The Impact of the Introductory IS Course on Students' Perceptions of IS Professionals

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ABSTRACT

Increasing the number of students pursuing Information Systems (IS) majors and careers is vital to the advancement of our knowledge-based economy. Literature suggests that one of the main reasons for students' lack of interest in IS has been the negative stereotypical image of IS professionals. Research has also emphasized that the introductory IS course plays a significant role in busting prevailing myths about the IS profession and in attracting larger pools of students to the discipline. Therefore, the purpose of this study was to understand students' perceptions of IS professionals before and after they were exposed to the IS field and careers through the introductory IS course. The findings suggest that students' image of IS professionals might not be as negative as previously thought. Furthermore, the study confirms the importance of the introductory IS course on how students view the IS field. The paper concludes with a discussion of the findings, implications, limitations, and future research directions.

Keywords: IS major, Introductory course, Student perceptions

1. INTRODUCTION

Information Systems (IS) workers play an influential role in our knowledge-based economy. However, despite a robust and growing job market, the demand for IS majors and careers across college students continues to be low (Li, Zhang, and Zheng, 2014). One of the main reasons cited for students' lack of interest in the IS discipline has been the negative image of IS professionals (Colvin, 2007; Firth, Lawrence, and Looney, 2008; Granger et al., 2007; Joshi and Kuhn, 2011; Lomerson and Pollacia, 2006; Zhang, 2007). Popular and academic literature indicate that students' stereotypical image of an IS professional is similar to that of a computer scientist, and students perceive IS professionals as computer nerds sitting in front of the computer all day long, doing mainly technical work. Furthermore, these studies posit that students are concerned about the nature of the IS work being too technical, difficult, boring, and antisocial (Firth, Lawrence, and Looney, 2008; Galletta, 2007; Harris et al., 2009; Lomerson and Pollacia, 2006). Other studies also refer to the gendered view of the IS profession and mention that female students have the perception that men, not women, prefer to pursue majors and careers in the IS field (Cory, Parzinger, and Reeves, 2006; Galletta, 2007; Zhang, 2007). These incorrect perceptions of IS professionals have been tied to students' lack of information about the IS profession and about the typical career opportunities available to IS professionals (Akbulut, 2009; Firth, Lawrence, and Looney, 2008; Lomerson and Pollacia, 2006).

Fortunately, research has also found that students' traditional negative stereotypes can be undermined if students inhabit local environments in which they are exposed to counter stereotypic roles (Dasgupta and Asgari, 2004). In this respect, at the college level, the introductory level IS course represents an excellent opportunity to clarify any misunderstandings students might have about IS professionals. Research has shown that if the content, instructors, and technologies used in introductory level IS courses are selected correctly, they might have a positive influence on how students view the IS field (Akbulut and Looney, 2007; Akbulut-Bailey, 2012; George, Valacich, and Valor, 2005; Granger et al., 2007). Therefore, the purpose of this study was to understand students' perceptions of IS professionals before and after they were exposed to the IS field and careers through the introductory IS course. More specifically we investigated the following research questions: (a) Do students hold strong stereotypic images towards IS professionals before they are formally introduced to the field of IS, and (b) Do students' initial perceptions of IS professionals shift after taking the introductory IS course and gaining more information about the nature of the IS field and potential career options? The remainder of this article is organized as follows. In the following section a discussion of the background literature is provided. Next, the research method is outlined and the results from the analyses are presented. The paper concludes with a discussion of the findings, implications, limitations, and future research directions.

2. BACKGROUND

Stereotypes are defined as cognitive structures containing the perceiver's generalized assumptions about the members of a particular group (Hamilton and Troiler, 1986; Wittenbrink, Gist, and Hilton, 1997). People use stereotypes to describe others, especially in unfamiliar situations. Stereotypes may involve positive or negative beliefs. They may be accurate or inaccurate regarding the average characteristics of the group (Dasgupta and Asgari, 2004; Leyens, Yzerbyt, and Schadron, 1994).

Understanding stereotypes is important because, as mentioned earlier, students' stereotypes of IS professionals might have an impact on their intentions to major in IS (Kuechler, McLeod, and Simkin, 2009; Nelson, 2014). According to domain identification theory, identification with a domain predicts an individual's likelihood of pursuing a job in that domain as well as his or her performance. In this respect, stereotypes about a particular domain may influence students' identification with that domain (Smith, Morgan, and White, 2005; Steele, 1997). Students assess their prospects in a particular domain, and their identification with that domain increases if the prospects of the domain are favorable and decreases if the prospects are unfavorable (Steele, 1997). Therefore, negative stereotypes about the IS profession may make it difficult for students to identify themselves with the IS domain and can cause them to shy away from pursuing a major in the discipline (Akbulut, 2009).

A review of the literature suggests that several studies have been conducted to capture the stereotypes of computer scientists. Most of these studies have focused on the under-representation of women in the discipline and investigated the perceptions of females only or compared the female and male students' views of computer professionals (Carter, 2006; Craig, Paradis, Turner, 2002; Margolis and Fisher 2003; Teague, 2002; Tjaden and Tjaden, 2000). These studies have found that the computer science (CS) profession is burdened by many, heavy negative stereotypes about the nature of the work these individuals do and the traits they possess. It has been assumed that similar stereotypes also exist in the IS field. While it is at times convenient to consider all the sub-fields of IT in the aggregate, because they share some common features, it is also necessary to disaggregate them into more specific fields (and sub-fields) for particular research and intervention purposes (Joshi and Schmidt, 2006; Lent et al., 2008). In this respect, considering the distinctions between the more technically oriented CS and more business oriented IS disciplines, there might be differences between the stereotypical images of CS and IS professionals. Therefore, generalizations from research findings in CS to IS (or the other way around) may result in flawed conclusions (Akbulut and Motwani, 2013; Beyer, 2008), necessitating studies that specifically focus on understanding students' perceptions of IS professionals.

A review of the academic and popular literature shows that most of the information available about IS stereotypes is anecdotal because so far only a limited number of studies have been conducted in this area. The first major study that specifically focused on understanding students' perceptions of IS professionals was conducted by Joshi and Schmidt (2006). The authors compared the perspectives of male and female undergraduate business students. They found that at the beginning of the semester, the stereotypical image of an IS professional was similar to that of a computer scientist. However, by the end of the semester, the study revealed that the students had developed a better understanding of the IS profession. Even though students still focused more on technical skills when describing IS professionals, they also acknowledged the importance of social, systems, and managerial skills. Joshi and Schmidt's study contributed greatly to our understanding of students' perceptions of IS professionals. However, the major limitation of the study was that students' perceptions were captured using qualitative methods (i.e. open ended questions). This method was the appropriate choice given the lack of accumulated knowledge about the subject and the exploratory nature of the study. Going forward, it is important for researchers to use quantitative methods to confirm and validate the findings of the study (Joshi and Schmidt, 2006).

In order to conduct such quantitative studies, researchers need sound instruments to measure IS stereotypes. However, until recently such instruments did not exist. Akbulut (2009) addressed this important research gap. The author conducted a study to understand whether the different types of IS stereotypes mentioned in the literature were empirically distinct factors, and whether strong, significant stereotypes existed along these factors. In order to achieve these objectives, the author generated an initial set of items that captured different dimensions of IS stereotypes reported in Joshi and Schmidt (2006), as well as in the CS literature. The author then conducted a series of empirical analyses. The findings revealed a psychometrically sound, five factor, 15-item instrument that measured IS stereotypes in terms of *geeks, gender*, *intelligence, managerial,* and *technical* dimensions. Then, the author examined the presence of stereotypes along each of these dimensions. The literature has generally assumed that IS professionals are viewed as geeks, mostly male, intelligent, technically oriented, and lacking managerial skills. The study uncovered that strong stereotypes existed along these dimensions. However, interestingly, most of the stereotypes were found to be in the opposite direction than the literature suggested. Students disagreed that IS professionals were geeks, that the IS profession was typically dominated by men, and that IS professionals were too technically oriented. They agreed that IS professionals possessed good managerial skills and were intelligent.

The major limitation of this study was that it captured students' perceptions at the end of the semester after they had been exposed to the field of IS. However, it is possible that at the beginning of the course students might have had negative stereotypes of IS professionals and these perceptions might have shifted during the course as students gained more information about the IS field and IS careers.

In order to address this particular limitation, the current study will capture students' perceptions at the beginning and then again at end of the semester. This will help us gain a deeper understanding of how students view IS professionals. Moreover, it will help us identify if there were any shifts in students' perceptions throughout the semester as they gained more information about the IS discipline and the career opportunities available to IS professionals.

3. RESEARCH METHOD

Given the objectives of the study, the survey methodology was utilized to collect the data. The sample and procedure, measures, and reliability and validity assessments are discussed in the following subsections.

3.1 Sample and Procedure

The study sample consisted of students enrolled in the introductory level IS course at the business school of a large state university located in the United States. The university is a co-educational liberal arts university serving more than 25,000 students with over 200 areas of study. The business school, accredited by AASCB International, largely attracts local students and retains a majority of the graduates in the region.

The introductory IS course investigated was a three-credit hour course and was taught in the computer lab. A variety of techniques were employed during class time including lectures, in-class discussions, hands-on exercises, projects, videos, and guest speakers. Students were also encouraged to write their own thoughts about IS topics and then discuss those with their classmates, answer questions that require critical and analytical thinking, brainstorm ideas through what-if situations, and participate in individual and group games.

The course provided students a preliminary introduction to the IS discipline. Emphasis was given to the fundamental business processes and how IS help to support and integrate these processes. Throughout the course, students gained hands-on skills in exploring and using different software packages. For example, students created business flow diagrams using MS Visio. They studied basic database concepts and created databases using MS Access. Furthermore, they learned about enterprise resource planning systems (ERP) and worked on major business processes using one of the most popular ERP software, the SAP system.

Throughout the course, students were introduced to different types of IS careers and learned about the roles and responsibilities of IS professionals. For example, the first chapter provided a high-level overview of IS careers. As a part of the chapter, students worked on an in-class exercise about the different types of positions available in the IS field. They also completed a related homework assignment. In addition, information about specific types of IS careers was provided to students throughout the semester. For example, the chapter discussing systems development introduced students to the responsibilities of a business analyst. Similarly, the enterprise systems chapter exposed students to various careers using ERP systems. Altogether, the course content and activities provided students with a better understanding of the IS profession.

The course was offered through multiple sections with each section being taught by one of several faculty members. Although the content covered in the course was similar across sections, instructors were free to develop their own assignments, hands-on exercises, exams, and lecture materials, such as presentation slides and handouts.

A web-based survey was administered during the first and last week of classes. Participation in the survey was voluntary. Students were offered extra credit as an incentive to participate in the survey. In order to reduce response bias, the following measures were taken: (a) a short survey was used to prevent the respondents from getting fatigued and mindlessly selecting the same response for all similar items, and (b) the survey software counterbalanced the instruments so that the measures were presented in a random order.

The sample was considered appropriate to answer the research questions for the following reasons. First, collecting data over multiple semesters (two consecutive semesters) from students who were taught by different professors increased sample variation and the generalizability of the findings. Second, since students' stereotypes may affect their choice of a major, it was important to understand the perceptions of students who were yet to finalize their decisions about which major to pursue (Akbulut and Looney, 2007; Joshi and Kuhn, 2011; Joshi and Schmidt, 2006). The course was required of all business students and the majority of students enrolled in the course were yet to decide which major to pursue. Students who had already chosen a major were removed from the final sample. The final sample included a total of 318 usable responses, a majority of whom were sophomores. Forty five percent of the respondents were female and fifty five percent were male. Respondents averaged 21.4 years of age (SD = 2.14).

3.2 Measures

The multidimensional scale developed by Akbulut (2009) was used to measure the different dimensions of the stereotypes construct. This scale incorporated five dimensions including: *geeks, gender*, *intelligence, managerial,* and *technical*. Each dimension consisted of three items that were measured by using a seven-point Likert-type scale, with a range from 1 (Strongly Disagree) to 7 (Strongly Agree).

The geeks dimension consisted of items referring to the geeky and nerdy attributes associated with IS professionals such as "IS professionals tend to be nerds" and "When I think about IS professionals I think about computer geeks." This study assumed being geeky/nerdy would be perceived as negative characteristics. However, it should be noted that, given the recent social movements to glorify these stereotypes and the astronomical stock prices of Google, Facebook, and the like, being geeky/nerdy could be considered as positive attributes, at least among certain communities.

The gender dimension included items that focused on whether the IS profession was dominated by men. Sample items included "Men, rather women, typically pursue careers in IS," and "Women typically avoid careers in IS."

In the intelligence dimension, items captured intellect, including the ability to problem solve and keep up with technology. Sample items included "IS professionals tend to be intelligent," and "IS professionals tend to have good problem solving skills."

The managerial dimension included items that were related to managerial, communication, and people skills. For example, items included "IS professionals tend to have good managerial skills," and "IS professionals tend to have good communication skills."

Lastly, the technical dimension captured the technical nature of the work performed by IS professionals as well as the need for a strong background in math and science.

Constructs	α	CR	AVE	Constructs 1	2	3	4	5
Geeks	0.840	0.896	0.764	**0.864**				
Gender	0.838	0.890	0.760	0.351	**0.860**			
Intelligence	0.778	0.860	0.668	0.078	0.070	**0.804**		
Managerial	0.792	0.848	0.696	0.419	0.333	0.332	**0.840**	
Technical	0.760	0.798	0.604	0.294	0.198	0.016	0.178	**0.768**

Note. α: Cronbach's α. CR: Composite reliability. AVE: Average variance extracted.

Table 1. Construct Reliability, Correlations, and Discriminant Validity

Sample items included "IS professionals do a lot of programming," and "IS professionals tend to have a strong background in math and science." The Appendix provides a list of the scale items.

This scale is a theoretically and psychometrically sound instrument that has exhibited excellent levels of reliability and validity in previous studies with different samples (Akbulut, 2009). Regardless, before the data was analyzed, the psychometric properties of the measures were again assessed and re-confirmed as discussed below.

3.3 Reliability and Validity

The reliability and validity of the measures were examined in three stages following Barclay, Higgins, and Thompson, 1995.

First, the reliability of items compromising each dimension was examined to ensure the items collectively measured their intended dimension consistently (Gefen, Straub, and Boudreau, 2000). Internal consistency reliability was examined in two ways by calculating Cronbach α's and composite reliability. Cronbach α's ranged from 0.760 to 0.840. Composite reliabilities were even higher, ranging from 0.798 to 0.896. As such, both reliabilities exceeded the generally agreed upon lower limit of 0.70 (Fornell and Larker, 1981; Nunnally, 1978), confirming the reliability of the scales (Barclay, Higgins, and Thompson, 1995; Fornell and Larker, 1981). Table 1 depicts the reliability estimates.

Second, convergent validity was examined both at the individual item and construct levels by assessing individual item loadings and the average variance extracted (AVE). In order to claim convergent validity at the item level, items should load on their intended constructs at 0.707 or greater and no undesirable cross-loadings should emerge (Gefen, Straub, and Boudreau, 2000). As shown in Table 2, all individual items exhibited adequate loadings (greater than 0.707) and no undesirable cross-loadings emerged as items loaded higher on their intended construct than any other construct. In order to claim convergent validity at the construct level, AVE values should be 0.50 or greater (Fornell and Larker, 1981) demonstrating that the construct as a whole shares more variance with its indicators compared to error variance. As shown in Table 1, AVE values for each construct were greater than the recommended threshold value of 0.50, confirming that the items collectively demonstrated convergent validity (See Table 1), (Fornell and Larker, 1981; Gefen, Straub, and Boudreau, 2000).

Third, discriminant validity was examined by comparing the AVE associated with each dimension to the correlations among the dimensions (Barclay, Higgins, and Thompson, 1995). The calculations emerging from the discriminant validity analysis are provided in Table 1. Diagonal elements (in bold) in Table 1 represent the square root of the AVE and the off-diagonal elements represent the correlations among dimensions. In order to claim discriminant validity, AVE values should be larger than any corresponding row or column entry. For each construct, the AVE exceeded the correlations between different constructs, confirming discriminant validity (See Table 1).

Combined with the strong evidence for reliability and validity, the psychometric properties of the measures were re-confirmed.

4. RESULTS

The data was analyzed in two stages. First, we focused on whether students held strong stereotypical images towards IS professionals. We employed one-sample t-tests, first at the beginning and then at the end of the semester, to detect the presence of stereotypes along each stereotype dimension at both points in time. A score significantly different from the scale midpoint (4) indicates the presence of a strong stereotype. The t-statistic could also be used to detect the directionality of the stereotype.

Second, we focused on identifying whether there was a statistically significant shift in students' perceptions of IS stereotypes after taking the Introductory IS course. We employed independent sample t-tests that compared beginning and end of the semester item scores. In addition, we calculated effect sizes to understand the practical significance, or the magnitude of change. The results of these tests are provided in Table 3.

Geeks Dimension. Results indicate that at the beginning of the semester, students neither agreed nor disagreed that IS professionals were geeks (t_0= -0.768, NS; item score M_0=3.92, SD_0=1.30 not significantly different than scale midpoint). However, at the end of the semester, students strongly disagreed that IS professionals could be classified as geeky or nerdy (t_1= -6.273, $p<0.001$; item score M_1=3.35, SD_1=1.47 significantly lower than scale midpoint). Parallel to these findings, a comparison of the beginning and end of the semester mean scores revealed a *significant decrease* at the end of the semester (t= 3.905, $p<0.001$). These findings together indicate that throughout the course, students perceptions about IS professionals have changed positively and by the end of the semester students did not attribute any nerdy features to IS professionals.

	Loadings and Cross-Loadings[a]				
Constructs/Items	**Geeks**	**Gender**	**Intelligence**	**Managerial**	**Technical**
Geeks 1	**0.876**	0.327	-0.047	-0.083	0.168
Geeks 2	**0.833**	0.219	0.105	-0.125	0.077
Geeks 3	**0.882**	0.147	-0.022	-0.254	0.206
Gender 1	0.186	**0.876**	0.133	-0.194	0.058
Gender 2	0.194	**0.822**	-0.176	-0.033	0.138
Gender 3	0.202	**0.894**	0.015	-0.112	0.116
Intelligence 1	-0.046	-0.011	**0.836**	0.113	0.154
Intelligence 2	0.196	-0.058	**0.794**	0.348	-0.106
Intelligence 3	-0.049	0.032	**0.802**	0.037	-0.112
Managerial 1	-0.188	0.105	0.349	**0.776**	-0.061
Managerial 2	-0.131	-0.111	0.156	**0.867**	-0.11
Managerial 3	-0.124	0.052	0.052	**0.849**	-0.026
Technical 1	0.032	-0.03	0.164	-0.074	**0.808**
Technical 2	0.108	0.162	0.169	0.099	**0.726**
Technical 3	0.248	0.133	-0.219	-0.214	**0.742**

[a] Entries in bold denote items that exhibited acceptable factor loadings. All loadings in bold are significant at the 0.01 level (2-tailed tests).

Table 2. Constructs, Items, Loadings, and Cross-loadings

	Time 0 Beginning of the Semester				Time 1 End of the Semester				Comparison		
Stereotypes	**M**	**SD**	**t-value**	**sig (df=159)**	**Mean**	**SD**	**t-value**	**sig (df=157)**	**t-value**	**sig (df=316)**	**Effect Size (Cohen's d)**
Geeks	3.92	1.30	-0.768	NS	3.35	1.30	-6.273	***	3.905	***	0.44
Gender	4.20	1.10	2.298	*	3.85	1.12	-1.658	*	2.792	**	0.32
Intelligence	5.77	0.94	23.633	***	6.05	0.79	32.763	***	-2.895	**	-0.32
Managerial	4.59	1.16	6.448	***	4.91	0.95	12.099	***	-2.690	**	-0.30
Technical	4.79	0.99	10.076	***	4.39	0.99	5.007	***	3.598	***	0.40

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

M = mean average item score (unweighted). SD = average item score standard deviation.

Table 3. Test Results

Gender Dimension. At the beginning of the semester, students thought that IS was a male dominated profession (t_0= 2.298, p<0.05, item score M_0=4.20, SD_0= 1.10, significantly higher than scale midpoint). However, when surveyed again at the end of the semester, students no longer believed that the IS profession was for men only (t_1= -1.658, p<0.05, item score M_1=3.85, SD_1=1.12 significantly lower than scale midpoint). A comparison of the beginning and end of the semester mean scores also showed a *significant decrease* at the end of the semester (t= 2.792, p<0.01). These findings together indicate that throughout the course, students perceptions about the gendered view of IS professionals have changed significantly and by the end of the semester students thought both men and women could pursue careers in the IS field.

Intelligence Dimension. Our results indicate that, both at the beginning and end of the semester, students agreed that IS professionals were intelligent people (t_0=23.633, p<0.001

Stereotypes	Time 0 Beginning of the Semester	Time 1 End of the Semester	Comparison
Geeks	Neither agree/disagree	Disagree	Significant decrease
Gender	Agree	Disagree	Significant decrease
Intelligence	Agree	Agree	Significant increase
Managerial	Agree	Agree	Significant increase
Technical	Agree	Agree	Significant decrease

Table 4. Summary of Findings

and t_1=31.763, $p<0.001$, item scores M_0=5.77, SD_0= 0.94 and M_1=6.05, SD_1=0.79, significantly higher than scale midpoint). In addition, a comparison of the beginning and end of the semester mean scores showed a *significant increase* by the end of the semester (t=-2.895, $p<0.01$). These findings together indicate that students believe that IS professionals are intelligent people and that their perceptions have strengthened throughout the semester.

Managerial Dimension. Similar to the intelligence dimension, both at the beginning and end of the semester, students thought that IS professionals possessed good managerial skills (t_0=6.448, $p<0.001$ and t_1=12.099, $p<0.001$, item scores M_0=4.59, SD_0= 1.16 and M_1=4.91, SD_1=0.95, significantly higher than scale midpoint). Moreover, when we compared the beginning and end of the semester mean scores, we observed a *significant increase* in the mean scores at the end of the semester (t=-.2690, $p<0.01$). These findings together indicate that students believe that IS professionals possess managerial skills and their perceptions have strengthened throughout the semester.

Technical Dimension. Both at the beginning and end of the semester, students emphasized the strong technical background required from IS professionals (t_0=10.076, $p<0.001$ and t_1=5.007, $p<0.001$), item scores M_0=4.79, SD_0= 0.99 and M_1=4.91, SD_1=0.99, significantly higher than scale midpoint). When we compared the beginning and end of the semester mean scores we observed a *significant decrease* in the mean scores at the end of the semester (t=3.598, $p<0.001$). These findings indicate that students recognize the technical skills that IS professionals have, but their perceptions about IS professionals being highly technically oriented have weakened throughout the semester. Table 4 provides a summary of the study's key findings.

Effect Sizes. To gain additional insights about the findings of the study, we calculated effect sizes (please refer to Table 3). Effect size is defined as the magnitude or size of an effect (Biddix, 2009). While the t-tests and p-values discussed above help researchers understand statistical significance, effect size helps researches understand the practical significance, or the magnitude of the change. Effect sizes were calculated using Cohen's *d* coefficient (Cohen, 1988; Ellis, 2009). Cohen classified effect sizes as *small* ($d = 0.2$), *moderate* ($d = 0.5$), and *large* ($d \geq 0.8$). If the effect size is smaller than 0.2, the difference between the means is trivial, even though it might be significantly different (Walker, 2008). On the other hand, a small size effect means that there is a real effect, which you can only see through careful study. Generally, the larger the effect size, the greater is the impact of an intervention (Walker, 2008). In our study, the effect sizes ranged from 0.30 to 0.44, suggesting small to moderate practical significance. This confirmed the introductory IS course was effective in changing students' initial perceptions of IS professionals.

5. DISCUSSION

This study helped us gain an understanding of students' perceptions of IS professionals before and after they were exposed to the IS field and careers through the introductory IS course.

While several studies have been conducted in the CS domain about the stereotypical image of computer scientists, studies that focus on the image of IS professionals have been scarce. Borrowing from the CS literature, it has been generally assumed that IS professionals are viewed as geeks, mostly male, intelligent, technically oriented, and lacking managerial skills. The findings of the study revealed that some stereotypical perceptions existed along most of these dimensions, particularly at the beginning of the semester before students were formally exposed to the IS discipline. When students were surveyed at the beginning of the semester, they neither agreed or disagreed that IS professionals were geeks. They agreed that the IS profession was typically dominated by men, and that IS professionals were too technically oriented. They also agreed that IS professionals possessed good managerial skills and were intelligent.

However, when the students were surveyed at the end of the semester, it was found that their perceptions had shifted during the course as they gained more information about the IS field in general and the nature of IS careers in particular. At the end of the semester, students disagreed that IS professionals were geeks. They also no longer thought that the IS field was dominated by men. At the end of the semester, students still agreed that IS professionals had good technical skills, but their perceptions have weakened throughout the semester. Regarding the intelligence and managerial skills, students' perceptions about IS professionals being intelligent and possessing managerial skills have strengthened significantly throughout the semester.

These findings together indicate even though students might have some negative perceptions or misunderstandings about the IS profession, their image of IS professionals is not as negative as previously thought. It was also observed that any negative perceptions students might have can be

overcome with the use of appropriate mechanisms. In this respect, the study confirmed the important influence of the introductory IS course on how students view the IS field. During the semester, students perceptions about IS professionals significantly shifted towards the more positive end of the spectrum.

For most students, the introductory IS course is their first formal introduction to the IS field, and students generally are not very familiar with the IS major and the careers in this field. With careful planning and implementation, introductory IS courses can be leveraged to dispel any misconceptions or negative stereotypes students might have (Firth, Lawrence, and Looney, 2008) and to attract more students to the discipline (Akbulut and Looney, 2007; Dick, et al., 2007; George, Valacich, and Valor, 2005; Looney and Akbulut, 2007). In order to achieve these objectives, the introductory course should emphasize the strategic role IS plays for businesses, society, and for individuals, rather than merely focusing on technical concepts (Firth, Lawrence, and Looney, 2008; George, Valacich, and Valor, 2005). The content of the course and the IT used in the classroom should be current, relevant, and interesting. For example, in our introductory level course, we focus on how IS serves as a tool to help achieve organizational objectives. While we strive to deliver up-to-date technical skills, such as the mastery of current technologies, we also make sure that we foster longer lasting competencies, such as the ability to see the big picture, successfully analyze business problems, and design effective solutions. Discussing contemporary topics such as 3-D printing, artificial intelligence, wearable computing, Internet of Things, among others, and using current software applications expose students to intriguing subjects. This approach also allows them to immediately apply concepts to solve today's individual and organizational problems.

The introductory IS course should expose students to different career options that are available to IS professionals and instill an understanding of the positive aspects of becoming an IS professional. Inviting guest speakers or arranging company visits would prove helpful in providing students firsthand exposure to issues facing IS professionals on a day-to-day basis. For example, in our university we recruit current IS students (particularly those with internship experience), recent IS graduates, as well as IS executives from well-known companies to serve as guest speakers in the introductory IS course. Students are also encouraged to participate in a Speaker Series professional development opportunity that features IS professionals and recent IS alumni. This event is held twice each semester and students can earn extra credit by participating in the event and reporting on their key learnings. Although, not integrated into the introductory course as a required component, opportunities to participate in company visits are also made available to students.

The instructor teaching the introductory IS course is extremely important as well (Firth, Lawrence, and Looney, 2008; George, Valacich, and Valor, 2005; Looney and Akbulut, 2007). The instructor should be a business and IS savvy professional who would serve as role model to students (George, Valacich, and Valor, 2005). At many universities, doctoral students or adjunct faculty are assigned to teach the introductory IS course so that tenure-track faculty can teach higher level IS courses that are part of the IS major (Firth, Lawrence, and Looney, 2008). At our institution, the administration tries to place our most effective teachers in the introductory course irrespective of their level or position. Moreover, when new faculty are assigned to the course, they go through an initial training to familiarize them with the course.

The findings of this study have important implications for research and practice. Previous studies have focused on understanding the stereotypes of IT professionals collectively or investigated the stereotypes of CS professionals and assumed that the IS field, which is a sub-field of IT, is also burdened by the same type of negative stereotypes. Our study has challenged the efficacy of such generalizations among different fields of IT. Our findings indicated that students' stereotypes of IS professionals were not as negative as previously thought, particularly after being exposed the IS field through the introductory course. Furthermore, our study extended the limited literature on students' stereotypes of IS professionals. More specifically, our study addressed the call for quantitative studies using survey methodology, which incorporate sound IS image constructs, for understanding the changes in students' perceptions before and after taking the introductory IS course (Akbulut, 2009; Joshi and Schmidt, 2006).

5.1 Limitations and Future Research

The findings of the study must be interpreted in the light of its limitations. The study was conducted at a single university, and data was collected from undergraduate business students who were yet to declare a major. Although this type of sampling is common in this type of research (Joshi and Kuhn, 2011), it limits the generalizability of the findings. In this respect, surveying students who were enrolled in multiple sections of the course, taught by different instructors increased sample variation and our ability to make broader inferences. Regardless, caution should be taken when generalizing the results. Since differences might arise in different academic settings, future studies should address the issue of generalizability through replication in different contexts using additional samples.

Another potential limitation of the study could be the approach of the instructors teaching the introductory course. As mentioned earlier, this course served as students' first formal introduction to the IS field. Therefore, instructors might have deliberately introduced the course materials in a way to debunk any misconceptions about the IS profession/professionals and to provide students with a more accurate picture of the IS discipline. Consequently, it must be left to future research to test whether any strategies used by the instructors would prove effective in inspiring students to form positive perceptions towards the IS discipline.

This study focused only on the students who were yet to declare a major and did not investigate the perceptions of students who had already chosen a major. Future research could benefit from a more comprehensive analysis of the perceptions of students majoring in IS and in other business disciplines. Such an assessment could provide richer insights as it would enable the researchers to compare the perceptions of students in different groups.

Additionally, this study focused on college students. By the time students reach college, they might have already

decided what major and career to pursue. Therefore, studies targeting high school students are needed to determine whether prevailing negative stereotypes of IS professionals exist among these younger students (Harris et al., 2009).

Further research is also needed to investigate the role stereotypes play in shaping students' educational and vocational decision making processes. This study provides a strong foundation that could be leveraged to understand the influence of stereotypes on students' interest in and pursuit of IS majors and careers.

Future research could also examine whether male and female students differ in terms of their perceptions about IS professionals. Underrepresentation of women in IS and related fields continues to be a major concern (Beyer, 2008; Harris et al., 2009) and understanding female student's perceptions of IS professionals would prove helpful in addressing this important concern.

6. CONCLUSION

In conclusion, this study's findings have important implications for IS programs, as the information gained in this study facilitates a deeper understanding of IS stereotypes. University educators can use this information to design and implement specific intervention strategies to challenge the stereotypical image of IS professionals and potentially attract larger pools of students to the IS discipline.

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APPENDIX

ITEMS

In order to measure the different dimensions of the stereotypes construct, the multidimensional scale developed by Akbulut (2009) was used. This scale incorporated five dimensions, each of which consisted of three items. For each item, respondents were asked to mark their opinions on a seven-point Likert-type scale, ranging from 1 (Strongly Disagree) to 7 (Strongly Agree).

Geeks
Geeks 1: IS professionals tend to be nerds.
Geeks 2: IS professionals tend to be technology geeks.
Geeks 3: When I think about IS professionals, I think about computer geeks.

Gender
Gender 1: The IS profession is dominated by men.
Gender 2: Women typically avoid careers in IS.
Gender 3: Men, rather than women, typically pursue careers in IS.

Intelligence
Intelligence 1: IS professionals tend to be intelligent.
Intelligence 2: IS professionals tend to have good problem solving skills.
Intelligence 3: IS professionals tend to be willing to keep up with technology.

Managerial
Managerial 1: IS professionals tend to have good managerial skills.
Managerial 2: IS professionals tend to have good communication skills.
Managerial 3: IS professionals tend to have good people skills.

Technical
Technical 1: IS professionals do a lot of programming.
Technical 2: IS professionals tend to have a strong background in math and science.
Technical 3: Computer science and IS professionals basically do the same type of work.

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