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# The Influence of Role Models on Students' Decisions to Pursue the IS Major

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## ABSTRACT

The purpose of this study was to understand the influence of role models on students' decisions to major in Information Systems (IS). Based on social cognitive career theory, we derived and tested a theoretical model to explain how role models influence students' academic choices. Results indicate that role models do not have a direct effect on students' aspirations to major in IS. The effects of role models on academic choices are channeled indirectly through other factors. More specifically, role models boost students' confidence in their own abilities to successfully perform as an IS major and raise their expectations of the positive outcomes that will be received by majoring in this discipline. Encouragement and stimulation from role models also inspire students to be inquisitive about IS majors and careers, which in turn elevates students' aspirations to pursue the IS major. Implications for theory and practice are discussed.

## Keywords

IS Careers, IS Enrollments, Majors, Role Models

## INTRODUCTION

According to career theorists, identification with role models is critical to individuals' career development and success (Quimby and DeSantis, 2006). In addition to the scholarly view, in the popular press career success is often attributed to having good role models, whereas the lack of role models has been identified as a significant barrier to career development (Gibson, 2004). Research has found a relationship between role model influence and a variety of occupational outcomes including; career salience, career maturity (Flouri and Buchanan, 2002), career indecision (Nauta and Kokaly, 2001; Perrone et al., 2002), attitudes toward non-traditional careers (Savenye, 1992; Greene et al., 1982), and career choices (Hackett et al., 1989). However, relatively less is known about the direct and indirect effects of role models on educational decision making process (Quimby and DeSantis, 2006).

Understanding the specific ways in which role models influence educational decisions constitutes an important area of research particularly for the Information Systems (IS) community. Over the last decade, concerned with the negative consequences of low enrollments, IS community has focused its efforts on (1) identifying the factors that influence students' interest in and choice of IS majors and careers, and (2) implementing different mechanisms to increase student enrollments (Dick et al., 2007; Firth et al., 2008; Joshi and Khun, 2011; Koch et al., 2010; Looney and Akbulut, 2007). As a part of these efforts, researchers have turned their attention to understanding how certain environmental support factors (e.g., effective teachers, innovative technologies, social support, existence of role models, etc.) influence academic interests and choices.

Despite its intuitive appeal, no evidence to date has empirically investigated the relationship between perceived role models and student academic choices in the IS discipline. Moreover, a theoretical model has yet to be put forth that explains the means by which role models influence students' decisions to major in IS. Understanding these mechanisms has important implications for explaining, predicting, and modifying student choice behaviors so that larger pools of students can be attracted to the IS discipline. Therefore; the purpose of this study is to explain how and why a key environmental support factor that has been repeatedly mentioned in the literature, role models, influences major selection in the IS discipline.

The remainder of this paper is organized as follows. The next section provides a brief overview of the underlying theory base. A research model and a set of hypotheses are then put forth. The research methodology is outlined and results are presented. The paper also includes a discussion of the findings and implications.

## THEORETICAL BACKGROUND

This study utilizes Social Cognitive Career Theory (SCCT), which was developed in the vocational psychology literature to integrate and extend the previous research on career development (Lent et al., 1994). SCCT represents a set of personal, environmental, and behavioral variables that influence academic and career choice behaviors over time. Utilizing SCCT, Akbulut and Looney (2007) derived the IS Major Choice Goals Model that describes the core factors affecting student decisions to major in IS. Even though this Model provides an explanation of the main factors (self-efficacy, outcome expectations, and interest) that motivate students to choose a major in the IS field, it does not incorporate all the factors that could potentially influence students' major or career decisions. Moreover, similar to the original SCCT, this model does not include any environmental factors. This is a major limitation, as individuals do not make educational or occupational choices in a vacuum. Recent research indicates that the environment might have important effects on the students' attitudes toward an IS major (Joshi and Kuhn, 2011). This current study extends the IS Major Choice Goals Model by including an environmental support factor, role models. The environmental, personal, and behavioral components of the model are discussed below.

*Environment:* Environment refers to the forces beyond an individual's boundaries (Bandura, 1986). When making educational choices, individuals are affected by environmental circumstances. Career development researchers have identified several environmental factors that individuals perceive as aiding their efforts to implement particular educational or occupational goals (Lent et al., 2005). While there are many important environmental support factors to consider, this study focuses on role models in steering students toward the IS major.

A *role model* is defined as a person in an influential role position, such as a parent, teacher, manager, or leader, who provides an example for other individuals to imitate (Erikson, 1985). Role models usually occupy socially important positions and distinguish themselves in a way that they are admired and considered worthy of emulation by other people. Role models can facilitate academic career development through their support and guidance as well as through the degree to which they provide inspiration and behavioral modeling (Nauta and Kokaly, 2001). According to identification theories, individuals tend to seek role models based on the similarities they perceive in terms of attitudes, behaviors, goals, or a desired status position. Individuals are motivated to enhance these similarities through observation and imitation. According to social learning or modeling theories, people turn to role models because they can prove helpful in learning new tasks, skills, and norms (Bandura, 1986). Identification theories focus more on the motivational and self-definitional aspects of role models, whereas modeling theories focus more on the learning aspects. Accordingly, role models offer individuals a way to refine their developing identities by providing them an image of a person they would like to become (Gibson, 2004). In this respect, role models serve as exemplary figures offering essential clues not only for individual growth and development but also for academic and career achievement (Gibson, 2004; Quimby and DeSantis, 2006). Therefore, role models are expected to play an influential role in student psychology and behavior in the context of IS major choices.

*Person:* Individuals bring a set of abilities, expectations, histories, emotions as well as cognitive resources to deploy when interacting with the environment. IS Major Choice Goals Model focuses on three key personal factors including self-efficacy, outcome expectations, and interests (Lent et al., 1994).

In the context of this study, *self-efficacy* is defined as an individual judgment of one's capability to perform effectively as an IS major. Self-efficacy provides individuals with a set of beliefs regarding their capabilities to exercise control over their actions and the environment. IS research suggests that self-efficacy plays a critical role when one interacts with information technologies (Agarwal et al., 2000; Compeau and Higgins, 1995).

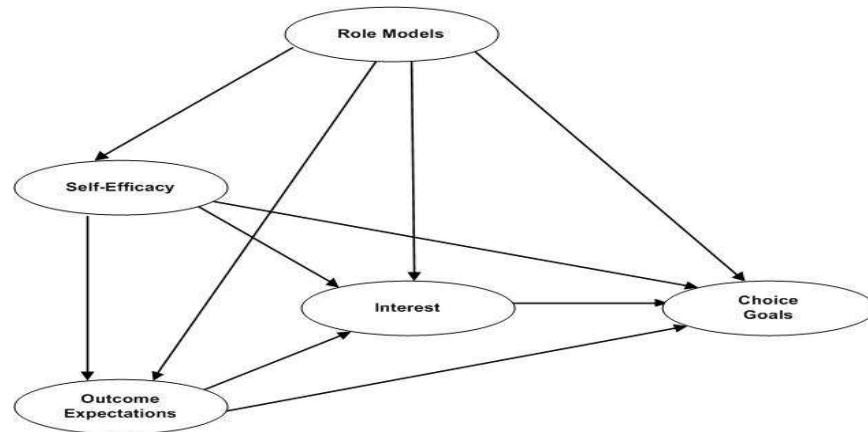
*Outcome expectations* refer to the perceived likelihood that valued rewards will be received as a result of pursuing an IS major. Outcome expectations can take three major forms: (a) physical (e.g., job security), (b) social (e.g. recognition), and (c) self-evaluative (e.g., sense of accomplishment) (Bandura, 1986).

*Interest* refers to an emotion that arouses attention to, curiosity about, and concern with a particular educational path (Lent et al., 1994). Even though individuals may try out and pursue many different activities throughout their formative years, they ultimately develop distinctive patterns of academic and career interests, as certain activities differentially intrigue people to varying degrees over time (Bandura, 1986; Lent et al., 1994). In this study, the target of interest specifically focuses on majoring in IS.

*Behavior:* In the context of career-related choices, the behavior in question is operationalized as choice goals, which can be defined as the determination to engage in a particular educational or occupational activity (Bandura, 1986). Specific to this study, *choice goals* refers to a student's aspirations to choose IS as a major. Goals play an important role in decision making theories, including career choice decisions. In this respect, career plans, aspirations, and expressed choices are considered as goal mechanisms (Lent et al., 1994).

## RESEARCH MODEL AND HYPOTHESES

Based on the above discussions, the research model illustrated in Figure 1 is developed. The model posits that role models, self-efficacy, outcome expectations, and interests are expected to independently and cumulatively affect choice goals. The following sections describe the hypotheses development.



**Figure 1: Research Model**

According to SCCT, role models serve as environmental support factors that have a direct effect on career choices (Lent et al. 2005). Research has shown that individuals will be more determined to be engaged in a particular course of action when they are exposed to role models participating in those activities. Specifically, research has found that students who had observed a successful role model in a particular career were more likely to report a preference for pursuing the same career (Scherer et al. 1991). As such, it is reasonable to assume that students would be more determined to select a major in the IS field if they were exposed to role models in this field. Therefore, the following hypothesis is offered:

*H<sub>1</sub>: Role models will have a significant positive influence on choice goals.*

Discussing the interplay among personal and environmental factors, Bandura (1999) stated that most of the environmental factors tend to affect human behaviors through intermediary self-processes rather than directly. Along these lines, Lent et al. (2005) suggested that environmental factors may indirectly affect choice behaviors through personal factors (i.e. self-efficacy, outcome expectations, and interest).

Specific to interest, identification with role models may promote student interest in a particular subject, as role models can expose students to a wide variety of relevant topics, activities, and advice, which may encourage students to become more inquisitive. Therefore, the following hypothesis is offered:

*H<sub>2</sub>: Role models will have a significant positive influence on interests.*

Through their behavior and expressed ways of thinking, role models can transmit knowledge and skills to individuals. In terms of self-efficacy; observing role models succeed in a particular major and/or career can strengthen students' beliefs in their own abilities. By the same token, observing others' failures can lower students' judgments of their own efficacy. The more students relate to the model being observed, the more likely the model's performance will have an impact on them. As such, students who are surrounded by role models that they can look up to and emulate are more likely to develop higher levels of confidence in their own abilities to perform as an IS major. Therefore, the following hypothesis is offered:

*H<sub>3</sub>: Role models will have a significant positive influence on self-efficacy.*

Similarly, role models may promote outcome expectations. Role models might provide information and examples about the consequences that may occur as a result of pursuing an IS major. When students perceive that other people who are similar to them or people that they admire have received certain positive outcomes a result of pursuing a major or career in IS, they tend to believe that they are more likely to obtain similar rewards as well. Therefore, the following hypothesis is offered:

*H<sub>4</sub>: Role models will have a significant positive influence on outcome expectations.*

The remaining hypotheses are put forth based on the original IS Major Choice Goals Model (Akbulut and Looney, 2007). The development of these hypotheses is summarized below.

The relationship between self-efficacy and outcome expectations has been repeatedly studied in the IS literature (Compeau and Higgins, 1995; Compeau et al., 1999). People expect to achieve desirable outcomes in activities at which they deem themselves as capable. Therefore, it is reasonable to assume that students who have higher levels of self-efficacy will develop robust outcome expectations.

*H<sub>5</sub>: Self-efficacy will have a significant positive influence on outcome expectations.*

Perceptions of self-efficacy play an important role in the formation of educational and vocational interests and behaviors. People tend to form enduring interests in activities in which they view themselves as capable (Lent et al., 1994). Therefore, students with higher levels of self-efficacy will be more interested in pursuing majors and careers within the field of IS. The following hypothesis is offered:

*H<sub>6</sub>: Self-efficacy will have a significant positive influence on interest.*

Self-efficacy beliefs are also assumed to have direct effects on choice goals. When high self-efficacy prevails, individuals are more likely to set goals to engage in a particular behavior (Bandura, 1986). As such, students who are confident in their abilities to perform as an IS major would be more likely to develop aspirations to major in the IS field. Therefore, the following hypothesis is offered:

*H<sub>7</sub>: Self-efficacy will have a significant positive influence on choice goals.*

Similar to self-efficacy, an individual's expectations about the consequences of pursuing educational and vocational paths shape interests (Lent et al., 1994). In essence, when a student expects pursuing a major or career in the IS field will result in favorable outcomes (high salary, job security, sense of accomplishment, etc.), he or she will be more likely to find that IS field compelling and develop an interest. Therefore, the following hypothesis is offered:

*H<sub>8</sub>: Outcome expectations will have a significant positive influence on interest.*

Outcome expectations can also affect choice goals directly. People develop goals, in part, based on the rewards they expect to receive. The higher the likelihood of obtaining valued outcomes by pursuing an IS major, the more likely that students will be determined to select IS as their major. Therefore, the following hypothesis is offered:

*H<sub>9</sub>: Outcome expectations will have a significant positive influence on choice goals.*

In addition to self-efficacy and outcome expectations, interest will influence choice goals. People tend to select academic and career options that match their primary interests (Holland, 1985). Emergent interests lead to cognized choice goals for further activity exposure, fostering the development of goals to choose particular actions (Lent et al., 1994). Therefore, students who are interested in the IS field will be more determined to major in the IS discipline.

*H<sub>10</sub>: Interest will have a significant positive influence on choice goals.*

## RESEARCH METHOD

Given the objectives of the study, the survey methodology was utilized to collect the data and test the research model. The sample consisted of students enrolled in different sections of an introductory level Management Information Systems course at the business school of a large state university located in the United States. Participation in the study was voluntary and participating students received extra credit as an incentive. A web-based survey was administered during the last week of classes, as the course provided most students a preliminary introduction to the IS discipline. A total of 318 usable responses were obtained. Forty five percent of the respondents were female and respondents averaged 21.4 years of age ( $SD = 2.14$ ).

Role models scale consisted of 5 items. This scale was adapted from Quimby and DeSantis (2006) was subjected to rigorous pre-testing in separate studies. The response format consisted of a 7-place Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). The remaining items were derived directly from the previously validated IS Major Choice Goals scale (Akbulut and Looney, 2007). Self-efficacy was measured using six items with a response format consisting of an 11-place Likert-type scale ranging from 0% (cannot do) to 100% (certain can do). Outcome expectations scale included ten items, with a response format consisting of an 11-place Likert-type scale ranging from 0% (will never occur) to 100% (will

always occur). Interest and choice goals were measured using five and four items respectively, with a response format consisting of a 7-place Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree).

### Data Analysis

The research model was assessed by using Partial least squares (PLS), a component-based structural equations modeling technique. PLS Graph Version 3.0 (Chin, 2003) was used.

#### Measurement Model Analysis

First, the reliability of each construct was examined. Cronbach's alpha coefficients and composite reliabilities were calculated to assess internal consistency reliability (Nunnally, 1978). Both reliabilities exceeded the generally agreed upon lower limit of 0.70 (Fornell and Larcker, 1981; Nunnally, 1978) and the reliability of the scale was confirmed (See Table 1).

Construct	No. Items	Avg. Item Scores		$\alpha$	CR	AVE	Constructs					
		<i>M</i>	<i>SD</i>				CG	INT	OE	SE	RM	
CG	4	2.881	1.579	0.979	0.984	0.940	<b>0.970</b>					
INT	5	4.369	1.339	0.950	0.961	0.833	0.691	<b>0.913</b>				
OE	10	8.061	1.858	0.967	0.972	0.779	0.337	0.510	<b>0.883</b>			
SE	6	5.868	2.111	0.974	0.979	0.885	0.487	0.515	0.416	<b>0.941</b>		
RM	5	4.384	1.184	0.908	0.932	0.733	0.319	0.446	0.377	0.361	<b>0.856</b>	

*Note:* Diagonal elements in bold represent the square root of the average variance extracted (AVE). Off-diagonal elements represent the correlations among constructs.

*M* = mean average item score (unweighted). *SD* = average item score standard deviation.  $\alpha$  = Cronbach's alpha. CR = composite reliability. AVE = average variance extracted. CG = choice goals, INT = interest, OE = outcome expectations, SE = self-efficacy, RM = role models.

**Table 1. Descriptive Statistics, Reliability, Correlations, and Discriminant Validity**

Convergent validity was assessed at the individual item and construct levels (Fornell and Larcker, 1981; Gefen et al., 2000). As shown in Table 2, all individual item loadings exceeded the 0.707 recommended level; indicating that the items converged adequately on their intended constructs. No undesirable cross-loadings emerged. Additionally, average variance extracted (AVE) values for each construct exceeded the recommended threshold value of 0.50, confirming the convergent validity of the items and constructs (see Table 1).

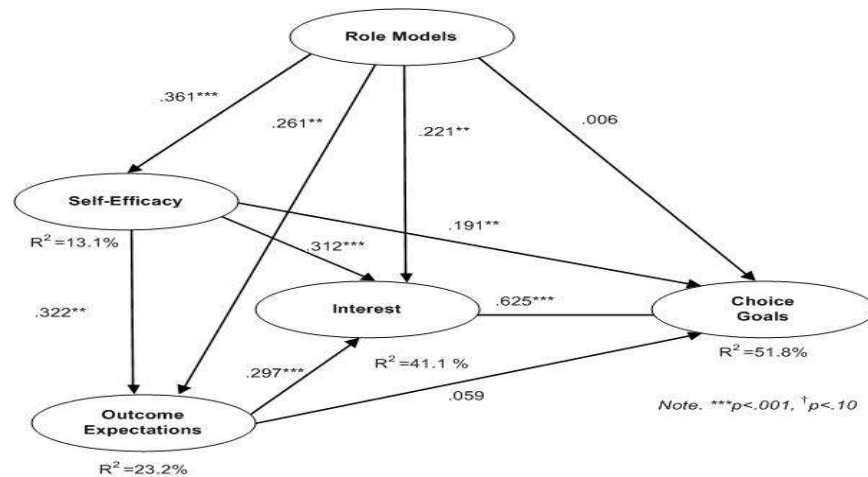
Construct/Item	Loading	Construct/Item	Loading
<b>Choice Goals</b>	0.9634	<b>Interest</b>	0.9112
	0.9638		0.9502
	0.9744		0.9430
	0.9760		0.9306
			0.8212
<b>Outcome Expectations</b>	0.7335	<b>Self-efficacy</b>	0.9172
	0.8963		0.9349
	0.8993		0.9542
	0.9184		0.9462
	0.8509		0.9390
	0.8779		0.9529
	0.8987		
	0.9232	<b>Role Models</b>	0.8021
	0.9005		0.8664
	0.9125		0.9013
		0.8863	
		0.8207	

**Table 2. Constructs, Items, and Loadings**

Discriminant validity was assessed by comparing the square root of AVE associated with each construct (Table 1) to the correlations among constructs (Barclay et al., 1995; Fornell and Larcker, 1981). For each construct, the square root of AVE exceeded the correlations among different constructs. Therefore, discriminant validity was established. Combined with the strong evidence for reliability and validity, the psychometric properties of the measures were deemed satisfactory.

### Structural Model Analysis

The structural model was tested by estimating the path coefficients among constructs. Figure 2 represents the results of the structural model analysis.

**Figure 2. Results**

Role models was not a significant predictor of choice goals (0.006, *ns*). Therefore no support was offered for H<sub>1</sub>. As expected, role models was a significant predictor of interest (0.221,  $p < 0.01$ ). Therefore, hypothesis H<sub>2</sub> was supported. Similarly, role models was found to have a significant influence on student self-efficacy (0.361,  $p < 0.001$ ) and outcome expectations (0.261,  $p < 0.010$ ), supporting hypotheses H<sub>3</sub>, and H<sub>4</sub>.

In terms of the IS Major Choice Goals Model, self-efficacy was found to be a significant predictor of outcome expectations (0.322,  $p < 0.010$ ), interest (0.312,  $p < 0.001$ ), and choice goals (0.191,  $p < 0.010$ ). Therefore, hypotheses H<sub>5</sub>, H<sub>6</sub>, and H<sub>7</sub> were supported.

Outcome expectations was a significant predictor of interest (0.297,  $p < 0.001$ ), supporting hypothesis H<sub>8</sub>. Outcome expectations did not have a significant influence on choice goals (0.059, *ns*). Hypothesis H<sub>9</sub> was not supported. Finally, interest was found to be a significant predictor of choice goals (0.625,  $p < 0.001$ ), supporting hypothesis H<sub>10</sub>.

In terms of the model's explanatory power, the results indicate that the model explains a sizeable proportion of the variance in choice goals. Role Models, self-efficacy, outcome expectations, and interest cumulatively accounted for 51.8 percent of the variance in choice goals. Combined, role models, self-efficacy, and outcome expectations explained 41.1 percent of the variance in interest. Role models and self-efficacy together accounted for 23.2 percent of the variance in outcome expectations. Social support explained 13.1 percent of the variance in self-efficacy.

## DISCUSSION AND CONCLUSION

This study leveraged and extended the IS Major Choice Goals Model to understand the manner in which role models influence students' aspirations to choose IS as their primary field of study. More specifically, it confirmed the importance of exposing students to role models; and explained how and why role models affect student aspirations to major in IS.

Findings of this study indicate that perceived role models play an important role in student uptake. Role models not only enhances students' confidence in their ability to successfully perform as an IS major, but also elevates students' expectations that valued rewards will be received by majoring in IS. Moreover, role models directly and indirectly (through self-efficacy and outcome expectations) affect student interest. Encouragement and stimulation from role models inspire students to be inquisitive and pique their curiosity about IS majors and careers.

The results did not provide support for the direct effects of role models on choice goals. Regardless, role models still play an important role; as its effects on choice goals are channeled indirectly through self-efficacy, outcome expectations, and interests. Specifically, role models augment self-efficacy and outcome expectations, which in turn increase student interest. Along these lines, strong self-efficacy and outcome expectations foster student interest in the IS discipline. It was also found that self-efficacy leads to more robust outcome expectations. The results did not provide support for the direct effects of outcome expectations on choice goals. However, as opposed to the earlier findings of the IS Major Choice Goals Model, self-efficacy was found to have directly influence students' choice goals. Finally, findings also provided strong support for the positive relationship between interests and choice goals, confirming that interest serves as the primary mechanism through which goals to choose IS major emerges.

These findings have important implications for theory and practice. In a recent study Joshi and Khun (2011) emphasized the need for discipline-specific understanding of IS academic and career choices since so far relatively little empirical research has been conducted in this area. Moreover, the authors criticized the existing studies for not focusing on environmental factors, and added that students' social environment may have important implications in terms of their attitudes toward IS careers. In this respect, this study contributes to our understanding of the factors that shape students' interest and choice behavior in the IS domain by incorporating an environmental support factor.

In terms of practice, clearly, the findings suggest that role models, can and do influence students' desire to major in the IS field. Recent studies have mentioned that college students are unaware of the careers in the IS field and as a result IS tends to be a major that is often discovered accidentally (Joshi and Kuhn 2011, Firth et al. 2008). As such, in order to attract more students to the IS major; it is important for higher education institutions to expose students to IS role models. One way to increase students' acquaintance with IS role models would be through mentoring programs. Particularly incorporating job shadowing and small group mentoring programs would be a creative way to connect students with IS professionals. Boosting mentoring by IS professionals would increase the exposure of students to inspiring experiences. Inviting peers that hold IS internships and alumni who work as IS professionals as guest speakers provides another venue for students to see other people whom they can identify themselves with have excelled in the field of IS (Firth et al. 2008). Working with faculty members who are admired and considered as role models within and outside the classroom could also prove helpful. Other resources, such as the Internet and the WWW could also be used to expose students to role models. IS programs can create online communities where students, faculty, advisors, IS professionals and the like can ask and answer questions and share relevant information. Similarly, hardcopy and electronic materials can be used to present career role models as previous research suggests that individuals that are not personally known (such as historical or even fictitious characters) can serve as role models (Nauta, 2001). For example, IS programs could create a database to include information about successful IS professionals, such as Steve Jobs, and their experiences.

Of course, potential role models are not limited to IS professionals, faculty, alumni, or peers. Parents, siblings, and significant others have also been reported among the most influential role models (Nauta, 2001). As such, it may prove helpful to utilize media to impart a positive image of IS professionals, communicating the rewarding prospects of the profession, as well as the important role IS professionals play in the advancement of our society.

### **Limitations**

The study utilized a survey to examine the relationships among the variables in the model. Although the measures exhibited excellent levels of reliability and validity, it is possible that self-reported data could have inflated the relationships among the variables. Moreover, the study was conducted at a single university, limiting the generalizability of the findings. Future studies should utilize additional methods and samples to increase the generalizability of the findings.

Even though the current research model incorporated an important set of factors that could affect student choices; it was not possible to include all potential factors. In order to develop a more comprehensive understanding of how students are attracted to the IS discipline, additional factors needs to be considered and validated.

The current study did not differentiate among different types of role models. Future research should examine how different role models (IS professionals, professors, peers, parents, etc.) influence students' choice of the IS major. It is also important to note that even though this study focused on the positive aspects of role models, research indicates that negative role models can also have important influences on individuals' behaviors as well. Therefore, future studies could examine the potential effects of negative role models on students' decisions to major in IS.

This study focused only on college students. By the time students reach college, they might have already decided on what major and/or career to pursue. Therefore, at the college level, it might be too late to persuade them to major in IS. Future studies should focus on imposing to students IS roles models at earlier stages in their lives.



The study did not consider the role of gender. However, especially in nontraditional careers, such as IS, women typically have fewer role models. Future studies should investigate whether gender specific role models influence male and female students in different ways as well as the importance of various types of role models in academic and career development of women in the IS field.

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