

# The Role of Social Cognitive Career Theory in Information Technology based Academic Performance

Sheila M. Smith

*Positive academic efficacy beliefs elevate educational expectations that lead to academic success (Bandura, 1997; Lent, Brown, & Hackett, 1994). The purpose of this study was to explore the relationship of the variables: past performance, computer self-efficacy, outcome expectations, academic grade goal, and academic performance within social cognitive career theory's model of performance (Lent, Brown, & Hackett, 1994). The study focused on the effects of social cognitive variables on academic performance in an information technology course. Participants were 193 undergraduate students (82 women and 111 men) who completed a background questionnaire, the Information Technology Proficiency Exam, the Computer Self-Efficacy scale, and the Technology Outcome Expectations scale. Based on path model results, the findings suggest that students' academic performance is related to past performance. Consistent with theory, the findings suggest that academic performance is influenced by computer self-efficacy via the establishment of an academic grade goal. In the present study, the past performance variable failed to predict academic performance when impacted by outcome expectations.*

## Introduction

Personal efficacy plays a vital role in educational attainment. Intellectual growth is partially determined by individual belief in personal ability to master various subjects and regulate self-learning (Schunk, 1989, 1994). Efficacy beliefs influence academic motivation and aspirations, level of interest in intellectual pursuits, scholastic achievements, and academic goal persistence (Bandura, 1995, 1997; Schunk, 1994). Positive academic efficacy beliefs elevate educational expectations that lead to academic success (Bandura, 1997). A strong sense of personal efficacy creates self-directed lifetime learners who are valued and economically rewarded in today's society (Lent, Hackett, & Brown, 1999). Strong efficacy beliefs, along with fundamental learning tools supplied by formal education, result in students who possess skills necessary for social and economic stability.

A lack of confidence with information technology may hamper academic and career success. Hill, Smith, and Mann (1987) found confidence in ability to use a computer predictive of

future involvement with information technologies. Exposure to information technology is essential to academic achievement and career development. Career success in almost every occupation depends on interaction with information technology.

A significant nexus of vocational education involves the construct of computer self-efficacy, defined as a judgment of one's capability to use a computer (Compeau & Higgins, 1995). Computer self-efficacy is an important personal trait that influences an individual's decision to use computers (Compeau & Higgins, 1995). According to Bandura's (1986) social cognitive theory, self-efficacy is personal judgment of the ability to apply possessed skills (can I do this?). People are often capable of achieving desired performance but do not exhibit behavior that will lead to task completion. Self-referent thought converts knowledge into action (Bandura, 1986).

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

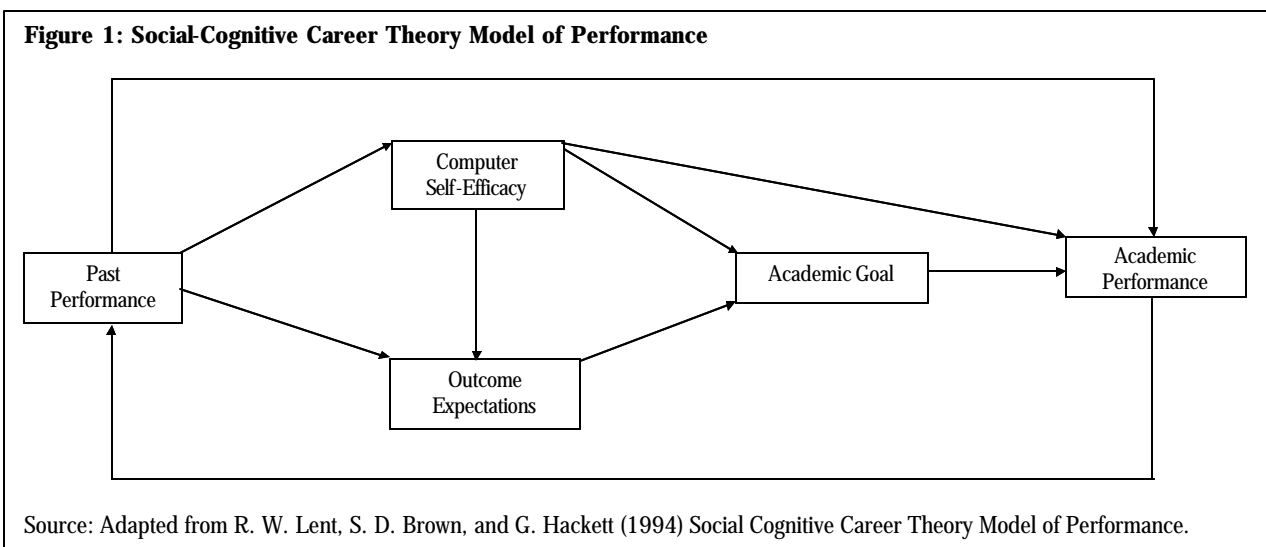
Bandura's (1986) social cognitive theory has been expanded to include academic performance with the development of social cognitive career theory (SCCT) (Lent, Brown, & Hackett, 1994, 1996). The word "career" used in the title of SCCT is inclusive of academic interest, choice, and performance. SCCT was designed to provide a framework for explaining both academic and career behaviors. Social cognitive career theory views academic progress as a developmental complement to career interest and choice. SCCT emphasizes three social cognitive variables that may be relevant to academic development: self-efficacy, outcome expectations, and goals. According to Lent, Brown, & Hackett (1994), self-efficacy refers to "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" (p. 83). SCCT defines outcome expectations as the desired consequences of a course of action and goals as the effort required to engage in an activity. The theoretical framework is based on three interlocking models: a) interest development, b) choice, and c) performance (Lent, Brown, & Hackett, 1994).

Several recent path analyses have provided initial support for the three models' ability to predict the math and science academic interests, choices, and performance of undergraduate students (Gainor & Lent, 1998; Lopez, Lent, Brown, & Gore, 1997; Lapan, Shaughnessy, & Boggs, 1996). However, the social cognitive career theory's model of performance has not been extended to the study of academic performance of undergraduate students enrolled in an information technology course.

## Purpose of Study

The purpose of this study was to explore the relationship of the variables: past performance, computer self-efficacy, outcome expectations, academic goal, and academic performance within social cognitive career theory's model of performance. An additional purpose of the study was to explore the use of the path model of performance as outlined in social cognitive career theory (Lent, Brown, & Hackett, 1994). In particular, it focused on the effects of the social cognitive variables on academic performance in an information technology course. In the present research, past performance, computer self-efficacy, outcome expectations, and academic goal were predicted to relate positively to academic performance. Specifically, the study analyzed the following hypotheses among undergraduate students:

- HO1: Past performance would account for a significant amount of academic performance variance.
- HO2: Past performance would account for a significant amount of academic performance variance when influenced by computer self-efficacy.
- HO3: Past performance would account for a significant amount of academic performance variance when influenced by computer self-efficacy and academic goal.



- HO4: Past performance would account for a significant amount of academic performance variance when influenced by outcome expectations and academic goal.
- HO5: Past performance would account for a significant amount of academic performance variance when influenced by computer self-efficacy, outcome expectations, and academic goal.

## Review of Literature

### *Social Cognitive Career Theory*

Social cognitive career theory (SCCT) (Lent, Brown, & Hackett, 1994, 1996) is concerned with two primary aspects of academic performance: the level of achieved success or proficiency and the degree of persistence despite encountering obstacles. SCCT assumes that complicated task performance requires possession of requisite mastery skills and works in tangent with a sense of personal efficacy that enables the translation of skills into productive performances. SCCT proposes that the self-efficacy belief system is impacted by past performance (as reflected by achievement or ability indicators) therefore directly or indirectly affecting performance. Past performance, self-efficacy, outcome expectations, and goals combine to influence performance.

*Performance Model.* The model of performance, one of the three interlocking models within social cognitive career theory is often seen as useful in explaining achievement relative to goals that are either personally selected (where activities are mandated by external agents) or personally adopted (Lent et al., 1994). The performance model is concerned with the level (or quality) of people's accomplishments, as well as with the persistence of their behavior in career-related pursuits (Lent et al., 1996).

According to Lent et al. (1994, 1996), there is a connection among past performance, self-efficacy, outcome expectations, and goals in determining performance outcomes. Additionally, consistent with social cognitive career theory's triadic-reciprocal view of interaction, they propose a feedback loop between performance attainments and subsequent behavior. The nature of goals

within the performance model concerns "performance goals," which refer to the level of attainment toward which one aspires within chosen performance domains.

### *Research Studies*

Comparing self-efficacy beliefs and academic outcomes among students considering science and engineering careers was initially explored by Lent, Brown, and Larkin (1984). Their study revealed that both level (degree of difficulty) and strength (endurance) of self-efficacy could predict academic performance as well as persistence for undergraduates enrolled in a career/educational-planning course and considering science or engineering as an academic major. High self-efficacy beliefs correspond with academic achievers who received higher grades and persisted longer in technical/science programs. Lent, Brown, and Larkin (1986) extended the findings of their 1984 study by combining self-efficacy with past performance, achievement, and vocational interest to determine academic outcomes, persistence, and range of perceived technical/science career choices. The major findings of the 1986 study supported and extended previous results showing that academic outcomes, vocational interest, and perceived range of technical/science career options are related to self-efficacy expectations.

Hackett, Betz, Casas, and Rocha-Singh (1992) consistently found academic self-efficacy the strongest predictor of academic performance in college-level engineering students. In addition to academic performance, interest in engineering occupations, positive outcome expectations, and faculty encouragement were positively related to academic self-efficacy. Stress and faculty discouragement were negatively related to academic self-efficacy. Although few gender differences were noted, women reported a significantly lower level of positive outcome expectations. Ethnicity was a significant predictor of academic self-efficacy, but was not predictive of performance.

Lapan, Shaughnessy, and Boggs (1996) conducted a longitudinal study assessing the influence of self-efficacy beliefs on choice of math/science majors before college entry. Following high school completion, subjects

completed self-efficacy measures and interest measures primarily related to mathematics and science. To complete the longitudinal study, approximately 3.5 years after the initial measurement administration, 101 of the original 148 subjects' university records were examined to determine selected college major. Significant gender difference was found at both examination periods. Men reported greater interest in math and science as entering college freshmen and as college juniors. Path analysis revealed a direct link between gender and math self-efficacy beliefs.

Lopez, Lent, Brown, and Gore (1997) implemented a path analysis model to test the four principal sources of self-efficacy information (mastery experiences, vicarious learning, social persuasion, and affective states) as outlined by Bandura (1986). Past performance (mastery experiences) had the largest impact on self-efficacy beliefs followed by social persuasion. In contrast to other studies, gender differences were not found in math-related academic interest or performance of the high school students examined in the study. Women reported receiving more social persuasion and vicarious learning than men. Women also earned higher math course grades than men students in this study.

Jinks and Morgan (1999) found moderate, yet positive correlation between self-efficacy beliefs and academic performance among secondary school students. Using three samples of students from urban, suburban, and rural school districts, Jinks & Morgan found academic self-efficacy related with students' self-reported grades in four core subjects of math, social studies, science, and reading. Student who expressed high self-efficacy beliefs also reported higher grades.

Ju Joo, Bong, & Chai (2000) examined the relationship among self-efficacy for self-regulated learning, academic self-efficacy, Internet self-efficacy, and strategy use to determine the applicability of self-efficacy theory in a web-based instruction environment. Path analysis revealed students' self-efficacy for self-regulated learning positively related to confidence both in the typical classroom learning and in using the Internet. Students' previous experiences working with computers significantly related to self-efficacy perceptions toward using the Internet. Internet self-

efficacy was predictive of students' performance on web-based instruction search exams, but not written exams.

## Method

### *Participants*

Participants were 193 undergraduate students at a large Midwest university. Students were enrolled in three sections of an introductory information technology course entitled Business Information Systems taught by the same instructor. Although six different academic departments (architecture, communications, fine arts, science and humanities, teachers college, and honors) were represented, the students were primarily from the college of business ( $n = 129, 67\%$ ). The 193 students (82 women and 111 men) ranged in age from 18 years to 41 years old with a mean age of 19.23 ( $SD = 2.52$ ). Grade level classification was: freshman ( $n = 36, 18.7\%$ ), sophomore ( $n = 116, 60.1\%$ ), junior ( $n = 28, 14.5\%$ ), and senior ( $n = 13, 6.7\%$ ). The ethnic composition of the students was: white ( $n = 158, 81.9\%$ ), African-American ( $n = 21, 10.9\%$ ), Hispanic ( $n = 5, 2.6\%$ ), Asian ( $n = 2, 1\%$ ), and other ( $n = 7, 3.6\%$ ).

### *Procedures*

Upon receiving permission from the internal review board, research measures were administered during a sixteen-week introductory information technology course. An information technology proficiency exam, computer self-efficacy scale, outcome expectations scale, and a background questionnaire were administered during the first week of the course prior to any instruction. Asking students what grade they expected to receive at the end of the course assessed the academic goal variable. The academic performance variable was derived from the students' end-of-term course grade. The course grade was based on completion of the information technology course that was composed of course exams (42%), computer lab assignments (38%), and a final information technology presentation (20%). The letter grade distribution was A ( $n = 27, 14\%$ ), B ( $n = 76, 39.4\%$ ), C ( $n = 74, 38.3\%$ ), D ( $n = 11, 5.7\%$ ) and F ( $n = 5, 2.6\%$ ).

Using assigned research identification numbers ensured confidentiality.

### *Instruments*

***Information Technology Proficiency Exam.*** To assess past performance, a 63-item Information Technology Proficiency Exam (ITPE) designed specifically for research purposes was developed by the investigator. This scale was designed to assess students' knowledge of fundamental information technology concepts. Questions based on introductory information technology subjects were generated from 10 chapters in the textbook used in the information technology course. The chapters were Introduction to Computers (6 items), Application Software (4 items), The System Unit (5 items), Input (5 items), Output (5 items), Storage (6 items), The Internet (5 items), Systems Software (6 items), Communications and Networks (5 items), and Database Management (4 items). The scale was composed of multiple-choice questions with only one possible correct answer. Each item was worth 1 point resulting in a scale value of 63 points. Although this scale has not been used in previous research, the researcher administered, revised, and examined the psychometric properties for three consecutive years prior to this study. Confirmatory factor analysis produced factor loadings of .30 or above on all the items on the ITPE.

***Computer Self-Efficacy Scale.*** 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 computer-related skills and knowledge. Each item proceeded by the statement, "I feel confident" was rated on a 5-point Likert-type response format (1 = strongly disagree and 5 = strongly agree). High scores indicated a high degree of confidence in one's ability to use computers. A high Cronbach alpha of .92 was derived for this sample. Confirmatory factor analysis produced factor loadings of .60 or above on all the items on the CSE.

***Technology Outcome Expectations Scale.*** Outcome expectations were measured with the Technology Outcome Expectations scale (TOE), a 13-item measurement modified by the investigator. The instrument was based on 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 academic and career plans. Positively and negatively worded items (e.g., "Taking information technology courses will help me make better career decisions") were rated on a 5-point Likert scale ranging from strongly agree (5) to strongly disagree (1). Negatively worded items were reversed scored so that the higher scores indicated stronger beliefs. A Cronbach alpha of .87 was derived for this sample. Confirmatory factor analysis produced factor loadings of .25 on one item and .35 or above on the other 12 items on the TOE.

***Background Questionnaire.*** The background questionnaire included measures of demographic characteristics (gender, age, ethnicity, academic department, and grade classification).

### *Data Analysis*

Hypothesized relationships among past performance, computer self-efficacy, outcome expectations, academic goal, and academic performance were tested with correlations. The Pearson product-moment correlation coefficient was the statistical measure used to determine the strength of the theoretical variables. An alpha level of 0.05 with a two-tailed probability was used to determine significance.

To assess the adequacy of the academic performance model, a structural equation model was conducted using Amos 3.6 (Arbuckle, 1997), a statistical software application. Structural equation modeling (SEM) is a confirmatory technique generally used to test a theory (Tabachnick & Fidell, 1996). SEM allows for the simultaneous examination of multiple relationships. Complex relationships are analyzed in a single model (Hair, Anderson, Tatham, & Black, 1998).

Four indexes to assess the overall fit of the hypothesized model to observed data were used. The most fundamental measure of overall fit is the likelihood-ratio chi-square statistic (Jöreskog & Sörbom, 1984), a nonsignificant chi-square suggests model adequacy. The chi-square index is sensitive to sample size and violations of the assumption of multivariate normality; therefore, alternative fit

indexes are generally used to complement the chi-square measure (Tabachnick & Fidell, 1996). The goodness-of-fit index (GFI) (Bentler, 1980), the adjusted goodness-of-fit index (AGFI) (Bentler, 1983), and the Comparative Fit Index (CFI) (Bentler, 1990) were the alternative indexes used in this study. A value of .90 or greater is commonly recommended for an acceptable level of fit (Hair, Anderson, Tatham, & Black, 1998).

## Results

Descriptive data were calculated for all the social cognitive theoretical variables. Table 1 presents the minimum, maximum, mean, and standard deviation for all variables. The past performance variable mean indicated that participants possessed limited prior knowledge about basic information technology concepts ( $M = 40.77$ ,  $SD = 6.52$ ). Based on a 63-point total value on the Information Technology Proficiency Exam, the participants' mean score was only 65% of the exam total. Using a grading system in which a 4.0 represented the letter grade A, the academic performance variable mean of 2.93 equated to an average course grade of slightly less than a B.

Table 2 shows results for the intercorrelations of social cognitive theoretical variables. Past performance had a statistically significant positive correlation with computer self-efficacy ( $r = .39$ ) and academic goal ( $r = .22$ ), at the .01 level. A statistically significant correlation between computer self-efficacy and academic performance did not exist ( $r = -.03$ ). At the .01 level, self-efficacy had a statistically significant positive correlation with outcome expectations ( $r = .20$ ) and academic goal ( $r = .30$ ). There was a statistically significant positive correlation between academic goal and academic performance ( $r = .34$ ). Contrary to theory, outcomes did not have a relationship with the academic goal or academic performance variable.

A path model using the maximum-likelihood estimation method tests the hypotheses among the theoretical variables. Figure 2 presents results from the path analysis. Specifically, the  $\chi^2$  value was not significant ( $\chi^2 = 5.10$ ,  $df = 4$ ,  $p = .28$ ). A non-significant chi-square value indicates that

the proposed model fits the observed covariances and correlations (Hair, Anderson Tatham, & Black, 1998). The GFI (.99), AGFI (.96), and the CFI = .99 indicated that the model fit the data adequately (Loehlin, 1992; Tabachnick & Fidell, 1996; Hair, Anderson, Tatham, & Black, 1998).

Hypothesis one stated that past performance determined by assessed knowledge of information technology concepts would predict the academic performance measured by the final grade obtained in an introductory course. Consistent with theory and prior results (Lopez et al., 1997), past performance produced a significant path to academic performance ( $\beta = -.19$ ) at the .05 level, providing support for hypothesis one. Hypothesis two states that past performance, influenced by computer self-efficacy, would predict academic performance. Past performance accounted for 15% of the computer self-efficacy variance ( $R^2 = .15$ ) and produced a significant path to computer self-efficacy ( $\beta = .40$ ). However, the path from computer self-efficacy to academic performance ( $\beta = -.20$ ) was not found in the present study. The results support hypothesis two only partially.

Hypothesis three suggested that past performance, when influenced by both computer self-efficacy and academic goal, would relate to academic performance. Past performance ( $\beta = .40$ ) when influenced by computer self-efficacy ( $\beta = .27$ ) and academic goal ( $\beta = .39$ ) positively

**Table 1: Descriptive Statistics (N=193)**

Variable	Min	Max	M	SD
Past Performance	19.00	56.00	40.77	6.52
Computer self-efficacy	1.80	5.00	3.76	.72
Outcome Expectations	3.08	5.00	4.46	.44
Academic Goal	1.00	4.00	3.66	.51
Academic Performance	1.00	4.00	2.93	.98

**Table 2: Correlations Among Theoretical Variables**

Variable	1	2	3	4	5
Past Performance	--	.39**	.11	.22**	.14*
Computer self-efficacy		--	.20**	.30**	-.03
Outcome Expectations			--	.06	.13
Academic Goal				--	.34**
Academic Performance					--

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

related to academic performance at the .01 level. As stated in hypothesis three, past performance, computer self-efficacy, and academic goal combined to explain 13% of the variance in academic performance ( $R^2 = .13$ ).

Hypothesis four stated that past performance, influenced by both outcome expectations and academic goal, would predict academic performance. The path from past performance to outcomes ( $\beta = .04$ ) was not significant; past performance accounted for only 4% of the outcome expectations variance ( $R^2 = .04$ ). Although the academic goal variable produced a significant path to academic performance ( $\beta = .39$ ), the path from outcome expectations to academic goal ( $\beta = -.01$ ) was not significant; therefore, hypothesis four was not supported.

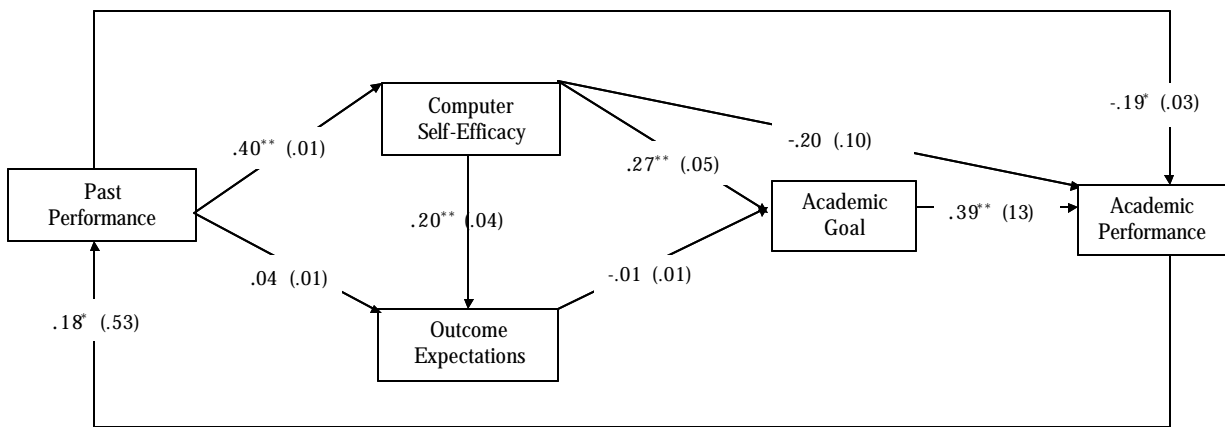
According to hypothesis five, the combination of past performance, computer self-efficacy, outcome expectations, and academic goal would predict academic performance. The path from past performance to computer self-efficacy ( $\beta = .40$ ) and the path from computer self-efficacy to outcome expectations ( $\beta = .20$ ) was significant at the .01 level. Although the outcome expectations variable did not provide a significant path to academic goal ( $\beta = -.01$ ), academic goal ( $\beta = .39$ ) produced a significant path to academic performance at the .01 level.

## Discussion

The theoretical foundation of social cognitive career theory's performance model outlines the motivational factors that can influence students' performance. This study was an initial attempt to extend the application of social cognitive career theory to an information technology-mediated learning environment. The findings are generally consistent with social cognitive career theory predictions.

The path analysis produced good support for the model in which past performance helped determine academic performance. Past performance, as measured by the score on the proficiency exam taken at the beginning of the course contributed significantly to academic performance defined by the final course grade. Introduction and repeated exposure to basic information technology concepts advances performance levels. Activity engagement greatly contributes to successful performance (Bandura, 1995, 1997; Lent et al., 1994, 1996). Administration of a pre-course proficiency exam may help educators identify high and low competency students. Instructors can use knowledge of students' previous experience with information technology to design a flexible curriculum. They can categorize computer-

**Figure 2: A Path Analysis of the Social-Cognitive Academic Performance Model. Standardized coefficients and their standard errors (in parentheses). \* $p < .05$ ; \*\* $p < .01$ ;  $\chi^2 = 5.10$ ;  $df = 4$ ;  $p = .28$ ; Goodness-of-fit index = .00; adjusted goodness-of-fit index = .96; comparative fit index = .99.**



Source: Adapted from R. W. Lent, S. D. Brown, and G. Hackett (1994) Social Cognitive Career Theory Model of Performance.

mediated tasks into difficulty levels and assign them to students based on the success of the students' past performance. Instructors can use competency assessment to establish classroom policies and procedures that will minimize the knowledge gap.

The path from past performance to self-efficacy was significant; however, the direct path from computer self-efficacy to academic performance was insignificant. An examination of the computer self-efficacy and academic performance variable mean scores (see Table 1) indicates that participants were over-confidence about their ability to perform in an information technology course. Often students arrive in introductory information technology courses with inaccurate perceptions about their knowledge and abilities. Perceived competencies that over- or underestimate assessed performance may reveal a lack of self-knowledge. The inability to assess computer self-efficacy beliefs accurately frequently creates an academic performance disparity (Bandura, 1997). Self-assessment measures throughout the curriculum can help students accurately measure their level of confidence and competence. Efficacy appraisals will help students develop accurate self-knowledge regarding their capabilities.

Consistent with theory, the findings suggest that past performances and computer self-efficacy (confidence) influences academic performance via the establishment of an academic goal. According to Lent, Brown, and Hackett (1994) goals may be the determining factor in activity engagement and performance accomplishments. In addition, social cognitive career theory posits that the quality of performance attained may partly depend on the objective of one's academic goal. Goal setting may contribute to improved performance if they are realistic and accompanied by appropriate behavior (Lent, Brown, & Hackett, 1994; 1996). Encouraging students to establish an initial grade goal and providing feedback about the self-assessment measure may heighten their level of academic performance. Instructors should periodically revisit academic goals throughout the course, and modify them according to progress.

Evaluation of the path model reveals that academic performance when influenced by academic grade goal was significant. According to social cognitive career theory, goals are

exceptionally important in governing performance attainment. Based on previous experience with information technology, students often enroll in introductory information technology courses with the impression that computer-mediated assignments are easily accomplished. They, therefore, expend only a minimal effort to achieve excellence. Goal setting may help students pursue excellence and concentrate on attaining quality performance levels (Schunk, 1989). Although goals do not ensure effective performance, they can help regulate one's performance behavior (Lent et al., 1994).

The model offered adequate fit to the data; however, outcome expectations did not produce a significant path to academic goal that subsequently affected academic performance as predicted by the model. Since the outcome expectation variable did not produce a significant path as outlined by social cognitive career theory, this warrants further refinement of the technology outcome expectation measurement. In addition to measurement revisions, future administration of the technology outcome expectations scale may require a thorough explanation that provides clarification of the variable. Although outcome expectations failed to provide a significant path to academic goal, the overall findings suggest that past performance, computer self-efficacy, and outcome expectations are related and that academic goal influences academic performance.

Further exploration of the model has practical implications for practice. Instructional practices that examine the impact of the social cognitive career theory variables in a technology-based learning environment may lead to valuable information that helps explain academic behaviors. Courses designed to develop and advance information technology concepts may benefit from assessing students' previous experiences with technology and efficacy percepts. Instructors should share assessment results with students to heighten awareness and help remedy academic disparities. Awareness may help student formulate a realistic appraisal of efficacy perceptions and ability. In conjunction with past performance and computer self-efficacy assessment, students should be encouraged to set an academic grade goal, understand the consequences of their academic

behavior, and expend the effort necessary for academic success.

Using social cognitive career theory to understand academic performance, educators can enhance students' learning experience. Information technology education that incorporates data acquired about past performance, computer self-efficacy, outcome expectations, and academic goals into the curriculum may help students improve their individual academic performance.

## References

- Arbuckle, J. L. (1997). Amos 3.6. Chicago, IL: SmallWaters Corporation.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191-215.
- Bandura, A. (1986). *Social foundation of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 1-45). Cambridge, England: Cambridge University Press.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman and Company.
- Bentler, P. M. (1980). Multivariate analysis with latent variables: Casual modeling. *Annual Review of Psychology*, *31*, 419-456.
- Bentler, P. M. (1983). Some contributions to efficient statistics in structural models: Specifications and estimation of moment structures. *Psychometrika*, *48*, 493-517.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238-246.
- Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *19*(2), 189-211.
- Fennema, E., & Sherman, J. A. (1976) Fennema-Sherman Mathematics Attitudes Scale: Instruments designed to measure attitudes toward the learning of mathematics by females and males. (Ms. No. 1225). *JSAS: Catalog of Selected Documents of Psychology*, *6*, 31.
- Gainor, K. A., & Lent, R. W. (1998). Social cognitive expectations and racial identity attitudes in predicting the math choice intentions of black college students. *Journal of Counseling Psychology*, *45*(4), 403-413.
- Hackett, G., Betz, N. E., Casas, J. M., & Rocha-Singh I. A., (1992). Gender, ethnicity, and social cognitive factors predicting the academic achievement of students in engineering. *Journal of Counseling Psychology*, *39*(4), 527-538.
- Hair, J. E., Anderson, R. E., Tatham, R. L., & Black W. C. (1998). *Multivariate data analysis*. (5<sup>th</sup> ed.). Upper Saddle River, NJ: Prentice-Hall.
- Hill, T., Smith, N. D., & Mann, M. F. (1987). Role of efficacy expectations in predicting the decision to use advanced technologies: The case of computers. *Journal of Applied Psychology*, *72*(2), 307-313.
- Jinks, J., & Morgan, V. (1999). Children's perceived academic self-efficacy: An inventory scale. *Clearing-House*, *72*(4), 224-230.
- Joo, Y. J., Bong, M., & Choi, H. J. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and internet self-efficacy in web-based instruction. *Educational Technology Research and Development*, *48*(2), 5-17.
- Lapan, R. T., Shaughnessy, P., & Boggs, K. (1996). Efficacy expectations and vocational interests as mediators between sex and choice of math/science college majors: A longitudinal study. *Journal of Vocational Behavior*, *49*, 277-291.
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, *45*, 79-122.
- Lent, R. W., Brown, S. D., & Hackett, G. (1996). Career development from a social cognitive perspective. In D. Brown & L. Brooks (Eds.), *Career choice and development* (pp. 373-421). San Francisco, CA: Jossey-Bass Inc.
- Lent, R. W., Brown, S. D., & Hackett, G. (1999). A social cognitive view of school-to-work transition. *The Career Development Quarterly*, *48*, 297-304.
- Lent, R. W., Brown, S. D., & Larkin K. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. *Journal of Counseling Psychology*, *33*(3), 265-269.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1984). Relation of self-efficacy expectations to academic achievement and persistence. *Journal of Counseling Psychology*, *31*(3), 356-362.
- Loehlin, J. C. (1992). *Latent variable models: An introduction to factor, path and structural analysis* (2<sup>nd</sup> ed.). Hillsdale, NJ: Erlbaum.
- Lopez, F. G., Lent, R. W., Brown, S. D., & Gore, P. A. (1997). Role of social-cognitive expectations in high school students' mathematics-related interest and performance. *Journal of Counseling Psychology*, *44*(1), 44-52.

- Schunk, D. H. (1989). Social cognitive theory and self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement* (pp. 83-110). New York: Springer-Verlag, Inc.
- Schunk, D. H. (1994). Self-regulation of self-efficacy and attribution in academic settings. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 75-99). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. (3<sup>rd</sup> ed.). New York: Harper Collins College Publishers, Inc.
- Torkzadeh, G., & Koufteros, X. (1994). Factorial validity of a computer self-efficacy scale and the impact of computer training. *Educational and Psychological Measurement*, 54(3), 813-821.

Material published as part of this journal, either on-line or in print, is copyrighted by the Organizational Systems Research Association. Permission to make digital or paper copy of part or all of these works for personal or classroom use is granted without fee provided that the copies are not made or distributed for profit or commercial advantage AND that copies 1) bear this notice in full and 2) give the full citation. It is permissible to abstract these works so long as credit is given. To copy in all other cases or to republish or to post on a server or to redistribute to lists requires specific permission and payment of a fee. Contact Donna Everett, [d.everett@moreheadstate.edu](mailto:d.everett@moreheadstate.edu) to request redistribution permission.