Students’ Stereotypes of IS Professionals and the Influence of the Introductory IS Course

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ABSTRACT
Over the last decade, declining enrollments in Information Systems (IS) discipline has been a major concern for the IS community. Literature suggests that one plausible explanation for the decline in enrollments is the negative stereotypical image students hold about IS professionals. It has also been 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 twofold: (a) to understand students’ perceptions of IS professionals; and (b) to investigate the role the introductory IS course plays in shaping students’ image of IS professionals. The study’s findings have important implication for IS programs, as the information gained in this study facilitates a deeper understanding of IS stereotypes and confirms the important influence of the introductory IS course on how students view the IS field.

Keywords
Image, IS careers, IS enrollments, stereotypes, introductory IS course

INTRODUCTION
Over the last decade, the Information Systems (IS) community has been struggling with a paradoxical situation regarding the supply and demand of IS professionals. On one hand, employment projections indicate continued growth in information technology (IT) related jobs with an expected growth rate exceeding 20% by 2020 (Thibodeau, 2012). On the other hand, due to the decline in enrollments in IS programs across the country; the supply of IS graduates has declined significantly since 2000s. Even though anecdotal evidence suggests that enrollments have started to slowly increase in the last couple years; estimations are that in the near future, there might not be enough IS graduates to fulfill the increasing demand (Lomerson and Pollacia, 2006; Panko, 2008; Leeuwen and Tanca, 2008).

Given the influential role IT workers play for our knowledge-based economy; understanding the reasons for the diminished interest in the discipline and developing strategies to effectively tackle declining enrollments have become important areas of concern for IS researchers. Even though there are many factors to consider, one of the main reasons cited for declining enrollments involves the negative stereotypes students hold about IS professionals (Colvin, 2007; Enns, Ferratt, and Prasad, 2006; Firth, Lawrence, and Looney, 2008; Granger, Dick, Jacobson, and Van Slyke, 2007; Lomerson and Pollacia, 2006; Van Slyke et al., 2007; Zhang, 2007). Several researchers have indicated that students perceive IS professionals as computer nerds sitting in front of the computer all day long doing technical work. These students are concerned about the nature of the IT work being too technical, difficult, boring, and antisocial (Enns et al., 2006; Firth et al., 2008; Galletta, 2007; Lomerson and Pollacia, 2006; Van Slyke, Case, Dick, and Granger, 2007). Other studies also cite the gendered view of the profession and mention that female students have the perception that men, not women, pursue majors and careers in the IT field (Cory, Parzinger, Reeves, 2006; Galletta, 2007; Zhang, 2007). These incorrect perceptions of IS professionals have been tied to the lack of information about the profession and about the typical career opportunities available to IS professionals (Firth et al., 2008; Lomerson and Pollacia, 2006; Van Slyke et al., 2007).

Research has found that students’ traditional negative stereotypes can be undermined if they 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 the 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; George, Valacich, and Valor, 2005; Granger et al., 2007; Looney and Akbulut, 2007). Therefore, the purpose of this study was twofold (a) to understand students’ perceptions of IS professionals; and (b) to investigate the role that the introductory IS course plays in shaping students’ image of IS professionals and the profession.
The remainder of this article is organized as follows. In the following section a discussion of the background literature is provided. Next, the research methodology is outlined and the results from the analyses are presented. The paper concludes with a discussion of the findings, limitations and implications.

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). Stereotypes may be positive (e.g., IS professionals are smart people) or negative (e.g., IS professionals are nerds) (Dasgupta and Asgari, 2004). They may be accurate or inaccurate regarding the average characteristics of the group (Leyens, Yzerbyt, and Schadron, 1994).

Understanding stereotypes is important because domain identification theory suggests that stereotypes about a particular domain may influence students’ identification with the domain in question (Smith, Morgan, and White, 2005; Steele, 1997). Students assess their prospects in a particular domain, and broadly speaking, their identification increases when the prospects of the domain are favorable, and decreases when the prospects are unfavorable (Steele 1997). In this respect, negative stereotypes about the IS profession may make it more difficult for students to identify themselves with the domain, and can cause them to shy away from the discipline.

A review of the literature suggests that a myriad of studies have been conducted to capture the occupational stereotypes of computer scientists and the CS profession. Due to the under representation of women in the discipline; most of these studies have either investigated the perceptions of females only or compared the female and male students’ views of computer professionals (Carter, 2006; Craig, Paradis, and Turner, 2002; Margolis and Fisher, 2003; Teague, 2002; Tjaden and Tjaden, 2000). These studies have found that the 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. However, given the distinction between CS and IS disciplines, there might be differences between the stereotypical images of CS and 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. The authors’ initial findings revealed that, in general, the stereotypical image of an IS professional was similar to that of a computer scientist. However, by the end of the semester, it was observed that the students developed a somewhat better understanding of the IS profession. Even though students focused more on technical skills when describing IS professionals and the profession, they also recognized 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 these perceptions were captured using qualitative methods (i.e. open ended questions). Given the relative lack of accumulated knowledge about the subject, utilizing qualitative methods was an appropriate choice. Regardless, the interpretive understanding gained through this study needs to be confirmed and validated through quantitative approaches.

Until recently sound instruments to measure IS stereotypes did not exist. Akbulut-Bailey (2009) conducted a study to understand whether the different types of IS stereotypes identified 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 conducted a series of empirical analysis and 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 do exist 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.

One major limitation of this study was that it captured students’ perceptions at the end of the semester after they have 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 in general, and the nature of IS careers in particular.

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 to gain a deeper understanding of how they view IS professionals and to identify if there were any shifts in perceptions throughout the semester.

**RESEARCH METHOD**

Given the objectives of the study, the survey methodology was utilized to collect the data. The sample consisted of students enrolled in different sections of an introductory level Management Information Systems (MIS) course at the business school of a large state university located in the United States. The course provided most 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. Participation in the study was voluntary and participating students received extra credit as an incentive. A web-based survey was administered during the first and last week of classes. 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).

The multidimensional scale developed by Akbulut-Bailey (2009) was used to measure the different dimensions of the stereotypes construct. The construct included 5 dimensions: *geeks, gender, intelligence, managerial* and *technical*. Each dimension consisted of 3 items that were measured by using a seven-point Likert-type scale, with a range from 1 (Strongly Disagree) to 7 (Strongly Agree).

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-Bailey, 2009). Regardless, the psychometric properties of the measures were assessed and reconfirmed before the data was analyzed. First reliability of the constructs was examined. Both Cronbach’s and composite reliability scores were well above the recommended level (0.70) for acceptable reliability (Barclay, Higgins, and Thompson, 1995; Fornell and Larker, 1981). Discriminant validity of the constructs was examined by comparing the AVE associated with each construct to the correlations among constructs (Barclay et al., 1995). For each construct, the AVE exceeded the correlations between constructs, confirming discriminant validity. Convergent validity was examined both at the item and construct levels. All individual items exhibited adequate loadings (greater than 0.707) and no unacceptable cross loadings emerged. Moreover AVE values were greater than 0.50, confirming the convergent validity of the items and constructs (Fornell and Larker, 1981; Gefen, Straub, and Boudreau, 2000). Combined with the strong evidence for reliability and validity, the psychometric properties of the measures were reconfirmed. Due to space limitations, the detailed test results are not reported here, but can be obtained from the authors.

**RESULTS**

Two sets of t-tests were employed to investigate the research questions.

a) One-sample t-tests were employed first at the beginning and then at the end of the semester to detect the presence of stereotypes along each construct 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.

b) Independent sample t-tests that compared beginning and end of the semester item scores were employed to identify whether there was a statistically significant shift in students’ perceptions of IS stereotypes throughout the semester. The results of both tests are provided below in Table 1.

**Geeks Dimension.** 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.” For this construct, the t-test revealed a non-significant negative value at the beginning of the semester ($t_{0.01}=-0.768$, NS), meaning that the item score ($M_{0}=3.92$, $SD_{0}=1.30$) was not significantly different than the scale midpoint (4). This result indicates that students neither agreed or disagreed that IS professionals were geeks. However, at the end of the semester, the t-test revealed a significant negative value ($t_{1.001}=-6.273$, $p<0.001$), meaning that the item score ($M_{1}=3.35$, $SD_{1}=1.47$) was significantly lower than the scale midpoint (4). This results suggests that at the end of the semester, students disagreed that IS professionals could be classified as geeky or nerdy. Similarly, a comparison of the beginning and end of the semester mean scores revealed a significant decrease in the mean scores 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.
Table 1. Test Results

<table>
<thead>
<tr>
<th>Stereotypes</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>sig (df=159)</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>sig (df=157)</th>
<th>t-value</th>
<th>SIG (df=316)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geeks</td>
<td>3.92</td>
<td>1.30</td>
<td>-0.768</td>
<td>NS</td>
<td>3.35</td>
<td>1.30</td>
<td>-6.273</td>
<td>***</td>
<td>3.905</td>
<td>***</td>
</tr>
<tr>
<td>Gender</td>
<td>4.20</td>
<td>1.10</td>
<td>2.298</td>
<td>*</td>
<td>3.85</td>
<td>1.12</td>
<td>-1.658</td>
<td>*</td>
<td>2.792</td>
<td>**</td>
</tr>
<tr>
<td>Intelligence</td>
<td>5.77</td>
<td>0.94</td>
<td>23.633</td>
<td>***</td>
<td>6.05</td>
<td>0.79</td>
<td>32.763</td>
<td>***</td>
<td>-2.690</td>
<td>**</td>
</tr>
<tr>
<td>Managerial</td>
<td>4.59</td>
<td>1.16</td>
<td>6.448</td>
<td>***</td>
<td>4.91</td>
<td>0.95</td>
<td>12.099</td>
<td>***</td>
<td>-2.690</td>
<td>**</td>
</tr>
<tr>
<td>Technical</td>
<td>4.79</td>
<td>0.99</td>
<td>10.076</td>
<td>***</td>
<td>4.39</td>
<td>0.99</td>
<td>5.007</td>
<td>***</td>
<td>3.598</td>
<td>***</td>
</tr>
</tbody>
</table>

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

**Gender Dimension.** 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.” For this construct, the t-test revealed a significant positive value at the beginning of the semester (t₀=2.298, p<0.05), meaning that the item score (M₀=4.20, SD₀= 1.10) was significantly higher than the scale midpoint (4). This indicates that respondents tend to agree that the IS profession is dominated by men. However, at the end of the semester, the t-test revealed a significant negative value (t₁= -1.658, p<0.05), meaning that the item score (M₁=3.85, SD₁=1.12) was significantly lower than the scale midpoint (4). This indicates that at the end of the semester, the respondents disagreed that the IS profession was dominated by men. A comparison of the beginning and end of the semester mean scores also showed that there was a significant decrease in the mean scores 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 and by the end of the semester students did no longer believe that the IS profession was only for men.

**Intelligence Dimension.** 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.” For this construct, the t-test revealed significant positive values both at the beginning and end of the semester (t₀=23.633, p<0.001 and t₁=31.763, p<0.001), meaning that the item scores (M₀=5.77, SD₀= 0.94 and M₁=6.05, SD₁=0.79) were significantly higher than the scale midpoint (4). This indicates that respondents agree that IS professionals tend to be intelligent. A comparison of the beginning and end of the semester mean scores showed that there was a significant increase in the mean scores at 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 their perceptions have strengthened throughout the semester.

**Managerial Dimension.** The managerial dimension included items that were related to managerial, communication, and people skills. Sample items included “IS professionals tend to have good managerial skills,” and “IS professionals tend to have good communication skills.” For this construct, the t-test revealed significant positive values both at the beginning and end of the semester (t₀=6.448, p<0.001 and t₁=12.099, p<0.001), meaning that the item scores (M₀=4.59, SD₀= 1.16 and M₁=4.91, SD₁=0.95) were significantly higher than the scale midpoint (4). This indicates that respondents agree that IS professionals tend to be intelligent. A comparison of the beginning and end of the semester mean scores showed that there was a significant increase in the mean scores at the end of the semester (t=2.690, 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.** 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. Sample items included “IS professionals do a lot of programming,” and “IS professionals tend to have a strong background in math and science.” For this construct, the t-test revealed significant positive values both at the beginning and end of the semester (t₀=10.076, p<0.001 and t₁=5.007, p<0.001), meaning that the item scores (M₀=4.79, SD₀= 0.99 and M₁=4.91, SD₁=0.99) were significantly higher than the scale midpoint (4). This indicates that respondents agree that IS professionals tend to have a strong technical background. A comparison of the beginning and end of the semester mean scores showed that there was a significant decrease in the mean...
scores at the end of the semester ($t=3.598$, $p<0.001$). These findings together indicate that students recognize the technical skills that IS professionals have, but their perceptions about the technical skills have weakened throughout the semester.

DISCUSSION AND CONCLUSION

The objectives of this study were twofold: (a) to understand students’ perceptions of IS professionals; and (b) to investigate the role that the introductory IS course plays in shaping students’ image of IS professionals and the profession. These objectives have been achieved successfully.

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 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. However, 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. When the students were again surveyed at the end of the semester, it was observed that their perceptions have 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. 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 that students’ image of IS professionals might not be as negative as previously thought and the negative perceptions they might have can be overcome with the use of appropriate mechanisms. First of all, we have to recognize the fact that today’s college students are longtime users of technology. In other words, today’s college students have grown up with technology and view it as an integral part of their everyday life (George et al., 2005; Jones, 2002). As such, it is possible that, even though IS is much more than technology, students who are well versed in technology have a somewhat more accurate understanding of technology related careers, including the IS profession.

The study also 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. Even though at the beginning of the semester students were somewhat unsure about whether IS professionals were technology geeks; at the end of the semester students clearly disagreed that IS professionals were typical computer nerds or geeks. Moreover, at the end of the semester students no longer thought of the IS discipline as a male dominated field, which represented a significant shift in their earlier beliefs. In addition, at the end of the semester, students were less focused on the technical aspects; such as the amount of the computer programming the IS professionals do. Rather, they emphasized the importance of managerial, communication, and people skills as well as good problem solving skills and intelligence than they did at the beginning of the semester.

In this respect, our findings confirm the importance of the introductory course. For most students the introductory course is their first formal introduction to the IS field and, moreover, the majority of these students are yet to decide what major to pursue. Therefore, with careful planning and implementation, introductory IS courses can be leveraged to dispel any misconceptions or stereotypes students might have (Firth et al., 2008) and to attract more students to the discipline (Akbult and Looney, 2007; Dick, Granger, Jacobson, and Van Slyke, 2007; George et al., 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 et al., 2008; George et al., 2005). The content of the course and the IT used in the classroom should be up to date, relevant and interesting. The 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 also prove helpful in providing students firsthand exposure to issues facing IS professionals on a day-to-day basis. The instructor teaching the introductory IS course is extremely important as well (Firth et al., 2008; George et al., 2005; Looney and Akbulut, 2007). The instructor should be a business and IS savvy professional who would serve as role model to students (George et al., 2005).

The findings of the study must be interpreted in the light of its limitations. The sample used could limit the ability to generalize the study findings. Since the study only surveyed students enrolled in introductory IS courses at one particular university, the sample was relatively homogenous. Although the data were collected from different instructors, students used the same textbooks, covered the same topics and used common projects across sections. Therefore, these students might not represent the broader student population to which the results are to be generalized. Considering the diversity of students and instructors, curricula, and pedagogical approaches, differences might arise in different academic settings (Looney and
Akbulut, 2007). As such, future studies should address the issue of generalizability through replication in different contexts using contemporary samples. Additionally, this study only focused on college students. Studies targeting high school students are needed to determine whether prevailing negative stereotypes of IS professionals exist among these younger students.

Due to the confidential nature of teaching evaluation data, we were unable to collect data that tied particular respondents to specific teachers. Because the data precluded comparisons across teachers, we were not able to determine how specific teachers affect student perceptions. Future studies should try to reveal how student perceptions about stereotypes of IS professionals correlate with their perceptions of the instructors.

Further research is also needed to investigate the role stereotypes play in facilitating or inhibiting student interest in and pursuit of IS majors and careers. Students’ having a better and more accurate picture of IS professionals might not necessarily transfer directly into an increase in the number of students pursuing IS degrees and careers.

In conclusion, these study’s findings have important implication 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 attract larger pools of students to the IS discipline.

REFERENCES


