Majoring in Information Systems: Reasons Why Students Select (or not) Information Systems as a Major

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Abstract

Filling the pipeline for information systems workers is critical in the information era. Projected growth rates for jobs requiring information systems expertise are significantly higher than the projected growth rates for other jobs. Why then do relatively few students choose to major in information systems? This paper reviews survey results from about two hundred freshmen business students at a medium sized western university. The survey asked these students to share their perceptions of jobs that do not require information systems skills, of skills employers look for in new employees, of reasons that peers major in information systems disciplines, and of reasons they do not. This research suggests further exploration of reasons students and professionals chose information systems as a field of study and work. It also suggests using a survey group other than general business majors.

Keywords: Information Systems, College Major, Career Selection

1. INTRODUCTION

Why students select the majors they do is an ongoing concern for university faculty and administration. It is also a national concern with the Obama administration announcing a new "One Decade, One Million more STEM Graduates" initiative in December of 2012 (Feder, 2012). The reasons for this initiative include BLS projections of double digit growth rates in STEM jobs over the next decade (see Table 1) as well as maintaining and increasing our national competitiveness in technology related industries (US Department of Labor, 2012; Feder, 2012). As it relates to the academy, Frauenheim (2004) illustrates that fewer majors translates into fewer graduate students which leads to fewer doctorates, which leads to fewer potential faculty. This phenomenon can occur in any major, including information systems majors.

The main concern is that the United States could lose its lead in STEM industries to countries such as China and India. For IS faculty, the concern is continuing IS programs and filling classrooms with IS students who will matriculate into the IS workforce.

The projected growth rate for all jobs, according to the BLS, is 14%, which gives a comparison for the statistics contained in Table 1 (US Department of Labor, 2012). Determining the factors that contribute to students not majoring

in STEM disciplines (IS in particular) has been a thread in the literature for decades. The facets of this research thread will be illustrated in the literature review section.

Table 1
BLS statistics related to CIS disciplines

Position	Growth Rate	Employment Change 2010-2020
Database Admin.	31%	33,900
Info. Sec. Analyst, Web Developer	22%	65,700
Network Analyst	28%	96,600
Comp System Analyst	22%	120,400

 (US Department of Labor, 2012)

2. LITERATURE REVIEW

Determining why students are not majoring in IS disciplines has primarily been accomplished with student surveys (Pollacia & Lomerson, 2006; Crampton, Walstrom, & Schamback, 2006; Walstrom, Schamback, Jones, & Crampton, 2008; Kuechler, McLeod, & Simkin, 2009; Downey, McGaughey, & Roach, 2011; Kumar & Kumar, 2013).
Pollacia and Lomerson (2006) reported factors such as too hard, too technical, and would not enjoy the work as reasons why students do not major in IS. Pollacia and Lomerson also reported that students are not receiving adequate or accurate information about IS careers during their high school years.
Crampton, et al. (2006) identified personal interest as the most important factor in major selection. Lower in the rankings came family, teachers, friends, and high school counselors. This survey also measured how informed students were about careers in business disciplines upon completion of high school. The bottom of this list includes computer science, information systems, and logistics/operations.
Walstrom, et al. (2008) verified that students are not aware or only marginally aware of careers in information systems upon completion of high school. This study also determined that factors most influencing IS as a major include personal interest, job prospects and salary while the least influencing factors include guidance counselors and advising centers. Kuechler, et

al. (2009) determined that non-IS majors do not consider themselves to be good with computers and also do not know what information systems are and what IS workers do.

Downey, et al. (2011) identified aptitude and interest as positively correlated with selecting an IS related major. Further, the survey identified influences of parents, friends, family, and high school counselors as the lowest factor in selecting IS as a major. The study by Downey, McGaughey, and Roach (2009) indicates that students major in MIS due to interest in the subject, interest in computers, and high monetary reward. In contrast, the less important factors in deciding to major in MIS include influence of high school teachers and counselors, and influence of family and friends.

In addition to recruiting students into IS disciplines, recruiting female students has been of concern to researchers and educators (Croasdell, McLeod, & Simkin, 2011; Beyer, 2008). Croasdell et al. (2011) found that females major in IS due to core reasons such as personal interest, job outlook, and respect of job position. Contrary to many studies listed in this section, Croasdell et al. also found that the influence of family members positively impacts females as to IS major selection.
Beyer (2008) found that female MIS students were more likely to have had positive role models such as computer teachers in high school. This, once again, points at the secondary school structure in the United States as an area critical to influencing major selection of students in college.

In a survey released by Microsoft (2011), STEM students decided on studying STEM disciplines in secondary school (78%) or before (21%). These students also reported that a class or a teacher sparking their interest in the subject was the top factor in deciding on a STEM major.

3. METHODOLOGY

A survey instrument was developed in the fall semester of 2012 and pilot tested in an introduction to business class. Refinements were made to the survey instrument based on the pilot study and the literature review (see Appendix A). The new survey instrument was then administered to multiple sections of the introduction to business class, in the spring semester of 2013, which is primarily composed of freshmen business students who have not

settled on their major concentration in the business department. The survey is presented along with an introductory talk about the CIS major in an attempt to stimulate interest in the major. The survey contains two free response questions and four Likert Scale questions. Additionally, basic demographic information was collected for analysis. A total of 202 surveys were collected, six of which were removed due to missing information or incorrectly coded responses. This resulted in an *n* of 196 for this study, with 69 females and 127 males, with an average age of 21.3 years. The average age appears elevated due to the presence of 24 non-traditional students (25 years of age and older) in the classes (Choy, 2002). The survey respondents consisted of 76% freshmen, 18% sophomore, 5% junior, and 1% senior.

4. FINDINGS

Chart 1
Students' perceptions of jobs that will not require knowledge of computer information systems
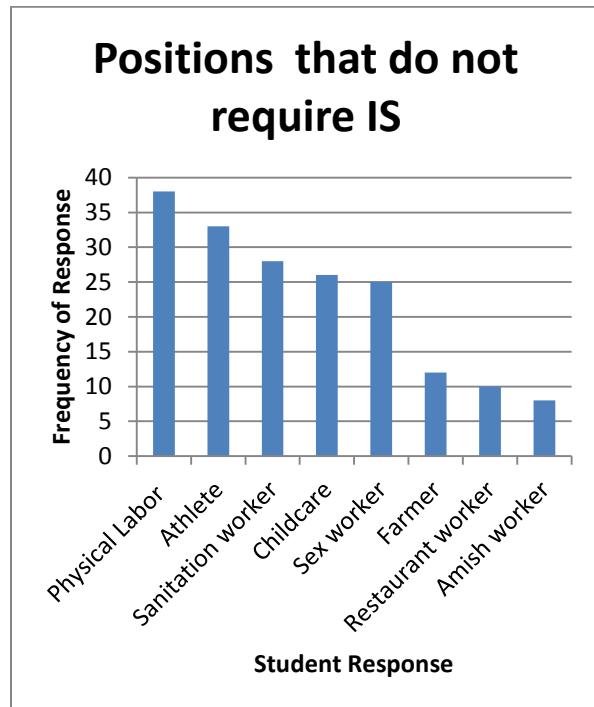

The first survey question asked the students to list a position in the business world that will not require any knowledge of computer information systems. This question was designed to stimulate conversation and to get the students

thinking not of where information systems are, but where are they not. The results are summarized in the Pareto chart, Chart 1.

Many of these positions are not technology driven, but they still utilize technology. For example, restaurant workers use point of sale systems for ordering, and credit card systems for billing, and many of the other job classifications use technology for communications.

The second question queried the students as to which types of information technology they could not live without in their lives. Chart 2 illustrates their responses.

Chart 2
Technology business students cannot live without
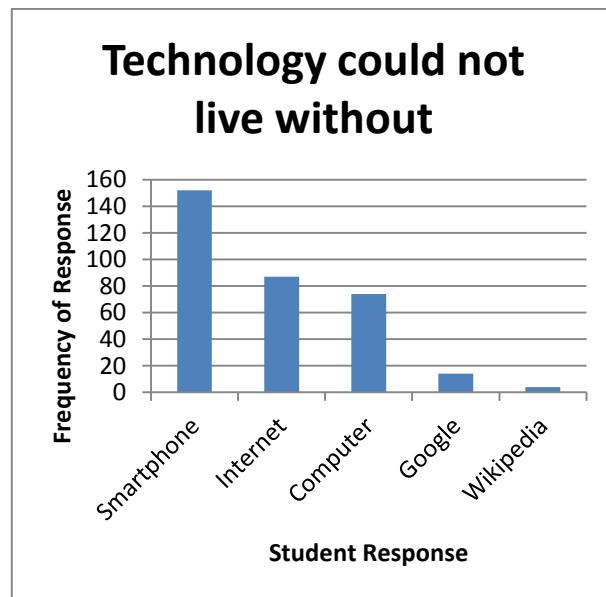
The most frequent response is smartphone, which can be used as a computer and to access the other three technologies (Internet, Google, Wikipedia). Arguably, the smartphone is the one piece of technology that students cannot live without. This is confirmed by every keynote panel at the AITP's National Collegiate Conference, where one skill these technology professionals are looking for is mobile application experience.

Question 3 asks "Which computer skills do employers look for in new employees?" The

responses are listed in Table 2, where 1 = not important and 5 = very important.

Table 2 illustrates that students perceive the Internet and the Microsoft Office Suite as the most in demand skills employers are looking for. Lower in importance are local area network skills, collaboration skills, and hardware skills. An ANOVA; $F_{(7,1559)} = 38.91$, $p < 0.01$, confirms that hardware skills are rated significantly lower than the other skills.

Table 2
Computer skills employers look for in employees (student perception)

Skill	Average	Standard Deviation
Internet Skills	4.5	1.0
Word Processing	4.4	0.8
Spreadsheet	4.3	0.8
Presentation	4.2	0.9
Database	4.1	0.8
Local Area Network	4.1	1.0
Collaboration	3.9	1.0
Hardware	3.1	1.3

Question 4 asks the students to rate the reasons why their peers major in CIS. The results are in Table 3, where 1 = not important and 5 = very important.

Table 3
Why students major in CIS (student perception)

Reason	Average	Standard Deviation
Personal Interest	4.2	1.0
Probability of work	4.2	0.9
Salary	4.1	0.8
Prestige of profession	3.6	0.9
Performance in HS classes	3.5	1.1
Parental influence	2.4	1.1
Friend/teacher influence	2.4	1.1

Table 3 yields three groupings of reasons that are statistically different as tested using an ANOVA; $F_{(6, 1357)} = 98.35$, $p < 0.01$. The primary drivers for students to major in IS are personal interest, employment prospects, and salary. Surprisingly, parental influence and

friend/teacher influence seem to have little (perceived) impact on students' selection of a major. Both of these results agree with the studies by Crampton, et al. (2006) and Downey, et al. (2011). This survey and others rank teachers as having very little impact on students' selection of a STEM major, contradicting the results of the Microsoft (2011) survey. The difference could be attributed to sample groups. While this survey along with Crampton, et al. (2006) and Downey, et al. (2011) sampled general business students, the Microsoft survey sampled STEM majors.

Question 5 asks the students to rate the reasons their peers do not major in CIS. The results are in Table 4 where 1 = not important and 5 = very important.

Table 4
Why students do not major in CIS (student perception)

Reason	Average	Standard Deviation
Not their career choice	4.4	1.0
Not interesting, too hard, mathematics requirements	4.1	1.1
Career opportunities	3.0	1.2
Financial considerations	3.0	1.1
Image of IS worker	2.9	1.1
Parental influence	2.6	1.2
Friend/teacher influence	2.4	1.1

Table 4 also yielded three groupings of reasons why students do not major in IS. Again, an ANOVA was used to determine these differences. $F_{(6,1354)} = 80.76$, $p < 0.01$. The most important factors for not majoring in IS appear to be personal interest and mathematics requirements. In a less important position are career opportunities, financial concerns, and the image of the IS worker. Confirming the results of the previous question (Table 3) parental influence and friend/teacher influence are rated as the least important reasons. These results agree with the study by Pollacia and Lomerson (2006).

The final question asked of the survey group is one of awareness of business careers. This question asks the students if they were informed about various careers while in high school. The results are presented in Table 5, where 1 = not informed and 5 = completely informed.

Table 5 yields two groupings, awareness of management, finance/economics, and marketing, careers and awareness of accounting and CIS careers. Students seem to be uninformed, in general, about all business careers according to the average ratings, but particularly uninformed about accounting and CIS careers. These results confirm those reported by Walstrom, et al. (2008) and reinforce the perception that students are uninformed about IS disciplines when completing high school.

Table 5
Students' knowledge of careers (self-reported)

Career	Average	Standard Deviation
Management	2.9	1.3
Finance/Economics	2.8	1.4
Marketing	2.7	1.3
Accounting	2.5	1.3
Computer Information Systems	2.3	1.3

Comparing responses by gender it is found that in four categories there are statistical differences in how males and females responded. These results are presented in Table 6, where 1 = not important and 5 = very important.

Table 6
Statistical differences between genders

Category	Average Male	Female	t-test statistic	p-value
Local area network skills	3.94	4.38	3.10	< 0.01
Hardware skills	2.92	3.48	2.87	< 0.01
Salary	4.00	4.29	2.30	< 0.05
Prestige of profession	3.51	3.75	1.73	< 0.10

In the categories where gender differences are statistically different, females consistently rated the job skill or reason for majoring in information systems higher than the males in the survey group. This could lead to the observation that females believe that more job skills will make a job seeker more employable and that females pursue salary and prestigious positions more than males.

5. CONCLUSIONS

Our study verifies what many other studies over the last decade have pointed out. Students major in IS fields due to personal interest, employment outlook, and salary levels. The employment outlook is positive and salary levels are good, so this leaves personal interest as the variable to study. Personal interest can be stimulated by parent and teacher contact, however, many studies show that students rate these contacts as low level factors on selecting a major. This result could be influenced by sample selection, so IS majors should be surveyed as to why they selected their major and conclusions about why students do not major in IS can be studied from the current sample.

This study and others (Pollacia & Lomerson, 2006; Walstrom, et al., 2008; Downey, McGaughey & Roach, 2009) suggest that university departments must increase their presence in area high schools in order to recruit interested students into IS disciplines. However, attacking this problem in high schools might be too late to stimulate interest in IS disciplines. Starting technology clubs in elementary or middle school could stimulate interest, as well as having technologically savvy teachers in the classroom. Both of these proposals require commitment from university IS departments and departmental personnel.

Stimulating personal interest in IS careers and the field in general is another approach to filling the IS pipeline with qualified workers. This research suggests further study on determining when personal interest is developed in IS careers and how to positively affect this interest. This proposed study could survey IS professionals and IS students to determine baseline personal interest variables which could indicate when and how to stimulate personal interest in the IS field.

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Appendix A
Computer Information Systems – A Degree for the 21st Century

1. List two positions in the business world that will not require any knowledge of computer information systems.

   a.

   b.

2. List two types of information technology that you could not live without in your personal life.

   a.

   b.

3. What kind of computer skills do you think that employers look for in new employees? Please rate each skill according to the scale: 1 = not important, 2, 3, 4, 5 = very important

	Presentation Skills (such as PowerPoint)
	Word Processing Skills (such as Word)
	Spreadsheet Skills (such as Excel)
	Database Skills (such as Access)
	Internet Skills (such as searching and information gathering)
	Local Area Network Skills (such as navigating the H:, K:, and F: drives)
	Collaboration Skills (such as Google Docs or Microsoft 365)
	Hardware Skills (such as replacing hard drives or network interface cards)
	Other Skills please list: _____

4. Why do you think students major in computer information systems? Please rate each reason according to the scale: 1 = not important, 2, 3, 4, 5 = very important

	Personal interest – technology is cool
	Probability of working in field after graduation
	Salary – starting and long-term
	Prestige of profession
	Parents influenced choice of major
	Friends or teachers influenced choice of major
	Performance in high school courses – technology studies are easy for them
	Other reasons: _____

5. Why do you think students do not major in computer information systems? Please rate each reason according to the scale: 1 = not important, 2, 3, 4, 5 = very important

	Not what they wanted to do for a career
	Career opportunities
	Financial considerations – salary, benefits
	Image of the information system worker
	Parents influenced choice of major
	Friends or teachers influenced choice of major
	Subject not interesting, subject matter too hard, mathematics requirements
	Other reasons: _____

6. Demographic questions. Please circle or fill in the blank.

Gender: ☐ Male ☐ Female	**Year of birth:** 19_____	
Year in school: Freshman Sophomore Junior Senior		
Major: _____ **Minor:** _____		

In high school I was informed about careers in:
Circle your response where: not informed = 1   2   3   4   5 = completely informed

Marketing	**1**	**2**	**3**	**4**	**5**
Management	**1**	**2**	**3**	**4**	**5**
Accounting	**1**	**2**	**3**	**4**	**5**
Finance/Economics	**1**	**2**	**3**	**4**	**5**
Computer Information Systems	**1**	**2**	**3**	**4**	**5**