Encouraging Students to Choose a Computer-Related Major: The Influence of Guidance Counselors

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Abstract

High school guidance counselors influence students' decisions concerning which area to major in upon entering college. Even though guidance counselors can influence students' decisions about choosing a major, many guidance counselors lack knowledge about the opportunities available in information systems (IS). This study captures quantitative and qualitative data from interviews to gain a better understanding of why guidance counselors may or may not encourage students to major in computer-related areas. It also provides suggestions for future research.

Keywords: Guidance counselors, computer majors, computer information systems, IS workers

1. INTRODUCTION

Throughout recent years, a declining interest in computer-related majors such as Computer Science (CS), Computer Information Systems (CIS), and Management Information Systems (MIS) in post secondary education has become evident. One study has indicated that, of surveyed universities that offer CS, CIS, and MIS degrees, 76.1% reported a decrease in the number of students enrolled in respective majors (Pollacia and Lomerson, 2006). In 2000, more than five hundred students were enrolled in the CIS program at our university. Today, that number has decreased by 60% to approximately two hundred students. One study cites that "computer science departments across the nation have recently experienced a precipitous drop in their enrollments, with the number of newly declared computer science majors falling 50% from 2000 to 2005" (Scarlatos and Lowes, 2007). Another study states that computer science enrollments in the U.S. have plummeted by up to 59% (Brookshire, 2006).

Of the declining number of students who declare a computer-related major, many are choosing to drop out of these programs. A recent study states that "most of the attrition happens during (or between) the freshman and sophomore years" (Beaubouef and Mason, 2005). The same study also cites that "drop rates as high as 30 to 40% are reported by many institutions, and are rapidly becoming the norm for computer science programs" (Beaubouef and Mason, 2005).

Contrary to many students' preconceptions, careers in computer-related fields have some of the fastest growth rates. One professor speculates "that the dot-com bust, the outsourcing of [information technology] IT jobs, and the volatility of IT stocks may

be discouraging students from pursuing IT degrees" (Pollacia and Lomerson, 2006). The decrease in students graduating with computer-related degrees has resulted in a shortage of Information Systems (IS) professionals. In effect, there have been diminishing numbers of qualified workers to fill positions in computer-related fields. According to a U.S. Department of Commerce report, the U.S. will face a shortage of IS professionals as massive growth in job opportunities occurs over the next five to ten years (Berry et al., 2006).

The waning interest and numbers in computer-related majors and fields are surprising because the U.S. Department of Labor has predicted "that eight out of the eleven fastest-growing occupations through 2012 that require a bachelor's degree will be in computer-related fields" (Pollacia and Lomerson, 2006). Employment related to computer scientists, systems analysts, and database administrators is expected to increase by up to 27% by 2014. Moreover, jobs for computer support specialists and systems administrators are expected to increase 18% to 26% by 2014 (Rettenmayer et al., 2007) Today, the top six occupations in our home state with the fastest annual growth rate are computer-related (http://www.cfnc.org).

There are multiple factors contributing to the declining interest and enrollment in computer-related majors and fields. One of these factors is students' decisions made, while in high school, concerning post secondary education and careers. One influential figure when making such decisions is a high school student's guidance counselor. "Guidance counselors are a source of information for students making college choices" (Cohoon, 2006). The purpose of our study is to identify how and to what degree high school guidance counselors influence their students when advising them to pursue computer-related majors in higher education.

The rest of this paper is organized as follows. Section 2 reviews relevant literature cited in previous research. Section 3 explains how we conducted our interviews with guidance counselors. Section 4 presents the results from our qualitative and quantitative analyses. Section 5 discusses the ramifications of our findings. Section 6 provides our conclusions from the paper.

2. LITERATURE REVIEW

The Influence of Guidance Counselors

Guidance counselors, also known as school counselors, provide students with information and advice concerning their educational and career pathway(s) (Silverman and Pritchard, 1993). "Guidance counselors also play a significant role in the progression and development of young people" (Waite, 2003). Through providing students with assistance, advice, and encouragement, guidance counselors can significantly affect a student's success. Recent studies of guidance counselors' influence on students' decisions when choosing a major have resulted in inconsistent findings, however.

Some believe guidance counselors are not significant sources for career information and guidance (Swortzel et al., 2006). In a recent survey, students majoring in IS were asked to rate how influential certain groups of people were when choosing to major in IS. Some of the groups included family, college professors, friends, and guidance counselors. Interestingly, out of all the groups, respondents rated guidance counselors as being the *least* influential (Rettenmayer et al., 2007). In another survey of 737 students, when asked who had most encouraged them to take technology-related classes, teachers and guidance counselors were only mentioned by 36% of the students (Silverman and Pritchard, 1996). Students have also reported getting little advice or information concerning technology classes from guidance counselors (Silverman and Pritchard, 1996).

However, other research suggests that guidance counselors can be quite influential in high school students' decisions. One study found that 'recommendations from high school guidance counselors' was rated as being the second most influential factor that led to their decision to major in IS (Rettenmayer et al., 2007).

Issues with Males versus Females

Computer-related fields have been long considered and perceived as being male-dominated. For this reason, among others, females have been disproportionately represented in computer-related fields and majors. In general, stereotypes have li-

mited females' exposure to IS and related courses and fields.

"Stereotypes influence people who advise students, such as their parents, guidance counselors, and teachers" (Spertus, 1991). It isn't uncommon for students and those who advise students to perceive computer-related fields as being 'nerdy'. One study revealed that young women, as well as young men, were discouraged by this stereotype (Jepson and Perl, 2002). With this stereotype, along with the fact that computer-related fields are perceived as being male-dominated, societal culture seems to consider it unattractive for females to be part of the 'nerdy' workforce. In fact, many women in an IT field have reported feeling uncomfortable in a male-dominated environment (Hellens and Nielsen, 2001). "In high school, the social stereotype often denies girls the encouragement that boys are given" (Leever et al., 2002).

As early as middle school, young women are 'filtered out' of mathematics and computer science disciplines because of discrimination from both teachers and guidance counselors (Leever et al., 2002). Due to the lack of support, many females fail to make the connection between what they are learning in computer-related education and careers in computer-related fields. As a result, young men are better prepared to pursue a future in a computer-related field (Leever et al., 2002). It has often been implied that females have 'other interests.' "The implication is that women want a balanced life and there is the misconception that computer scientists cannot obtain a balance between work and family" (Jepson and Perl, 2002). Still, guidance counselors agree that students are not well informed about technological careers and tend to view careers as male and female (Silverman and Pritchard, 1993). Such inequities are evident in the following quote:

> "Well, if they [female students] bring me their registration card with (an AP [advanced placement] science course) listed, I'll check to see if that's really what they meant…but I would never encourage it. I mean, it's usually their last year and there are so many fun things going on. I think they'll be busy enough and they can get into the serious work in college" (Spertcus, 1991).

In fact, one study indicates that guidance counselors had the greatest negative influence on females' decisions to become involved in technology-related fields (Waite, 2003). From the same survey, only 10% of females selected "my guidance counselor said that I should take it" as one of the reasons they decided to enroll in a computer-related course (Waite, 2003). In effect, it is interesting to note that another study indicates that, relative to males, females are influenced more by their guidance counselors (Rettenmayer, 2007).

Why Counselors May / May Not Encourage Students to Pursue IS-related Majors

Even with the abundance of computer-related job opportunities and the lack of qualified persons to fill such positions, it seems guidance counselors, in general, do not bolster or encourage computer-related fields of study when advising students. There is a multitude of issues that could be causing guidance counselors to encourage or to not encourage students to major in computer-related areas.

Guidance counselors seem to lack the knowledge needed to fully understand and promote computer-related majors. "It is clear that depending on high school guidance counselors as a recruitment source is not an effective solution. Perhaps high school counselors are not guiding students into [computer-related fields] because they do not fully understand the profession" (Gray and Daugherty, 2004).

Many guidance counselors cited lack of flexibility as a problem in advising students to take certain courses. Students' schedules only allow for so many electives (Silverman and Pritchard, 1993).

In 2001, a survey was conducted of 420 high school guidance counselors. Nearly all respondents claimed they used a computer, but 12% did not have access to PCs in their offices. Also, those counselors with the largest caseloads were the least likely to use technology (Trotter, 2003).

Age seems to be inversely related to positive perceptions of career and employment opportunities in computing. In other words, the younger the students are, the more positive their perception (O'Lander, 2003). Not only is this apparent in the perceptions of students, but it is also evident in those of guidance counselors.

Most notably, guidance counselors are uninformed about computer-related majors. Previous research has suggested that academia are not doing a good job of marketing the IS business degree. Students coming to a major college campus have often not been exposed to the IS profession by their social contacts such as guidance counselors. Also, IS is a relatively new profession that the general population may not understand. There is a likelihood of people outside of the IS major having an incorrect or skewed perception of the field. Many people, including guidance counselors, associate anything that's computer-related with math and science. Also, some IS professionals may not share in the positive professional image of their counterparts. This could discourage counselors when considering recommending IS to a student (Berry et al., 2006).

Academia needs to, more concisely, market computer-related majors so that guidance counselors will be able to interpret the provided information and use it when advising students about their choice of major (Kamali, et al., 2004). Some guidance counselors claim not to have the resources or time to provide a lot of specific information about careers (Silverman and Pritchard, 1993).

School counselors are not well informed about computer-related majors. It is imperative that school counselors are better informed. A career in information systems is promoted less in high school than are other technical areas, such as engineering, mathematics, and science (Hellens and Nielsen, 2001).

3. METHODOLOGY

First, one of the authors conducted a non-structured telephone interview with his previous high school guidance counselor to gather information. We then created a structured interview to investigate guidance counselors' knowledge, attitudes, and feelings concerning computer-related majors.

We randomly selected and emailed 30 guidance counselors from a spreadsheet of 523 guidance counselors in North Carolina. In our email, we asked for permission to conduct a telephone interview with them. Ten guidance counselors agreed to participate in this study.

Demographics

All ten respondents were females in our home state between 25 – 64 years old possessing at least a Master's degree. As shown in Table 1, half were between 45-54 years old.

Table 1 – Age Distribution of Guidance Counselors

Age Range	Number of Guidance Counselors
25-34	1
35-44	2
45-54	5
55-64	2

Ninety percent of the respondents have worked for more than five years as a guidance counselor, while seventy percent of them have worked at their current school for ten or less years. The high schools in which we interviewed guidance counselors have between 150 – 1,500 students. Over these, two schools had less than 500 students, five had between 500 – 1,000 students, and three had between 1,000 – 1,500 students. The average number of students across all ten schools was 856.

Between one to four guidance counselors work at each of the schools. As shown in Table 2, half of the guidance counselors advise more than 300 students at their respective school. The average number of students advised by each guidance counselor in this study was 286.

Table 2 – Number of Students Advised by Guidance Counselors

Number of Students Advised	# of Guidance Counselors in this study who advise the corresponding number of students
150 or less	1
151 – 225	2
226 – 300	2
301 – 375	5

4. FINDINGS

We gathered both quantitative and qualitative data through the interviews. At the end of each interview, we asked each guidance counselor to answer several questions on a scale from 1 (very little) to 7 (very much). Table 3 summarizes the responses to our questions about the influence of referent groups on the guidance counselors' attitudes about a college major.

Table 3 - Influence of Referent Groups on Guidance Counselors' Attitudes about a Major in College

Referent Group	Mean
Current Students	4.3
Teachers	3.3
Parents	3.0
Principals	1.9
Other guidance counselors	1.5

As shown in Table 3, other guidance counselors and principals have little influence on guidance counselors' attitudes about a college major (such as CIS). Only one referent group, current students, had a mean greater than four. We also asked the guidance counselors several other questions, which were also rated on a scale from 1 (very little) to 7 (very much). Table 4 shows these interview questions and the average for each.

Table 4 – Other Questions Posed to Guidance Counselors

Interview Question	Mean
Do you believe it would be worthwhile for a student to major in CIS?	6.3
Do you like using computers?	5.1
Do you believe that, after graduation, students majoring in CIS would make more money than students majoring in other fields?	5.0
Do you like new technology?	4.9
In general, what level of knowledge about computers and technology do you have?	3.8
How much information are you provided about new technologies?	3.8
How aware are you about the number of available jobs in computer-related areas?	3.7
Do you believe you are fairly up-to-date on new technologies?	3.6
How knowledgeable are you about CIS as a major?	3.2

In addition to the quantitative results shown in Table 3 and 4, we also asked several open-ended questions. These questions allowed us to delve further into the factors that might influence guidance counselors whether to encourage students to major in computer-related areas. The following subsections summarize the main findings after combining the qualitative and quantitative data.

Limited Knowledge about CIS and Related Majors

Even though guidance counselors indicated in the quantitative questions that they are somewhat knowledgeable about the CIS major (see Table 4), we found that only one counselor knew much about CIS. Most respondents thought that CIS and computer science are the same major. They also believed that CIS is very math-oriented. When asked about her familiarity with CIS or related majors, one counselor said, "Just vaguely. I haven't really been instructed on any of that." Another counselor stated that they haven't really been exposed to resources that would inform them about computer-related majors. Yet another person said, "I probably need more information about CIS; I'm not familiar with it."

Lack of Knowledge about the IS Job Market

Most of the guidance counselors did not realize that there is a shortage of IS-related workers. One person said, "As I understand, the job opportunities aren't as numerous as they used to be." Another stated, "I really know very little about the jobs related to [CIS]." Some guidance counselors think the number of IS-related jobs is decreasing because of outsourcing.

Lack of Importance of Traditional Referent Groups

As shown earlier in Table 3, and also discovered through open-ended interview questions, guidance counselors' attitudes towards CIS-related majors are not influenced by

traditional referent groups such as their peers, principals, and students' parents. Some counselors did note other important groups, however, such as college recruiters and former students currently working in the field.

Limited Time / Too Many Students to Advise

We discovered that half of the counselors in this study advise over 300 students. Since they have other job responsibilities, it seems difficult for guidance counselors to have adequate time to provide sufficient guidance. Students may also be impacted by time limitations. A counselor mentioned, "We have problems with getting students to take a computer class because we're on block schedules for 90 minutes."

The Generational Gap

Most of the guidance counselors admitted that they do not use computers and technology very much. When asked about their usage of technology, one respondent stated, "You may get a different answer from some of our younger counselors…I don't feel like I can keep up anymore…I don't speak the language. I don't feel like I'm in the loop as much." Another counselor said, "It's [CIS] not a field that was around when I was growing up and in college. It's just something I don't know a lot about and haven't had a lot of exposure to."

5. DISCUSSION

With the increasing demand for qualified IS workers, it is important that we make sure that high school guidance counselors are fully informed about the career possibilities for students who major in IS-related fields. After interviewing these guidance counselors, it seems that most of them do not receive accurate and/or up-to-date information about IS and related majors.

IS faculty, IT companies, and other related trade groups need to be proactive in communicating information about computer-related majors to guidance counselors. Several counselors mentioned in the interviews that they are influenced by those people who visit them from colleges. CIS faculty should plan to visit local guidance counselors to inform them about the major. Some colleges are providing perks to guidance counselors to make sure they are aware of their programs. For instance, some colleges will take guidance counselors to the theater, symphony, and sporting events in order to promote their offerings (Winter, 2004). Those groups interested in promoting the CIS major and related jobs should consider spending the time and money to inform guidance counselors about the field.

We were surprised that most of the traditional referent groups, such as other guidance counselors and students' parents, have little influence on guidance counselors' attitudes about majors such as CIS. We plan to conduct future research with a larger sample size to see if this still holds true. We have procured a list of all of the high school guidance counselors in our home state and several surrounding states, and we intend to send them a survey in the near future to further analyze this issue.

6. CONCLUSION

Guidance counselors influence students' decisions concerning which area to major in upon entering college. However, counselors seem to lack knowledge about CIS and related majors and the IS job market. They also lack sufficient time to adequately inform students about the opportunities available in IS. This study reviews the previous literature on this topic and provides new data that can be used in future research. It is important that we increase the number of students majoring in IS-related fields. Guidance counselors are an important group that we need to better target in the future.

7. REFERENCES

Beaubouef, T. and Mason, J. (2005) Why the High Attrition Rate for Computer Science Students: Some Thoughts and Observations. Inroads – The SIGCSE Bulletin, 37 (2) 103-106.

Berry, R., Rettenmayer, J., and Wood, J. (2006) An Investigation of Student Perceptions about the Information Systems Profession. Journal of Computing Sciences in Colleges, 21 (5) 130-136.

Brookshire, R. (2006) Letter from the Editor Strategies for Fighting Declining Enrollments. Information Technology, Learning, and Performance Journal, 24 (1) 1-3.

Cohoon, J. (2002) Recruiting and Retaining Women in Undergraduate Computing Majors. Inroads SIGCSE Bulletin, 34 (2) 48-52.

Gray, M. and Daugherty, M. (2004) Factors that Influence Students to Enroll in Technology Education Program. Journal of Technology Education, 15 (2) 1-17.

Hellens, L. and Nielsen, S. (2001) Australian Women in IT. Communications of the ACM, 44 (7) 46-52.

http://www.cfnc.org.

Jepson, A. and Perl, T. (2002) Priming the Pipeline. Inroads SIGCSE Bulletin, 34 (2) 36-39.

Kamali, R., Cassel, L., and LeBlanc, R. (2004) Keeping Family of Computing Related Disciplines Together. Conference on Information Technology Education, 241-243.

Leever, S., Dunigan, M., and Turner, M. (2002) The Power to Change is in our Hands. Journal of Computing Sciences in Colleges, 18 (2) 169-179.

O'Donnell, K. and Logan, K. (2007) High School Counselors' Influence. http://www.uwstout.edu/rs/2007/Counselors%20Influence.pdf.

O'Lander, R. (1996) Factors Affecting High School Students' Choice of Computer Science as a Major. Proceedings of the Symposium on Computers and the Quality of Life, Philadelphia, PA, 25-31.

Pollacia, L. and Lomerson, W. (2006) Analysis of Factors Affecting Declining CIS Enrollment. Issues in Information Systems, 7 (1) 220-225.

Rettenmayer, J., Berry, R., and Ellis, S. (2007) The Image of the Information System Profession: An Investigation of Gender Differences. Journal of Computing Sciences in Colleges, 22 (5) 46-51.

Scarlatos, L. and Lowes, S. (2007) Building Bridges: The 2006 Summer Institute. Journal of Computing Sciences in Colleges, 23 (3) 23-30.

Silverman, S. and Pritchard, A. (1993) Guidance, Gender Equity and Technology Education. ERIC Document Reproduction Service No. ED 362651).

Silverman, S. and Pritchard, A. (1996) Building Their Future. Girls and Technology Education in Connecticut. Journal of Technology Education, 7 (2) 1-13.

Spertus, E. (1991) Why are There so Few Female Computer Scientists? Massachusetts Institute of Technology, Cambridge, MA.

Swortzel, K., Deeds, J., and Taylor, W. (2006) Sources for Learning bout Information Technology Careers and Personal Influences on the use of Information Technologies of High School Students: A Longitudinal Trend Study. Journal of Southern Agricultural Education Research, 56 (1) 114-124.

Trotter, A. (2003) Click HERE for Guidance, http://www.bobturba.com/ClickHere.pdf.

Waite III, W. (2003) Factors that Prevent Female Students from Enrolling in Technology Education Courses at Richfield Senior High School. http://www.uwstout.edu/lib/thesis/2003/2003waitew.pdf.

Winter, G. (2004) Wooing of Guidance Counselors is Raising Profiles and Eyebrows. The New York Times, Accessed 2 Feb. 2008, http://query.nytimes.com/gst/fullpage.html?res=9804E5DF123BF93BA35754C0A9629C8B63&st=cse&sq=wooing+of+guidance+counselors+is+raising&scp=1