Why Are Students Not Majoring in Information Systems?

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ABSTRACT

The purpose of this study was to examine some of the factors that influence and impact business students when they select their major and, more particularly, to examine why students are not majoring in information systems. Students in an entry level business class responded that they were more knowledgeable about careers in management, marketing, accounting, and finance than they were about careers in information systems. These business students indicated that they are looking for majors that will be interesting, provide them with job security initially and over their careers, and pay them well. The most important information sources used by these students in their major selection decision were information on college/department websites, brochures about the major, and information on the Internet. When asked why they were not majoring in information systems, the top two reasons given were "not what I wanted to do" and "subject not of interest."

Keywords: Academic Choice Decision, Choice of Major, Career Choice, Enrollment

1. INTRODUCTION

Recently, there has been much discussion in the popular and business press regarding the demise of the American technology worker (Engardio, et al., 2003), particularly workers in the information technology profession (Baker and Kripalani, 2004). After the boom times of the late 1990s, the job market for IT workers eroded during the economic recession of the early 21st Century. Economy related job loss in combination with the increase in IT outsourcing led some to proclaim the IT profession doomed to decline within the USA. Despite headline news articles, the overall job market for IS professionals has remained relatively strong, and, according to U.S. Bureau of Labor Statistics (BLS) projections, remains one of the major occupational growth areas for the next decade (Hecker, 2005). Indeed, these BLS projections suggest almost half (five of the top twelve) of the fastest growing occupations will be in high-paying IT related occupations, and that overall computing related occupations most important issue according to CIOs and other top ranking IT managers (Luftman, et al., 2006). Skilled IT professionals are central to technology enabled productivity improvements that have historically driven U.S. economic prosperity (Atkinson and McKay, 2007; Greenspan, 2000). With IT employment at an all time high, continued job growth expected, and enrollments in information technology related majors near an all time low, it is likely the USA will encounter a severe IT worker shortage that could negatively are growing "more than three times faster than the average for all occupations" (Hecker, 2005, p. 72). Yet, it is possible that new college students and their advisors have been swayed by the gloomy headlines, as enrollments have plunged in most college computer science and information systems programs (Chabrow, 2004). As reported in the CRA Bulletin (Vegso, 2006), according to the freshman survey data collected by the Higher Education Research Institute (HERI), enrollments in computer science and related computing programs have fallen by 70% since peaking around the year 2000. Correspondingly, computing related enrollments are the lowest they've been since the late 1970's, a time period that pre-dates many computing related curriculums.

The continued importance of the IT workforce issue is highlighted by ongoing studies of top IT management concerns. In a recent study of "Key Issues for IT Executives," the concern about "attracting, developing, and retaining IT professionals" hasagainbeenrankedasthe2nd impact the national economy. Some have referred to this pending talent shortage as a national crisis, while others merely refer to the pending shortage as "a major challenge to remaining competitive" (Mitchell, 2006). Consequently, it is in the nation's best interest to better understand the phenomenon of degree major selection by students attending our institutions of higher learning. (Note: while this study focuses on the USA, similar enrollment concerns have been

noted in Australia, Canada, South Africa, and Western European countries.)

Historically, enrollment trends in different areas of study oscillate and interest in differing college of business degree programs fluctuate. Currently, enrollments in information systems related degrees are very low. Similarly, in the late 1990s, enrollment in accounting degree programs was down. Consequently, there is now an insufficient supply of properly schooled accounting graduates and that labor market is very tight. Fortunately for the accounting profession, accounting programs are now drawing large numbers of students to that discipline. Nonetheless, it would be helpful to attract students to a discipline before a labor shortage becomes obvious. While student career choice patterns are likely to vary over time, it would be beneficial to both the students and society if we can ensure that new entrants are making informed choices about life-influencing career and degree decisions. Can we influence, impact or predict these fluctuations? Do we know why students are spurning IT related degree programs? The purpose of this study was to examine some of the factors that influence and impact business students when they select their major and, more particularly, to examine why students are not majoring in information systems. Factors related to familiarity with possible career options and sources of information were examined. In addition, traditional factors, such as those related to career outcomes, characteristics of the profession itself, and referent groups, were also examined.

2. LITERATURE REVIEW

Until recently, information technology-related majors have enjoyed an abundance of student enrollments. Therefore, little attention has been given to understanding why students select these majors. Correspondingly, little research has been published documenting the factors that influence student selection of computer information systems and other information technology (IT) majors. Instead, we will have to examine previous studies done in referent disciplines. We will first review studies done on the accounting major and conclude with a review of career/occupational choice studies that have been conducted without focusing on a single academic major.

Recently, a number of studies have been conducted examining the selection of accounting as a major. In the late 1990s, the accounting field experienced drastic declines in the number of majors, spurring concern about the perilous future of the profession (Albrecht and Sack, 2000). Twenty-one separate studies of the choice-of-major decision were reviewed by Simons, et al. (2003). They identified earnings, career opportunities, career characteristics, and characteristics of the major as principal categories in major selection. They found that the most important career factors when selecting a major were financial rewards (with long-term earnings outweighing initial earnings), job availability, and interest in the major/career.

After surveying professors and accounting practitioners, Albrecht and Sack (2000) enumerated five major reasons for declining enrollments in accounting programs. The reasons given included 1) starting salaries that were low relative to other business majors, 2) students having more attractive career alternatives than in the past, 3) contemporary students more willing to choose risky majors than in the past, 4) a lack of information and considerable misinformation about what accountants do, and 5) concern that the 150-hour rule increased the effort and the opportunity cost associated with majoring in accounting. In an effort to evaluate these findings Francisco, et al. (2003) found the major reasons for not majoring in accounting included "quality of work" issues (accounting viewed as boring), and their research also supported the conclusion that misinformation and misconceptions about what accountants do are pervasively held by high school teachers, counselors, and students.

Noland, et al. (2003) found that the factors influencing major selection by accounting and information systems majors were long-term salary possibilities, prestige of the profession, job security, and starting salary, while influence of a professor, influence of family members, and difficulty of the subject matter rated much lower. Reasons non-accounting students gave for not majoring in accounting primarily reflected quality of work issues related to boring and unsatisfying work. Alumni, the Internet, newspapers, and TV were rated as the top information sources influencing the choice of major. The researchers also suggested that high school teachers have a stronger influence on the major choice of African American students, and that females are under-represented in the information systems major. John-Charles and Walstrom (2000) found the primary reasons that African American students selected their major were interest and enjoyment in an area of study, enjoyment of the working conditions, and marketability. Interestingly, Noland and colleagues found a discrepancy between the reasons non-accounting students reported for their accounting avoidance and the reasons accounting professors and practitioners had surmised as reported in Albrecht and Sack (2000). This disconnect suggests that it is unwise for IS faculty to presume that we know why students are shunning IT majors.

Ultimately, declining enrollments in accounting were reversed, perhaps related to lessons learned through research, albeit some would credit the Sarbanes Oxley Act of 2002 that brought abundant attention to the accounting profession and was dubbed "the full employment act for accountants." Interestingly, others have attributed these increased enrollments to the highly-publicized scandals in the accounting area (e.g. Enron, WorldCom). According to several writers, these scandals have transformed accounting into a "sexy" field (e.g. Byrnes 2005; McDonald 2005).

Galotti and Kozberg (1987) listed the following four factors as the most important in influencing students when selecting a major in general: "How much I care about the subject," "Something I do well in," "Something with good career opportunities," and "What I want to do with this major after college." In a subsequent study, Galotti (1999) found that students relied on only a few criteria as part of their academic choice decision. While students acknowledged the importance of the choice of major decision, they found the decision process stressful and reduced their stress by restricting the number of alternatives and criteria they considered. These criteria were grouped into several categories. The top six categories were interest/enjoyment, ability, values, curriculum requirements, departmental reputation, and parental advice. Limited search in making the

choice of major decision has also been reported by others (Brousseau and Driver, 1994), and this limited search problem may be exacerbated in relation to the computing disciplines, where almost half the surveyed students reported high school 'did not prepare them at all' for computing oriented education (Varma, 2006).

Lowe and Simons (1997) studied the relative importance of 13 factors influencing the choice of business major. They found that the most important criteria influencing the choice of major across all business student majors were future earnings, career options, initial earnings, and ability/aptitude. They found distinguishable differences among majors. For example, accounting students were particularly influenced by external factors such as long-term earnings, initial earnings and career options, whereas marketing majors highlighted interesting subject matter, and management majors rated self-employment opportunities highly. For all groups studied, referent sources (parents, teachers) had only moderate influence on the major selected.

3. METHODOLOGY

A questionnaire was constructed and administered to students enrolled in an introductory business course designed for incoming freshman at this large mid-western university (USA). The questionnaire closely corresponds to the instrument used in Noland, et al. (2003). The Noland, et al. (2003) study attempted to examine declining enrollments in the accounting field by surveying upper-level accounting students and a somewhat smaller sample of upper-level IS students (given the accounting focus of the study, these were classified as non-accounting students). Since the issues examined in this study were very similar to those examined in the Noland et al. (2003) study, a slightly modified version of their questionnaire was used in order to enable consistency and enable future comparisons between the findings of the two studies. It also allowed us to build off the success of the Noland, et al. (2003) taking into consideration the major factors discovered during the literature review and making minor adaptations to better fit our IS focus and general business student sample. In adopting a survey based on prior literature, the relevance of key issues of student concern and consideration were confirmed via a focus group session of students in a prior class. Due to the exploratory nature of this study, face validity was used to determine the appropriateness of the questions (Nunnally, 1978, p. 111).

Participants were asked to respond to the importance of some items using a 6-point Likert-type scale, to some items by checking "all that apply", and to some items by answering open-ended questions. Pedhazur and Pedhazur-Schmelkin (1991, pp. 119-122) suggest the use of five, six or seven point Likert scales as being appropriate. A 6-point Likert scale was selected for this study since it does not allow the respondent to select a neutral position on an issue, and since scales lacking midpoints may be more reliable (Alwin and Krosnick, 1991). These characteristics were deemed to be important for the purposes of this study.

The purpose of the course from which the sample was taken is to introduce freshman and transfer business students to the theory and practice of private enterprise, including purposes, structures, functional areas and related institutions. The course is also intended to ensure that students are making an informed career choice decision by having them research and be exposed to career information in various business disciplines. Participation in the survey was voluntary and the confidentiality of individual responses was assured.

The student body of this state university is comprised of approximately 55 percent from a major metropolitan area, 39 percent from surrounding rural and suburban communities and townships in the Midwest, and 6 percent international and out of state. The average ACT score for incoming freshmen is approximately 24, and the university was ranked by Kiplinger Magazine (Clark, 2007) as one of the best values in public education, partially due to an above average graduation rate.

4. FINDINGS

A total of 303 responses were collected from students enrolled in this introductory business course: 130 of the students (44 percent) indicated they were female and 163 (56 percent) indicated they were male. This suggests an under-representation of females in these course sections since the overall university population is about 58 percent female. Both the university population and the sample respondents are mostly traditionally aged college students with approximately 98% of the respondents ranging in age from 17-23 and representing the demographic cohort often referenced as Generation Y. While the course is designated as a freshman level course, 200 of the respondents indicated they were freshmen, 57 indicated they were sophomores, 36 indicated they were juniors, and ten failed to indicate their gender and class rank. The upper level students represent internal and external transfers who recently switched to a business major.

Descriptive statistics reporting mean values was the primary statistical analysis method used in this study; frequencies were evaluated to examine for any flagrant violations of normality assumptions. Generally, violations were not encountered. Most item scales demonstrated a full range of responses, and a wide variation in response was also suggested via the variance and standard deviation indicators. Evaluation of frequency plots revealed little evidence of floor or ceiling effects, although there was a moderate 'floor effect' in regards to students' awareness of career opportunities in regards to a few disciplines (information systems and logistics) and information sources. Few of the measurement scales demonstrated any severe issues related to skewness. For example, of the ten item-scales measuring career awareness, only one measurement item showed skewness exceeding an absolute value of 1.0 while most skewness values did not exceed 0.3. Similarly, most kurtosis indicators and normality plots supported univariate normality of measures.

4.1 What Majors Are Students Selecting?

Table 1 shows the distribution of respondents by major. The largest number of respondents identified themselves as business administration majors. This major is often selected by students who are still undecided, but know they want to be business students. The other more traditional majors that have been around much longer (accounting, finance, marketing and management) were selected by 173 (over

half) of the respondents. Strikingly, only five respondents (less than two percent) identified information systems as their major.

Major	Number of Respondents	Percent
Business Administration	79	26.0
Marketing	73	24.0
Accounting	47	15.5
Finance	32	10.6
Management	21	7.0
International Business	10	3.3
Other	9	3.0
Business Teacher Education	5	1.7
Information Systems	5	1.7
Economics	3	1.0
Insurance	3	1.0
Logistics	0	0
Undecided	6	2.0
Not reported	10	3.3
TOTAL	303	100.1

Table 1. Respondents by Major (in order of frequency)

The population from which the responses were collected was composed of, among others: Business Administration majors (29.2 percent); Marketing majors (18 percent); Accounting majors (13.3 percent); Finance majors (11.7 percent); Management majors (8.7 percent); International Business majors (3.8 percent); and Information Systems majors (0.6 percent). A complete Chi-square analysis yielded a X^2=6.02 with a critical value of 15.507 showing no statistically significant difference between the distribution of majors in the College population and the distribution of majors among the respondents.

4.2 How Much Do Students Know About These Majors Coming Into College?

Table 2 shows the average perceived knowledge and awareness level of the respondents upon completion of high school, and then shows the percent of students who acknowledge having very little awareness of career opportunities in the discipline (by rating their awareness as either 1=Not aware or 2=marginally aware). This table indicates that students perceived their knowledge and awareness level of the more traditional majors (accounting, finance, marketing and management) as higher than other majors. Interestingly enough, none of the perceived knowledge and awareness levels were very high. With a scale from one to six, 3.5 would be the middle. Only management and marketing were barely above this mid-point mark. Of special concern, both computer science and information systems ranked near the bottom of student knowledge and awareness, yet the focal university has degree programs in both disciplines.

The "Lower Third" column in Table 2 illustrates the percent of students selecting career awareness ratings from the lower third of the item response scale. Such ratings signify that the student had at best marginal awareness of career opportunities in the related discipline. Unfortunately, IS rated among the worst in student awareness, with approximately 58% of students acknowledging they were either 'not aware' or were only 'marginally aware' of related career opportunities.

Area	Average Knowledge Level*	Lower Third Career Awareness Rating**
Management	3.81	17 %
Marketing	3.76	18 %
Accounting	3.31	34 %
Finance	3.09	36 %
Economics	2.98	40 %
Insurance	2.91	40 %
Computer Science	2.90	45 %
International Business	2.84	47 %
Information Systems	2.46	58 %
Logistics / Operations	2.01	73 %

* 1=Not Aware; 6=Excellently Informed

** Lower Third = respondents rating awareness level as 1 or 2 (not aware, marginally aware)

Table 2. Responses to the Question: How knowledgeable and informed (aware) were you about possible careers in each of the following areas when you completed high school? (in order from most knowledgeable to least knowledgeable)

The results in Table 2 suggest that students entering college are choosing their majors based upon an average, at best, level of knowledge and awareness concerning possible careers associated with these majors. Awareness is particularly problematic relative to Information Systems, and to a lesser extent, Computer Science. Despite knowledge and awareness levels that are far from complete, it is interesting to note that the top five majors selected by these students (as shown in Table 1) correspond very well with the top four careers with which they possess the highest levels of knowledge and awareness. Marketing, accounting and finance are ranked 2nd, 3rd, and 4th in both tables. Management, ranked 1st in knowledge and awareness, corresponds to majors in both business administration and management, ranked 1st and 5th in Table A. Similarly, information systems and logistics had the lowest awareness ratings and also ranked near the bottom in choice of major. This suggests that knowledge and awareness levels, even those that are not exceptionally high, likely have an impact on major selection.

4.3 Are They Aware of Possible Careers in a Chosen Major?

Intuitively it would seem that students interested in a particular major would have greater awareness of the career possibilities in that major than students who did not select the major. Table 3 shows a comparison between respondents who selected a particular major and those who did not select that major regarding awareness about career possibilities in a particular major. Majors selected by over 20 respondents were reviewed. In addition, while the number of respondents who selected information systems as a major was small

(five), it was important to review this group and they were added to the table. Table 3 shows that there was a significant difference (at the 0.05 level) between the awareness of majors and non-majors regarding awareness of possible careers in a major. For all respondents except management majors the difference was significant at the 0.01 level.

MAJORS	N	MEAN	F	SIG.
Awareness of Careers in Accounting				
Accounting	47	4.45	42.065	.000 ***
Not Accounting	247	3.10		
Awareness of Careers in Finance				
Finance	32	3.69	7.127	.008 ***
Not Finance	261	3.01		
Awareness of Careers in Marketing				
Marketing	73	4.32	16.707	.000 ***
Not Marketing	221	3.57		
Awareness of Careers in Management				
Management	21	4.38	3.979	.047 **
Not Management	273	3.77		
Awareness of Careers in IS				
Information Systems	5	4.00	7.113	.008 ***
Not Information Systems	288	2.44		

*** significant at the 0.01 level ** significant at the 0.05 level

TABLE 3. Comparison of Awareness About Possible Careers in Their Chosen Major

4.4 What Is Important To Students When They Pick A Major?

Table 4 shows the factors important when students are selecting a major. The factors in this table can be primarily grouped into three categories of influences: social/referent, personal interest and ability, and unique career-related factors offered by a particular field. While the highest-ranking factor was personal interest in the subject matter, eight of the top 10 were career oriented. These included the probability of working in the field after graduation, starting and long-term salary prospects, prestige of the profession, occupational growth forecasts, job security, opportunities for ongoing professional development, and reputation of the degree program at the university. The factors rated as the least important were referent sources: high school guidance counselors, university career services programs, and university advisement center. "Family member" was the only referent source that, on average, scored above the midpoint of the 6-point rating scale. It appears from Table 4 that business students are looking for majors that will be interesting, provide them job security initially and over their careers, and pay them well.

Factor in Choice of Major	Average Importance *
Personal Interest in Subject Matter	5.08
Probability of Working in Field After Graduation	4.80
Long-Term Salary Prospects	4.80
Starting Salary	4.40
Prestige of Profession	4.37
Occupational Growth Forecasts/Predictions	4.33
Job Security of related occupations	4.14
Opportunities for Ongoing Professional Development	4.07
Ease of Subject Matter – easy for me	3.91
Reputation of Degree Program at University	3.91
Family Member (s)	3.74
Performance in High School Subject Matter Courses	3.64
Reputation of University Degree Program Faculty	3.57
Performance in University Subject Matter Courses	3.53
Difficulty of Subject Matter – difficult for most people	3.33
Professor (s) at University	3.20
Probability of Graduating with Honors in Major	3.18
Flexibility of Work Schedule	3.11
Friend(s)	3.00
High School Teacher(s)	2.99
High School Career/Interest Tests/Assessments	2.95
University Advisor(s)	2.83
Opportunity to Participate in Student Organization (s)	2.83
Counseling Center Career/Interest Tests/Assessments	2.60
High School Guidance Counselor(s)	2.59
University Career Services Program(s)	2.47
University Advisement Center	2.46

* 1=Not Important; 6=Very Important

Table 4. Importance of Factors in "Why" Respondents Selected Their Major (in order of importance from most to least)

4.5 Why Are They Choosing Not to Major in Information Systems?

Table 5 shows the responses to the question "If you are not a Business Information Systems major, what are the reasons you aren't?" Respondents were allowed to select as many of the nine reasons in Table 5 as they perceived to be applicable. The top two reasons were "not what I wanted to do" and "subject not of interest." The "image of the IT worker" was identified by 60 respondents. "I'm not suited for IT type work" and "subject matter too hard" made up the

remainder of the top five reasons. However, when asked to comment on other reasons for not selecting the major, 18 people (the greatest frequency) indicated they did not know enough about the major. Other reasons such as "don't like computers" and "outsourcing" were only mentioned by three and one respondents, respectively.

Somewhat surprisingly, "poor career opportunity" was selected only six times as a reason for not selecting information systems as a major. This represents only about one percent of the total reasons given and calls into question the belief held by many that outsourcing and lack of jobs are significant impediments to attracting students to the IS field.

Reason	Number of Respondents
Not what I wanted to do	173
Subject not of interest	169
Image of the IT worker	60
I'm not suited for IT-type work	33
Subject matter too hard	23
Financial Considerations	19
Poor Career Opportunity	6
Bad teacher	3
Boring teacher	1

Table 5. Answers to the question "If you are not a Business Information Systems major, what are the reasons you aren't?
(In order of frequency)

4.6 Where Are They Getting Their Information?

Since students are looking for majors that will be interesting, provide them job security initially and over their careers, and pay them well, it is worthwhile to note the information sources they are using to determine which of these majors have these desirable characteristics. Table 6 shows where students indicated they are getting their information. College/Department Websites, brochures about the major and information on the Internet/Web were perceived to be most important. Nonetheless, on a scale of one to six, 3.5 is the midpoint and none of the commonly reported information sources, on average, scored above the midpoint. This leaves the question still open, "Where are they getting their information about these majors?" It is likely that many students are affected by the perceptions of family and friends. Table 4 indicated family members were at least moderately important influences in their selection of a major.

5. DISCUSSION AND CONCLUSIONS

The purpose of this study was to explore what factors and information sources are most important to contemporary "Generation Y" students when selecting their college major and, more particularly, to examine which factors might be associated with students shunning enrollment in IS and computing related majors. The results of this study suggest that students didn't consider themselves very informed about career opportunities in IT. Information systems ranked only above "logistics/operations" in terms of their career awareness level, and computer science wasn't terribly far ahead. Given the low level of awareness of IT career opportunities, this suggests that the choice of computing related majors may not even be considered by students when they graduate from high school. Certainly in this study, awareness of IS career opportunities and the choice of IS as a major were both very low. A comparison of the results shown in Tables 1 and 2 suggests that there is a strong association between student awareness level of career opportunities and their selection of a major.

Information Source	Average Importance*
Information on College/Department Website	3.36
Brochures about the Major	3.25
Information on Internet/Web	3.24
Newspaper Articles	3.00
Television or Movie portrayal of the occupation	2.87
Presentations by Faculty	2.80
Online Job Listing(s)	2.79
Presentations by Current Students	2.75
Invited Speakers	2.57
Presentations by Alumni	2.52
Informational CDs or DVDs	2.17
Job Listings in Classified Ads	2.10

* 1=Not Important; 6=Very Important

Table 6. Importance of Information Sources When Respondents Select Their Major
(in order of importance from most to least)

This study failed to identify the important sources of information used by students when selecting a major. Of the information sources listed, information on college/department websites, brochures about the major, and information on the Internet were most important. However, none of these sources were rated as above average importance. While the college/department website was ranked relatively high, it is unlikely students will visit these websites for computing related majors unless they become aware that these are potentially rewarding career areas.

The results of this study indicate that career-oriented factors were more important in student major selection than factors related to university career service programs, the influence of high school advisors or counselors, or the influence of university advisors or counselors. Admittedly, since most respondents were freshmen, the university advisors had limited chances to influence these respondents. Nonetheless, it appears these students are not receiving, or are ignoring, the career information and advice they should have received in high school. Unfortunately, the low influence of referents on student major selection is not unique to this study.

Contrary to common conjecture, this study failed to confirm perceptions of "poor career opportunity" and related concerns about outsourcing as cogent factors in the minds of students. Only one percent of students expressed concerns about career opportunities as having influenced their decision to not major in IS. Similarly, only one student expressed concerns regarding outsourcing of IS-related jobs. Subsequent classroom discussions suggest these entry level students are relatively unaware of the outsourcing issue and thus it was unlikely to have influenced their major selection.

The top two reasons given by students for not majoring in information systems were: "not what I wanted to do" and "subject not of interest."

5.1. Possible Remedies.

It appears likely that students are not exposed early enough to the true nature of IT to make an informed decision. Table 4 indicates that at least a moderate level of importance is attached to performance in career-related high school courses. Unfortunately, information technology-related subjects, similar to accounting, are often relegated to coverage as a "trade" and may not even be offered in the regular curriculum at many high schools that are highly respected in their locale. Based on conversations with students, their primary IT-related high school experience is in the areas of keyboarding or 'office'-related tools with little attention to the problem solving and systems solution focus of most IS/IT work. The notion that IT receives insufficient exposure at the high school level is supported by a survey conducted by Varma (2006). Correspondingly, research suggests secondary school business educators are relatively unaware of the job characteristics and competencies of the information systems occupations (Berry, O'Bryan and Cummings, 2004). Does this lack of understanding by high school teachers result in lack of topic and occupational coverage? If the business teachers are relatively unaware of information systems then, by extension, it's likely the high school counselors have few expert referents available for building their own awareness. Unfortunately, lack of exposure provides limited opportunity for high school students to establish personal interest in the problem solving aspects or emergent application content of IS/IT subject matter.

This is particularly problematic when many students enter college at least believing that they know what they want to do. Approximately 55 percent of respondents indicate that they selected their major while in high school while another 21 percent made the decision during the freshman year; only 1.3 percent of respondents comments indicated they were still undecided even though this was a predominately freshman level class. Of the 200 freshman respondents, 150 made their major selection while still in high school, 43 made the selection as a college freshman and 3 were still undecided (two non-responses and two selected 'other'). Given the high percentage of students making their initial major selection in high school, it appears clear that there is a need to connect with and inform incoming students before they reach college.

The American Institute of Certified Public Accountants has been involved for some time in a $25 million, five-year student marketing campaign that aggressively targets high school and college students from 16 to 22 years of age. The campaign includes the use of various print media, direct mail, email, television broadcasts on college campus networks, an internet site and a "Dream Internship" essay contest to attract students. A series of posters sent to thousands of high schools directs students to a website (www.StartHereGoPlaces.com). This website educates students on career opportunities in accounting, CPA skill sets, colleges and scholarships. In addition, the website offers students the opportunity to play several games, including a business simulation game. The message of this campaign has reached hundreds of thousands of students. Perhaps a similarly aggressive campaign is needed in order to educate students on the true variety of opportunities offered in the information technology profession. The results of this study, which suggest that web-based content and brochures are among students' most highly rated information sources, strengthens the argument for such a campaign.

As mentioned, IT and accounting both tend to suffer relative to some other subjects in terms of exposure at the high school level. This lack of exposure likely makes the first course in college of paramount importance in dispelling myths about these fields. A number of researchers in accounting have suggested that the first college accounting course is an important recruiting tool (e.g. Chen et al., 2005; Geiger and Ogilby, 2000). Correspondingly, IT related programs may want to re-orient the first course to include more interesting aspects of the profession rather than solely focusing on the traditional 'programming' course. Such a "new and improved" introductory IT course could be a successful marketing tool for the IT major and, thereby, convince some students to switch to an IT major. Major change by business students is not a rare event. Noland, et al. (2003) found that approximately 41 percent of accounting majors and 73 percent of IS majors had in fact changed majors one or more times. Similarly, Malgwi (2005) and colleagues found that nearly half the business students had changed majors one or more times.

However, even a reorientation of the first college IT-related course will not be a cure-all, since most students are initially selecting their major while still in high school and many students never enroll in this first IT-related course. Considerable research suggests that previously-held beliefs are difficult to overcome (Rabin and Schrag 1999), even for professionals who would presumably be knowledgeable of the potential for such psychological effects (Pfeiffer et al 2000; Strohmer and Shivy 1994). Still, efforts must be made at all levels to educate students on the myriad opportunities available to them. The newly required 'introduction to business' course, in which this survey was conducted, illustrates an attempt by our college to ensure students targeting a business major are adequately informed of the primary context, and occupational opportunities associated with each major business discipline.

One potential step in remedying the lack of IS/IT knowledge may be in increasing the potential influence of high school and university guidance sources such as career service programs and advisors. Indeed, the lack of influence from these sources may be due to a lack of current knowledge among those involved in these capacities. A concerted effort by educators to ensure sufficient knowledge of contemporary IS/IT work may assist in bringing the profession to the attention of these potentially useful sources of student awareness. Thus, university educators should look to establish stronger ties and offer expert assistance to the secondary schools. Most importantly, the business community needs to become more vocal in expressing their needs for IS/IT professionals, and more collaborative in their efforts to share both the organizational importance and personal 'day in the life' type experiences related to their IT resources. Such outreach efforts should serve to inform

students of the occupational context and rewards, build interest in the application, and importance, of IT enabled solutions, and concurrently expand the awareness level of secondary school teachers and counselors.

5.2. Limitations and Future Research Avenues.

Only five of the respondents indicated IS as a major. This relatively low number of IS majors is one of the main issues at hand in the profession, and is a primary motivation behind this study.

When examining information sources used by respondents to assist them in selecting a major, none of the sources were rated above average importance. That could mean that we have yet to identify the sources that are most important to students when selecting a major. Future research should include examining additional possible information sources of importance. Correspondingly, the lack of information sources may indicate students are making their important choice of major decision based on only a limited search and decision process. Future research should evaluate how fully informed and aware students are of the typical work characteristics and occupational rewards in common business occupations.

In addition, the data and resultant analysis of this study are based on self-perceptions. Perceptions do not always correspond to reality. Respondents may misrepresent their knowledge and awareness levels or make inaccurate estimates. Future studies might seek to employ more objective measures when examining occupational awareness.

Another potential limitation – inherent in many academic surveys – is that the results are not necessarily generalizable across other groups of college students. The sample for this study was drawn primarily from the Midwest United States. The Midwest is typically considered to be more conservative than the East or West Coast and the results of this study may not be as generalizable to those populations. Similar studies should be conducted in those areas to verify if the findings hold. Also, the sample in this study was composed almost exclusively of traditional college-age students. It is very possible that non-traditional students are more informed regarding the various career opportunities, more mature in their decision-making processes, and more likely to consider different factors. Future studies should seek to examine where students (traditional and non-traditional) obtain their information about career options, starting salary and long-term salary prospects, information about introductory job prospects and long-term job security, and, especially, information about the nature of the work.

As stated previously, when non-IS majors were asked why they didn't choose IS as a major, a nontrivial number of students admitted they simply don't know enough about the profession. However, most students in this study apparently assume they know enough about the field to determine that they are not interested in the subject matter and IT is not where they wish to go. By far, the most common responses were that it "wasn't what they wanted to do" and the "subject matter was not of interest". At the same time, in the current study, their interest in the subject matter ranked higher in importance than any other factor in determining their selection of a major. Since the majority of these students were first semester freshmen with limited exposure to IT coursework, it is likely that they made their assessments based on incomplete information. Future studies should examine precisely what students think IT involves. Do they see it as primarily programming or data input? If so, many may view IS/IT as either too exacting and frustrating or too boring.

The Albrecht and Sack monograph (2000), in addressing the then-declining accounting enrollments, noted that information systems was one of several "new", attractive majors that was competing mightily with accounting in attracting bright students. Given the strong economy at that time, they noted that students were more concerned with growth potential and wealth accumulation than with the safety and predictability that accounting offered for a career path. At that time, they noted the strong economy as an important contributor to the drastic declines in accounting enrollments. Students at that time had not seen a bad economy and were perhaps more willing to choose "risky" majors. If they associate IT with "dotcoms", they know that the bubble has long since burst and they may view IT as risky. Since the 21st century began, the U.S. economy has seen nothing but uncertainty. Although jobs are plentiful in IT, the perceived predictability of a career path may not be apparent given the headlines associated with globalization and outsourcing. Therefore, perhaps perceptions about a shift in the economy partially explains why we see accounting enrollments sharply increasing and IT enrollments lagging. Exploration of this 'risk aversion' focus would present a worthwhile area of study.

Ultimately, it is important that program administrators examine their curriculum to assess whether it meets current needs, and whether the introductory course includes a focus on capturing youthful relevance, interest, and engagement. The current study is intended as an initial look into students' perceptions about the field and, therefore, does not address curriculum issues. Future studies should perhaps incorporate curriculum-related items in an attempt to assess whether curriculum changes are in order.

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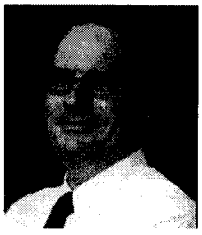

regional, national, and international information systems conferences.

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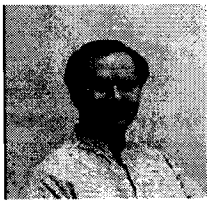

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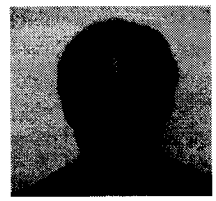

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APPENDIX A.

Student Opinion Survey

We are interested in knowing what factors influenced your decision in choosing your major. The purpose is to help academic departments to better inform potential students. Your **participation is optional**. Your answers will be kept **strictly confidential** and no one will be identified in the tabulated results. Thank you for participating.

PLEASE* CIRCLE *YOUR ANSWERS

1. What is your major? (Double majors should circle more than one)

Accounting Economics Finance Insurance Business-Administration

Logistics Marketing Management Information Systems International-Business

Undecided Other (please be specific): _____

2. For each of the following, please CIRCLE the importance of the item listed for why you selected your major (with 1 being the lowest and 6 being the highest).

	Not Important					Very Important
University Advisement Center	1	2	3	4	5	6
University Advisor(s)	1	2	3	4	5	6
University Career Services Program(s)	1	2	3	4	5	6
Counseling Center Career/Interest Tests/Assessments	1	2	3	4	5	6
Personal Interest in Subject Matter	1	2	3	4	5	6
Difficulty of Subject Matter – difficult for most people	1	2	3	4	5	6
Ease of Subject Matter – easy for me	1	2	3	4	5	6
Performance in High School Subject Matter Courses	1	2	3	4	5	6
Performance in University Subject Matter Courses	1	2	3	4	5	6
Family Member (s)	1	2	3	4	5	6
Friend(s)	1	2	3	4	5	6
High School Guidance Counselor(s)	1	2	3	4	5	6
High School Teacher(s)	1	2	3	4	5	6
High School Career/Interest Tests/Assessments	1	2	3	4	5	6
Reputation of Degree Program at University	1	2	3	4	5	6
Reputation of University Degree Program Faculty	1	2	3	4	5	6
Professor (s) at University	1	2	3	4	5	6
Opportunity to Participate in Student Organization (s)	1	2	3	4	5	6
Flexibility of Work Schedule	1	2	3	4	5	6
Job Security of related occupations	1	2	3	4	5	6
Long-Term Salary Prospects	1	2	3	4	5	6
Prestige/Image of Profession	1	2	3	4	5	6
Starting Salary	1	2	3	4	5	6
Probability of Working in Field After Graduation	1	2	3	4	5	6
Occupational Growth Forecasts/Predictions	1	2	3	4	5	6
Probability of Graduating with Honors in Major	1	2	3	4	5	6
Opportunities for Ongoing Professional Development	1	2	3	4	5	6
Other. Please state what:	1	2	3	4	5	6
Other. Please state what:	1	2	3	4	5	6

3. To what extent were the following information sources important in choosing your major?

	Not Important					Very Important
Information on Internet/Web	1	2	3	4	5	6
Information on College/Department Website	1	2	3	4	5	6
Presentations by Current Students	1	2	3	4	5	6
Presentations by Faculty	1	2	3	4	5	6
Presentations by Alumni	1	2	3	4	5	6
Invited Speakers	1	2	3	4	5	6
Television or Movie portrayal of the occupation	1	2	3	4	5	6
Newspaper Articles	1	2	3	4	5	6
Brochures about the Major	1	2	3	4	5	6
Informational CDs or DVDs	1	2	3	4	5	6
Job Listings in Classified Ads	1	2	3	4	5	6
Online Job Listing(s)	1	2	3	4	5	6
Other (please specify):	1	2	3	4	5	6
Other (please specify)	1	2	3	4	5	6

4. Thinking back to High School, how knowledgeable and informed (aware) were you about possible careers in each of the following areas when you completed high school: (mark X in appropriate column)

Area	Not Aware	Marginally Aware	Slightly Informed	Somewhat Informed	Well Informed	Excellently Informed
Accounting						
Computer Science						
Economics						
Finance						
Insurance						
Logistics / Operations						
Information Systems						
International Bus						
Management						
Marketing						

5. If you are <u>not a Business Information Systems major</u>, what are the reasons you aren't? (Circle all that apply.)

Boring teacher	*Bad teacher*	*Subject matter too hard*	*Subject not of interest*	*Poor Career Opportunity*	*Not what I wanted to do*		*Financial Considerations*	*I'm not suited for IT-type work*	*Image of the IT worker*

Other: _____

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