information technology interest scale instruments were administered during the first week of the course. Using assigned research identification numbers ensured the confidentiality of participants.

### Research Design

Descriptive data were calculated for all the measures. The means, standard deviations, and range of scores for the predictor variables (sources of computer self-efficacy, computer self-efficacy beliefs, and outcome expectations) and the criterion variable (information technology interest) were determined. Simple intercorrelations were computed for all variables in the study. An  $\alpha$  level of 0.05 with a two-tailed probability was used to determine significance. A hierarchical regression analysis for information technology interest using the sources of computer self-efficacy, computer self-efficacy beliefs, and outcome expectations as predictor variables was performed. The stepwise version of statistical regression was used to determine which variables contributed the greatest statistical significance to information technology interest (Tabachnick & Fidell, 1996).

### Results

Means, standard deviations, and range of scores for the predictor variables (four

sources of computer self-efficacy, computer self-efficacy beliefs, and outcome expectations) and the criterion variable (information technology interest) are presented in Table 1.

Correlations computed for the four sources of computer self-efficacy, computer self-efficacy beliefs, outcome expectations, and information technology interest are presented in Table 2. All correlations between the social cognitive variables and information technology interest were statistically significant ( $p < .01$ ), ranging from .23 to .68.

Table 3 presents the results of the hierarchical regression analysis predicting information technology interest. The first hypothesis stating that the four sources of computer self-efficacy would predict interest in information technology was partially supported. Two of the source variables, mastery experiences ( $p < .01$ ) and affective states ( $p < .05$ ) significantly predicted interest in information technology. Hypothesis 2 was supported. The results suggest computer self-efficacy beliefs ( $p < .01$ ) accounted for a significant amount of the information technology interest variance. Outcome expectations also

**Table 1: Descriptive Data for Social Cognitive Theory Variables (N= 278)**

Variable	<u>M</u>	<u>SD</u>	<u>Range</u>
Predictor Variables			
Mastery Experiences	3.64	.60	1 - 5
Vicarious Learning	3.61	.53	1 - 5
Social Persuasion	3.37	.63	1 - 5
Affective States	1.99	.70	1 - 5
Computer Self-efficacy	3.80	.73	1 - 5
Outcome Expectations	4.39	.50	1 - 5
Criterion Variable			
Information Technology Interest	2.99	.75	1 - 5

**Table 2: Intercorrelations Among Social Cognitive Theory Variables**

Variable	1	2	3	4	5	6	7
1. Mastery Experiences		.34**	.59**	-.68**	.55**	.37**	.57**
2. Vicarious Learning			.44**	-.29**	.32**	.35**	.32**
3. Social Persuasion				-.26**	.38**	.33**	.42**
4. Affective States					-.47**	-.39**	-.51**
5. Computer Self-efficacy						.23**	.44**
6. Outcome Expectations							.47**
7. Information Technology Interest							

\*\*  $p < .01$

**Table 3: Hierarchical Regression Analysis Predicting Information Technology Interest (N= 278)**

Predictor Variable	Beta	Partial F	R <sup>2</sup>	Omnibus F
Mastery Experiences	.25	3.19**		
Vicarious Learning	.02	.41		
Social Persuasion	.09	1.38		
Affective States	-.14	-2.15*		
Computer Self-efficacy	.13	2.35**		
Outcome Expectations	.26	4.99***		
Overall			.43	35.32***

Note. Degrees of freedom (6, 271)

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

accounted for a significant amount of the information technology interest variance, thus supporting hypothesis 3. Results suggest that the overall model was significant ( $R^2 = .43$ ,  $F(6, 271) = 35.32$ ,  $p < .001$ ).

To explore the contribution of each variable, statistical regression analysis using the stepwise version for predicting information technology interest was used (see Table 4). Mastery experiences was the most important predictor variable, thus providing support for hypothesis 4. Outcome expectations and computer self-efficacy were also significant predictors of information technology interest. The overall model accounted for a significant amount of the information technology interest variable ( $R^2 = .42$ ,  $F(3, 274) = 67.96$ ,  $p < .001$ ).

## Discussion

As the first empirical investigation to examine the application of a social cognitive model using vocational interest in information technology as the specific domain, results from this study extend the social cognitive career theory (SCCT) literature. The theory's model of interest development (Lent et al., 1984, 1996) hypothesized career and academic interest based on the social cognitive variables: sources of self-efficacy, self-efficacy, and outcome expectations. Study findings offer support for the applicability of SCCT in explaining the information technology interest of undergraduate students. Consistent with theory, all of the social cognitive variables were strongly related to information technology

interest. The significant relationship between information technology interest and the social cognitive variables provides initial empirical support for this observation.

Information technology interest had the highest correlation with mastery experiences. Repeatedly engaging in an activity that produces efficacious beliefs generally promotes interest formation. A strong inverse relationship existed between information technology interest and affective states. Affective disposition is an important element in efficacy information development that leads to interest crystallization. Individuals with less computer anxiety are more likely to possess more interest in information technology (Lent et al., 1996). Although vicarious learning and social persuasion were positively related to information technology interest, the two source variables did not provide a unique contribution.

Specifically, findings suggest that two source variables, mastery experiences and affective states, were important variables related to vocational interest in information technology. As hypothesized, the source variable, mastery experiences, was the most important predictor of information technology interest. Subsequent statistical stepwise regression confirmed the significant contributory nature of mastery experiences. According to Bandura, (1977, 1986, 1995) mastery experiences, considered the most influential source of efficacy, enable individuals to achieve personal standards of merit that elevates interest and affirms personal efficacy (Bandura, 1982). The overall hierarchical regression model was statistically significant; in addition to the two

**Table 4: Statistical Regression Analysis Predicting Information Technology Interest (N= 278)**

Predictor Variable	Beta	Partial F	R <sup>2</sup>	F
Mastery Experiences	.37	6.51***		
Outcome Expectations	.30	6.09***		
Computer Self-efficacy	.16	2.96**		
Overall			.42	67.96***

Note. Degrees of freedom (3, 274)

\*\* $p < .01$ , \*\*\* $p < .001$

source variables, computer self-efficacy and outcome expectations were also predictors of information technology interest. Involvement in activities that produce efficacious results and positive outcomes usually contributes to interest development (Lent et al., 1994).

Although the findings from this investigation provide support for the applicability of social cognitive career theory to the field of information technology, a limitation deserves mention. Additional examination of the psychometric properties of the research instruments is warranted. Study instruments possessed strong reliability; conducting subsequent studies will provide additional psychometric properties.

Findings from this investigation have further implications for practice. The present findings suggest that efforts to broaden academic and career interests in information technology may benefit from an examination of individual perceptions about mastery experiences and affective states. Past performance experiences affect desire to learn information technology concepts. Successful mastery of computer skills leads to an increase in information technology interest, while the lack of interest may be due to unsuccessful skill mastery attempts. Assessment of previous computer experiences can be used to distinguish between students who are motivated, yet lack previous experience and students who are unmotivated due to unfavorable experiences. Knowledge of perceptions about previous experience can help educators formulate an effective curriculum designed to meet the needs of every student's skill level. Awareness of positive or negative encounters with information technology may also provide educators with an understanding of individual affective states. Computer anxiety dissipates as frequency of use increases. Many students are eager to acquire an understanding of information technology concepts, despite the influence of computer anxiety on confidence level. Some students possess little or no interest in technology; however, to satisfy academic and career requirements many students reluctantly enroll in information technology courses. Knowing how a student feels about interacting with information technology can help educators establish a learning

environment that addresses different levels of mastery experiences and affective states.

In addition to mastery experiences and affective states, it may be advantageous to focus on computer self-efficacy beliefs and outcome expectations. An examination of computer self-efficacy beliefs may be helpful to both the student and the educator. Self-knowledge of abilities can serve as a stimulus to attain information technology skills. Understanding students' perception of their capability to master information technology competencies allows the educator to compensate for individual differences by tailoring instruction. Educators and students can work together to help students overcome self-imposed limits and identify the value of obtaining a proficient information technology skill level. Personal beliefs about the value of information technology skills affect judgment regarding outcome expectations. Anticipation of money, social status, and/or personal pleasure increases the likelihood of activity involvement. Lent et al. (1994) stated, "The more valued the perceived outcomes, the more likely that people will adopt particular career goals" (p. 95).

Awareness of the most influential source(s) of beliefs may contribute to an empowering sense of efficacy and enhance outcome expectations; this increased awareness may foster interest. Knowledge of sources of self-efficacy, personal efficacy beliefs, and desired outcomes may provide insight into interests and, in turn, may clarify academic and career goals.

Future research could test SCCT's model of interest development using a structural equation model. A path analysis model will further test the utility of SCCT in explaining interest in information technology. Path analysis can help verify the multifaceted structure that impacts vocational interest in information technology, such as student motivation and computer-related task difficulty.

A study is needed that examines the personal, contextual, and experiential factors incorporated into SCCT (Lent et al., 1994). Interest may vary according to gender, ethnicity, environmental influences, and/or personal experiences. Examination of the cultural dynamics that may have an impact on information technology interest will assist educators in the development of a curriculum that considers diverse learners. Finally, a study is

needed that examines the information technology interest of elementary and secondary school students. Introduction of information technology at an early age provides enriched learning opportunities that may increase levels of confidence and interest. Early identification of academic/career interests at a crucial developmental stage may be fundamental in widening the range of academic and career options (Betz, 1992).

In conclusion, the findings support SCCT's model of vocational interest (Lent et al., 1994). This study demonstrated the predictive nature of the four sources of self-efficacy, computer self-efficacy beliefs, and outcome expectations in relationship to information technology interest. Mastery experiences, affective states, computer self-efficacy and outcome expectations were important predictors of interest in information technology. The findings show promise for future research of information technology interest within the social cognitive career theory framework.

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