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The Changing Nature of IT Career Determinants: A Two-Year Longitudinal Study

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ABSTRACT

Although enrollment in information technology has increased, it cannot match the growth of the IT labor market with more students needed to enter into the IT field to fulfill demand. This research follows high school students for two years regarding the choice of IT as a college major using the lens of social cognitive career theory (SCCT) to better understand career decision-making over time. Self-efficacy, interest, and intent to major relationships are examined both cross-sectionally and longitudinally. Findings show that IT self-efficacy has a significant positive effect on interest and intent to major respectively and interest in IT has a significant positive effect on intent to major in IT. These are consistent with previous research in SCCT. Contrarily, only IT self-efficacy increases over time, while intent to major decreases during this same two-year time period.

Keywords

Social cognitive career theory, longitudinal, career choice

INTRODUCTION

The challenge of filling job vacancies in science, technology, engineering, and math (STEM) is still an issue (Babin et al. 2010; Lent et al. 2008; Luse et al. 2016; Luse et al. 2014; Ryan 2023). America needs to boost STEM education to fill the demand for 3.5 million STEM jobs by 2025 (C. 2022; Lazio and Jr 2019) otherwise, it is likely to not have enough workers with needed and professional skills and knowledge (Luse et al. 2016).

Social Cognitive Career Theory (SCCT) widely applies career development to understanding how to influence occupational interests and choices (Lent 2000) through intricate reciprocal links among person, environment, and behavioral variables (Lent et al. 1994). Most previous research has tested this theory with students in the STEM field cross-sectionally (Burga et al. 2020; Heinze and Hu 2017; Navarro et al. 2007) but a greater understanding on the longitudinal impacts of intervention programs designed to influence individual career decisions to choose IT as a major in the college is needed.

This study focuses on measuring interests and IT self-efficacy on individual intent to choose a major in IT by utilizing the SCCT model and examining these core concepts over time with 43 students across 40 different high schools for 2 years. Results reveal that initial cross-sectional relationships are consistent with previous research (Flores and O'Brien 2002; Heinze and Hu 2017; Rottinghaus et al. 2003). Longitudinally, we find that self-efficacy increases stably but interest does not. Interesting to know that intent to major actually decreases over this same two-year period. This study contributes to the application of SCCT in the IT domain for longitudinal impacts in early career development.

BACKGROUND

Social cognitive career theory is used to understand how people choose their careers and predict their career behavior (Lent et al. 1994). This theory is developed from Bandura's general social cognitive theory (Bandura 1986) which stresses the dynamic interactions of individual, behavioral, and environmental factors (Lent et al. 1994; Lent et al. 2008; Luse et al. 2014). SCCT acknowledges that people have the ability to control their own professional behavior, but it also takes into account external environmental and psychological factors that are likely to support or undermine this ability in career development (Lent et al. 1994; Luse et al. 2014).

SCCT contains three interconnected models: 1) interest model; 2) choice model; and 3) performance model (Lent and Brown 2019; Lent 2000). All of these models contain the core concepts of self-efficacy and outcome expectation with different

outcome variables relying on these three socio-cognitive mechanisms (Burga et al. 2020; Luse et al. 2014). The outcome variables in each mechanism are intentions in the interest model, choice goals in the choice model, and performance goals in the performance model (Lent et al. 1994). Since the interest model is built upon the choice model (Lent and Brown 2019) and the two models overlap for core concepts, we use the choice model of SCCT to scrutinize self-efficacy, interest, and intention to major (Luse et al. 2014).

The choice model in SCCT has self-efficacy, interest, and choice goals (intent to major in this study) (Lent et al. 1994; Lent et al. 2008). In the context of IT, IT self-efficacy refers to a belief that individuals have the ability to perform an IT task successfully (Bandura 1986; Luse et al. 2014; Scheibe et al. 2007). Interest in IT represents that people enjoy IT activities or subjects (Luse et al. 2014). Intent to major is when students intend to perform some actions (Lent et al. 2015), such as choosing IT as their major (Rursch and Luse 2019). Based on previous research, SCCT widely applies to measure each concept through cross-sectional studies (Lent et al. 2015; Rursch and Luse 2019). Individuals with higher self-efficacy are likely to develop interests in IT (Lent and Brown 2019). Since they believe they are good at the tasks in an area and have good performance in each activity, they are more likely to have interest to pursue or choose to do the same thing. In empirical studies, self-efficacy is found to have a positive relationship with interest (Flores and O'Brien 2002; Rottinghaus et al. 2003) and intention to choose IT as a major (Heinze and Hu 2017; Navarro et al. 2007). In addition, interest is seen as a strong predictor of choice of future career goals (Brown and Brooks 1990). Interest in a field, such as programming, has been associated with a future major in IT (Babin et al. 2010). Given this information, we hypothesize the following cross-sectional relationships:

Hypothesis 1: The initial level of IT self-efficacy will influence the initial level of interest in IT.

Hypothesis 2: The initial level of IT self-efficacy will influence the initial level of intent to major.

Hypothesis 3: The initial level of interest in IT will influence the initial level of intent to major.

Previous research focused on the one-time impact of SCCT; However, SCCT emphasizes the dynamic impacts on a focal individual from context and environment (Lent et al. 1994; Lent 2000). The three core concepts of SCCT, self-efficacy, interest, and intent to major, might change over time individually in a certain condition, such as through training programs. Self-efficacy is relatively dynamic in particular activity domains (Lent et al. 1994) with individual beliefs changing dependent on performance and other socio-contextual elements driving career goals (Burga et al. 2020; Lent et al. 1994; Valcour and Ladge 2008). When students have more experience in IT through an educational program, their IT self-efficacy is likely to increase due to an increase in confidence performing IT tasks (Luse et al. 2013).

Interest is also dynamic as more positive experience with IT leads to greater interest (Brown and Brooks 1990). Moreover, students having more experience in a certain area might intend to choose to pursue a career in that area (Belchior and Lyons 2021; Lent et al. 2015). For example, students with strong coding skills might choose computer science as their major in college. Given this information, we hypothesize:

Hypothesis 4: As students gain more experience in IT, they will show an increase in IT self-efficacy.

Hypothesis 5: As students gain more experience in IT, they will show an increase in interest in IT.

Hypothesis 6: As students gain more experience in IT, they will show an increase in intention to major in IT.

Figure 1 shows the research model with the proposed hypotheses, where level corresponds to initial cross-sectional levels for each variable and slope corresponds to change in levels for each variable over time.

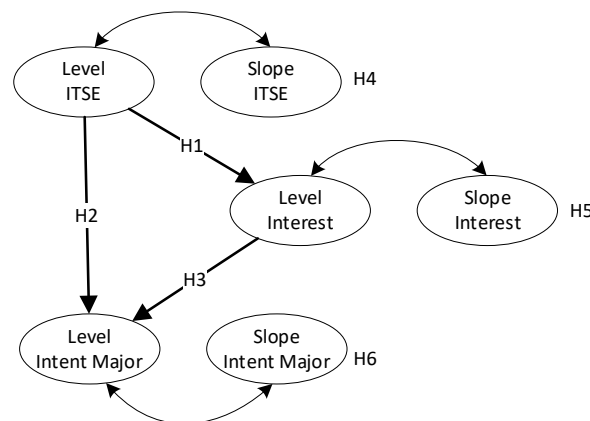


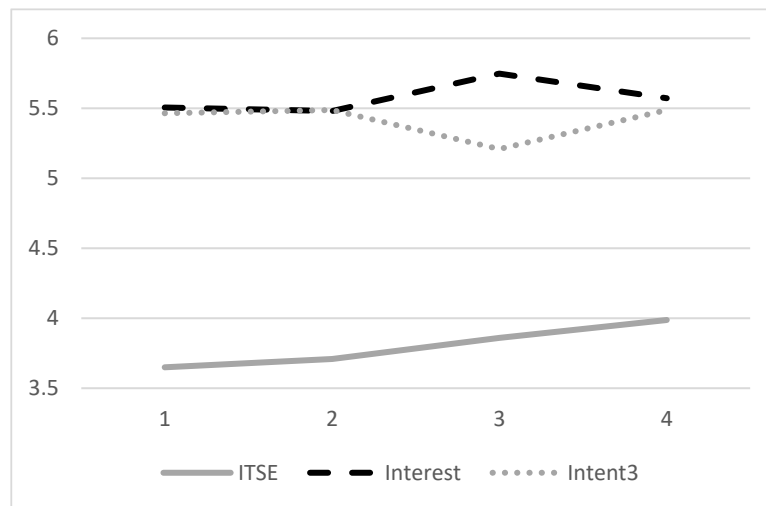
Figure 1. Research model**DATA COLLECTION**

Participants consisted of 43 high school students who participated in a program for increasing interest in IT majors from across a Midwestern state (Rursch et al. 2009). The program contained educational programming, service-learning projects, and competitive events to explore IT in the areas of cyber defense, game design, and robotics utilizing technology systems from previous research (Luse et al. 2021; Luse and Rursch 2021). The program aimed to enhance understanding and enthusiasm for IT and increase enrollment in IT-related post-secondary education to address future needs in the IT industry. Online surveys were emailed to students both in the fall, after initial enrollment in the program, and spring, after the conclusion of the program. The purpose of this study was to assess the multi-year impact of those who participated in the program. Over a two-year period, students were surveyed four separate times, at the beginning and end of each academic year.

RESULTS

The sample consisted of 43 students measured at four separate time points, totaling 172 measurements. Questions measuring the three constructs of IT self-efficacy, interest in IT, and intent to major in IT were utilized from previous research (Luse et al. 2014) based on best practices of task-based assessment (Davazdahemami et al. 2018). Cronbach alpha values at all four measurement times were found to be high for both ITSE (0.89, 0.85, 0.85, 0.84) and interest (0.86, 0.82, 0.84, 0.88), with intent to major in IT measured using a single item.

Growth curve modeling was used to test the research, allowing examination of both the cross-sectional impact of the exogenous variables on the endogenous variables (H1-H3), and the longitudinal slope of each variable over time (H4-H6) (Luse et al. 2013). Results show that the initial level of ITSE has a significant positive effect on the initial level of interest ($\beta = 0.64$, $p < 0.001$),¹ supporting H1. The initial level of ITSE also has a significant positive effect on intent to major ($\beta = 0.26$, $p = 0.040$), supporting H2. Furthermore, the initial level of interest has a significant positive effect on intent to major ($\beta = 0.66$, $p < 0.001$), supporting H3. Examining the longitudinal relationships, there is a significant increase in the level of ITSE over time (mean = 0.48, $p = 0.029$), supporting H4. Conversely, there is no significant increase in the level of interest over time (mean = -0.24, $p = 0.616$), not supporting H5. While there is a significant change in intent to major over time (mean = -0.50, $p = 0.042$), the change is decreasing, contrary to H6. Figure 2 shows the mean trajectories of each of the three variables over each of the four-time points.

**Figure 2. Longitudinal impact****DISCUSSION**

It is important to satisfy the demand of the job market for the IT industry by encouraging more students to choose an IT-related field as their major. Interacting with high school students in their early career development can increase the possibility of opportunities to major in IT areas (Babin et al. 2010). This study builds on previous research using SCCT in IT (Luse et al.

¹ All regression betas displayed are standardized. One-sided tests were used, given the directional hypotheses.

2016; Luse et al. 2014; Rursch and Luse 2019) and extends previous findings investigating why students choose to major in IT and the change in self-efficacy, interest, and intent to major over time by examining cross-sectional and longitudinal impacts in the choice model of SCCT.

Our research reveals that IT self-efficacy has a significant positive effect on interest and intent to major separately and interest in IT has a significant positive effect on intent to major in IT before the program starts, which are consistent with previous research of cross-sectional studies in SCCT (Flores and O'Brien 2002; Heinze and Hu 2017; Luse et al. 2014). Consequently, to measure the longitudinal impact of the three concepts, our results show that IT self-efficacy steadily increases over time. By completing more IT tasks successfully, students have more confidence to perform these tasks. Conversely, interest does not change while intention to major significantly decreases over time. It is interesting to see in Figure 2 that this fall in intent to major takes place in timepoint three. It is possible that when students gain more understanding about IT, they might know what they really like or dislike and might have more thoughts and plans for their career development. This needs to be investigated further in future research.

In addition, post hoc analyses show that the slope of IT self-efficacy positively affects the slope of interest ($\beta = 1.43$, $p = 0.030$) whereby the greater the *increase* in IT self-efficacy, the greater the *increase* in interest in IT. This implies that concentrating on increasing student self-efficacy can have a correspondingly greater increase in interest. Moreover, post hoc analysis also shows the initial level of interest has a positive effect on the slope of intent to major ($\beta = 0.60$, $p = 0.043$), implying an accelerating effect in this relationship. Students with a high level of interest in IT at the start of the program are more likely to increase their intention of choosing IT as a major over time. For students who are predisposed, the program is more likely to *increase* their intention to major. Overall, this study contributes to understanding the longitudinal impacts of students in early career development in information technology. Greater research is needed to better understand the directional nature of these impacts.

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