# MANAGING RECRUITMENT OF STUDENTS TO THE CIS MINOR IN THE COLLEGE OF BUSINESS

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## ABSTRACT

*This study aims to investigate the factors (gender, major, a priori knowledge) influencing student perception of a CIS minor and whether they select a CIS minor, in the hope of providing insight to colleges/universities in developing a strategy to successfully manage the recruitment process of students to the CIS minor. It was found that students' gender, major and a priori knowledge do directly impact their perception of the usefulness of a CIS minor. In addition, the study also found that a person's gender directly impacted their decision to select a CIS minor. However, students' major and a priori knowledge did not seem to significantly influence their decision about actually selecting a CIS minor.*

**Keywords**: Information systems, minor selection, gender difference, major, a priori knowledge

## INTRODUCTION

Our society has moved from the industrial age to the information age. Information technology has dramatically changed the way firms do business and has even transformed the actual nature of a firm. Organizations are seeking individuals with the ability to integrate their technical knowledge with communication, interpersonal, and organizational skills. It is estimated that computer skills will be needed for 60% of entry level jobs in the future (12). It is essential for students in all business majors to integrate their subject knowledge with technology skills. For this purpose, the computer information systems (CIS) minor has been offered in some schools to complement the student's major field of study by offering knowledge, skills, and experience in developing information systems and computer-related solutions to various business problems.

**Problem Statement**

Contrary to the increasing importance of information and computer knowledge for employers, college student interest in the information systems minor has declined precipitously. It is worthwhile to investigate and understand students' perception/attitude toward computers/ information systems and the factors influencing their selection of a CIS minor so that a strategy may be developed to increase student interest in the CIS area. Previous studies have addressed some aspects of this issue:  such as student's perception of information technology/computers (7, 10), student perception and misconceptions of IS careers (1, 4, 9), and the factors influencing student selection of an CIS major (14). Up to now, no study has been done on student selection of a CIS minor. To fill this gap in the literature, this study aims to investigate the factors influencing student perception of a CIS minor and whether they select a CIS minor, in the hope of providing insight to colleges/ universities in developing a strategy to successfully manage the recruitment process of students to the CIS minor.

## RESEARCH FRAMEWORK AND HYPOTHESES

The research framework is described in Figure 1. Gender, major and a priori knowledge are identified as directly impacting student's selection of a CIS minor, and also indirectly through their perception of the CIS minor. Next, we proceed to discuss each hypothesis in the model.
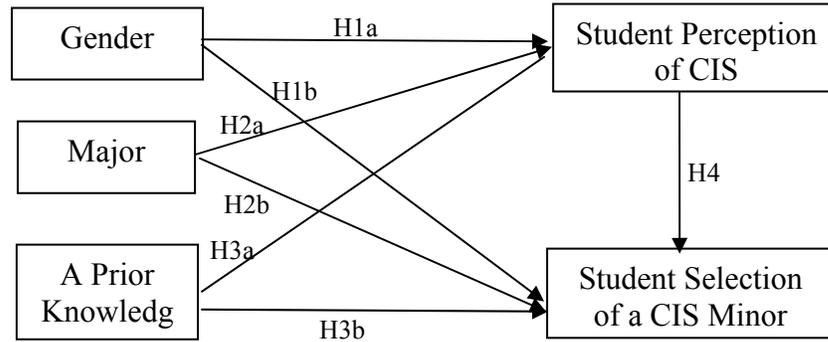


**Figure 1. Research Framework**

### The Impact of Gender

Previous studies have found that gender affects perceptions/attitudes toward computers (10). Males are twice as likely as females to choose a major in IS (4). By 1996, the percentage of women attaining degrees in computer science has consistently been less than 20% (3). In 1999, only 20% of women were working in high-tech jobs despite the fact that women make up half of the workforce (15). Several reasons may help to explain gender difference toward computers. First, according to Frenkel (5), computer culture, which emphasizes obsessive, highly focused behavior as the key to the success, puts women in an uncomfortable situation. Second, parents hold different attitudes toward their children' educations. They tend to emphasize the importance of math, physics, and computer science for their sons and literature and reading for their daughters (13). Finally, women generally are less confident in their mathematical abilities (8) and abilities to use computers (13, 16) than men and thus lack confidence in their decision to enter the CIS minor/major program.  It is hypothesized that:
> *H1a: gender will influence student perception of a CIS minor.*
> *H1b: gender will influence student selection of a CIS minor.*

### The Impact of Major

It is possible that students in different majors have different perceptions and attitudes toward a CIS minor. Students in some majors may perceive a CIS minor as very interesting and helpful to their major and future career, students in other majors may not.  For example, the study of Chung et al. (2) finds that business students possess a more favorable attitude toward computers than non-business students. It is plausible that business students in different majors differ in their view of a CIS minor. Therefore, it is hypothesized that:
> *H2a: major will influence student perception of a CIS minor.*
> *H2b: major will influence student selection of a CIS minor.*

**The Impact of a Priori Knowledge**

A priori knowledge may affect student perception of a CIS minor. A student's a priori knowledge about CIS can be obtained from professors, advisors, parents, friends, websites, published materials, and/or their own experience in using computers. Their own computer usage will, in turn, affect their attitudes toward computers/CIS (2). For example, the longer a student has a computer-related experience, the more positive the student's attitude toward computers (7, 10). A priori knowledge also impacts a student's final selection of a CIS minor. Fox et al. (4) find that lack of knowledge about the CIS field has prevented some high school students from wanting to major in this area. The same situation can be applied to a CIS minor as well. Therefore, it is hypothesized that:

> H3a: a priori knowledge will influence student perception of a CIS minor.
> H3b: a priori knowledge will influence student selection of a CIS minor.

**The Impact of Student Perception of the CIS minor**

Studies have shown that student perception/misconception of CIS will directly influence their decision to select or not select a CIS major/minor. Students usually perceive that IT careers to involve little human interaction and a great deal of programming (9, 4). As reported by Cale et al. (1), students tend to believe that a typical CIS graduate is a person who designs new computer hardware, entered college with a strong background in computers, and is a whiz at mathematics. If students believed that the CIS program had a relatively stronger math and/or computer background it could be a barrier to entering the major/minor.  It is hypothesized that:

> H4: student perception of a CIS minor will influence their selection of a CIS minor.

## RESEARCH METHODOLOGY

**Data Collection**

A survey was administrated in a total of 14 introductory CIS sections in Fall 2002 at a college of business in New England. The survey was conducted during the classes at the same week for all the sections. A total of 317 students completed the survey. Since this study focuses on the perception of students in four business majors (accounting, management, finance, and marketing), the students already majoring in CIS and Liberal Arts majors were removed from the analysis. The final usable sample size was 203.  Of the sample, 59.9 % were male, 40.1% were female, 16.3% were majoring in Accounting, 27.2% were majoring in management, 22.8% were majoring in finance and 33.7% were majoring in marketing. In addition, management and finance major are male-dominated with 80.0% and 65.2% respectively; while accounting and marketing major are almost evenly populated by male and female students.

**Data Analysis**

*Factor analysis of student perception of a CIS minor:* Student perception of a CIS minor was originally represented by seven items in the questionnaire (see Table 1). An exploratory factor analysis was performed to identify possible factors underlying these seven items (defined as P1 to P7). Initial factor analysis revealed that item P4 had a cross-loading on two factors. After

dropping P4, three factors emerged as shown in Table 2.  For simplicity, only loadings above .40 were displayed. Based on the underlying meaning of the items loaded on each factor, it was decided to name these three factors as usefulness (coded as UF), level of difficulty (coded as LD) and job opportunities (coded as JO) of a CIS minor.

**Table 1. The Original Items of Student Perception of a CIS Minor**

|  | Item |
|---|---|
| P1 | CIS minor is interesting |
| P2 | CIS minor is helpful to my major |
| P3 | CIS minor is helpful to my future job-seeking |
| P4 | CIS minor offers creativity and challenge |
| P5 | CIS minor is more difficulty than other minors |
| P6 | CIS minor involves lots of time and effort |
| P7 | CIS minor provides lots of job opportunities |

**Table 2. Exploratory Factor Analysis for Student Perception of a CIS minor**

| Item | UF | LD | JO | α |
|---|---|---|---|---|
| P1 | .87 |  |  |  |
| P2 | .84 |  |  | .83 |
| P3 | .76 |  |  |  |
| P5 |  | .93 |  | -- |
| P6 |  | .86 |  |  |
| P7 |  |  | .90 | -- |
| Eigenvalue | 2.14 | 1.82 | 1.12 |  |
| % of Variance | 35.70 | 30.31 | 18.62 |  |
| Cumulative % of variance | 35.70 | 66.01 | 84.63 |  |

*The impact of gender, major and a priori knowledge on student perception of a CIS minor*

*Gender*: A t-test was used to see whether there was gender difference in student perception of a CIS minor. The results were shown in Table 3.  A significant difference was found between male and female students in relation to their perception of usefulness of a CIS minor (UF). As shown in Table 3, male students tend to consider a CIS minor as more useful to their major than female students. It is important to note that no significant gender differences were found in relation to level of difficulty and job opportunities of a CIS minor.

**Table 3. Student Perception of a CIS Minor by Gender (T-test)**

|  | T-test difference in Mean | | |
|---|---|---|---|
|  | Male (N=122) | Female (N=81) | P-value |
| UF | 3.38 | 3.15 | **.05** |
| LD | 3.59 | 3.60 | .88 |
| JO | 3.67 | 3.73 | .67 |

**Table 4.  Student Perception of a CIS Minor by Major (ANOVA)**

|  | Major (# of students) | Mean | F-value | P-value |
|---|---|---|---|---|
| UF | Accounting (33) | 3.22 | 2.432 | **.06** |
|  | Management (55) | 3.41 |  |  |
|  | Finance (46) | 3.49 |  |  |
|  | Marketing (69) | 3.09 |  |  |
| LD | Accounting (33) | 3.56 | 1.986 | .117 |
|  | Management (55) | 3.43 |  |  |
|  | Finance (46) | 3.53 |  |  |
|  | Marketing (69) | 3.78 |  |  |
| JO | Accounting (33) | 3.70 | 0.070 | .976 |
|  | Management (55) | 3.67 |  |  |
|  | Finance (46) | 3.75 |  |  |
|  | Marketing (69) | 3.68 |  |  |

**Table 5.  Student Perception of a CIS Minor by a Priori Knowledge (ANOVA)**

|  | Familiarity(# of students) | Mean | F-value | P-value |
|---|---|---|---|---|
| UF | Not familiar (121) | 3.11 | 8.023 | **.000** |
|  | Somewhat familiar (73) | 3.49 |  |  |
|  | Familiar (9) | 4.00 |  |  |
| LD | Not familiar (121) | 3.53 | .763 | .467 |
|  | Somewhat familiar (73) | 3.69 |  |  |
|  | Familiar (9) | 3.67 |  |  |
| JO | Not familiar (121) | 3.65 | .510 | .601 |
|  | Somewhat familiar (73) | 3.78 |  |  |
|  | Familiar (9) | 3.56 |  |  |

*Major*: Analysis of Variance (ANOVA) was used to test whether student perceptions of a CIS minor differ among four majors (accounting, management, finance, and marketing). Table 4 shows that student perceptions of usefulness of a CIS minor do differ by major. Following the ANOVA, 12 t-tests were performed between every two of four majors to identify significant group differences. It was found that there was a significant difference in student perception of usefulness of a CIS minor between management majors and marketing majors ($\alpha$=.05), and between finance majors and marketing majors ($\alpha$=.02). Students in management and finance perceive a CIS minor as more useful than those in marketing as indicated in Table 4.

*A priori knowledge*: a priori knowledge was measured by the students' familiarity with a CIS minor in this study. ANOVA was then used to see whether student perceptions of a CIS minor differ in term of different levels of a priori knowledge (see Table 5). It was found that a priori knowledge does impact student perception of usefulness of a CIS minor ($\alpha$=.00).  It seems that the more familiar/knowledgeable a student is with the CIS minor, the more students perceive that minor as being helpful.

*The impact of gender, major and a priori knowledge on a student selection of a CIS minor*

*Gender*: To test for the impact of gender on student selection of a CIS minor, a chi-square test of homogeneity was performed.  The results show that gender does impact the section of a CIS minor, with a significant level less than .01(see Table 6). Male students considering choosing a CIS minor (26%) was significantly higher than female students (9%).

*Major*: Again, a chi-square test was performed to test the impact of major on student selection of a CIS minor. The result show that selection of a CIS minor will not be impacted by a student's major, with a significant level greater than .10 (see Table 7).

**Table 6.  Student Selection of a CIS Minor by Gender (Chi-square test)**

| Student Selection | Male | | Female | | Chi-square Test |
|---|---|---|---|---|---|
| | **Actual Freq.** | **Expected Freq.** | **Actual Freq.** | **Expected Freq.** | |
| **Choose CIS** | 19 | 14.35 | 4 | 8.65 | $\chi^2$=19.73 |
| **Not Choose CIS** | 31 | 42.43 | 37 | 25.57 | df=5 |
| **Undecided** | 23 | 16.22 | 3 | 9.78 | P<0.01 |
| **Total** | 73 | 73 | 44 | 44 | |

**Table 7.  Student Selection of a CIS Minor by Major (chi-square test)**

| Student Selection | Accounting | | Management | | Finance | | Marketing | | Chi-square Test |
|---|---|---|---|---|---|---|---|---|---|
| | **Actual Freq.** | **Expe. Freq.** | **Actual Freq.** | **Expe. Freq.** | **Actual Freq.** | **Expected Freq.** | **Actual Freq.** | **Expe. Freq.** | |
| **Choose CIS** | 4 | 3.726 | 9 | 6.486 | 7 | 5.313 | 3 | 7.475 | $\chi^2$=9.01 |
| **Not Choose CIS** | 11 | 11.016 | 16 | 19.176 | 13 | 15.708 | 28 | 22.1 | df=11 |
| **Undecided** | 4 | 4.212 | 8 | 7.332 | 7 | 6.006 | 7 | 8.45 | P>.10 |
| | 19 | 19 | 33 | 33 | 27 | 27 | 38 | 38 | |

*A priori Knowledge*: ANOVA was performed to test whether a priori knowledge differed among three groups of students (those considering choosing a CIS minor, not considering choosing a CIS minor and undecided). No significant difference was found among these three groups in relation to a priori knowledge (see Table 8).

**Table 8.  Student Selection of a CIS Minor and A Priori Knowledge (ANOVA)**

|  | Student Selection | Mean | F-value | p-value |
|---|---|---|---|---|
| **A Priori Knowledge** | Considering choosing CIS minor | 1.52 | 1.979 | .143 |
|  | Not Considering choosing CIS minor | 1.29 |  |  |
|  | Undecided | 1.42 |  |  |

**Table 9. Student Perception and Selection of a CIS Minor (ANOVA)**

|  | Student Selection | Mean | F-value | P-value |
|---|---|---|---|---|
| **UF** | Choosing CIS Minor | 4.14 | 26.335 | **.000** |
|  | Not Choosing CIS Minor | 2.99 |  |  |
|  | Undecided | 3.51 |  |  |
| **LD** | Choosing CIS Minor | 3.98 | 4.430 | **.014** |
|  | Not Choosing CIS Minor | 3.44 |  |  |
|  | Undecided | 3.37 |  |  |
| **JO** | Choosing CIS Minor | 3.94 | 3.992 | **.021** |
|  | Not Choosing CIS Minor | 3.41 |  |  |
|  | Undecided | 3.73 |  |  |

*The impact of student perception of a CIS minor on student selection of the CIS minor*

ANOVA was used to test whether student perception of a CIS minor differ among three groups of students (those considering choosing a CIS minor, not considering choosing a CIS minor and undecided). Table 9 shows that  student perception of usefulness, level of difficulty and job opportunities of a CIS minor all significantly impact students' final selection of a CIS minor, with significant levels all less than .05. Following ANOVA, t-tests were performed between each of two groups to see if significant group differences existed. Compared with students who are not considering choosing a CIS minor, those students who are considering choosing a CIS minor perceive the CIS minor as more helpful to their major and future careers and providing more job opportunities for them, even though they do perceive a CIS minor as more difficult.

## SUMMARY AND DISCUSSION

This research probes the questions of whether gender, major, or a priori knowledge influence students' perception of a CIS minor in terms of  usefulness in their studies, level of difficulty, and job opportunities and how those factors influence their decision to select or not select a CIS minor. It was found that students' gender, major and a priori knowledge do directly impact their perception of the usefulness of a CIS minor. In addition, the study also found that a person's gender directly impacted their decision to actually select a CIS minor. Furthermore, the study revealed that student perception of usefulness, level of difficulty, and job opportunities of having a CIS minor did influence their decision in the selection of a CIS minor. However, students' major and a priori knowledge did not seem to directly influence their decision about actually selecting a CIS minor.

## IMPLICATIONS AND RECOMMENDATIONS

Based on results of this analysis, some recommendations can be drawn to guide the recruitment process of students to a CIS minor. First, efforts need to be made in attracting female students to

the CIS minor. This study finds that female students have a less favorable attitude toward a CIS minor and are also less likely to choose a CIS minor than male students. Since the number of female students today is almost the same as that of male, if more female students can be attracted to the CIS minor program, it could significantly increase total student population in the program. Second, information about the CIS minor program needs to be well planned and communicated to students so that they can have a high level of a priori knowledge of CIS before they need to select a minor. As the results of this study indicate, students with a priori knowledge perceive a CIS minor as more interesting and more helpful to their major and career, which, in turn, will increase their likelihood of selecting a CIS minor. Finally, student perceptions about the CIS minor needs to be refocused and a better understanding of careers in IS needs to be promoted.

## REFERENCES

1.  Cale, Jr., E. G, Mawhinney, C. H., Callaghan, D. R. (1991). Student Perceptions of Information Systems Careers: Misconceptions and Declining Enrollments, Journal of Research on Computers in Education, 23 (3), 434-443.
2.  Chung, S. H., Schwager, P. H., & Turner D. E. (2002). An Empirical Study of Students' Computer Self-Efficiency: Differences among Four Academic Disciplines at a Large University, Journal of Computer Information Systems, 42(4), 1-6.
3.  DeBare, I. (1996). High Tech Industry Zipping Along But Women are often Left Behind, Sacramento. Available: www.sacbee.com/news/projects/women/wcmain.html.
4.  Fox, T. L., Hindi, N., Remington, W. S. (2001). Students' Perceptions and Misconceptions of a Career in IS, Journal of Computer Information Systems, 42(1), 83-89.
5.  Frenkel, K. A. (1990). Women and Computing, Communication of ACM, 33(11), 34-42.
6.  Harris, A.(1992), The Impact of the Introductory MIS Course on Students' Attitudes and Perceptions toward Microcomputers, Journal of Computer Information Systems,33(2), 38-41.
7.  Jones, M. C. and Berry, R. L. (1995). Information Technology: an Assessment of Student Perceptions, Journal of Computer Information Systems, 35(4), 28-32.
8.  Lewis, D. J. (1991). Mathematics and Women: The Undergraduate School and Pipeline, Notices of the American Mathematical Society, 38(7), 721-723.
9.  Mawhinney, C. H., Cale, Jr., E. G., Callaghan, D. R. (1990). Freshman Expectation of Information Systems Careers Versus Their Own Careers, Journal of IS Education, 2(3).
10. Liaw, S. S. (2002). An Internet Survey for Perceptions of Computers and The World Wide Web: Relationship, Predication, and Difference, Computers in Human Behavior, 8(1), 17-35.
11. O'Leary, P.  (1999). Accessibility of Computer Science: A Reflection for Faculty Members, Retrieved February 14, 2003, from **http://www.cs.umd.edu/~oleary/faculty**.
12. Robinson, L. H. and Thoms, K. (2001). A Longitudinal Study of College Student Computer Knowledge, Journal of Computer Information Systems, 42(1), 9-12.
13. Shashaani, L. and Khalili, A.(2001). Gender and Computers: Similarities and Differences in Iranian College Students' Attitudes toward Computers, Computers and Educations, 37(3-4), 363-375.
14. Trower, J., Willis, G.W.K., Dorsett, D. (1994). An Evaluation of Factors Influencing Intentions to Major in Information Systems, Journal of IS Education, 6(4).
15. Workfile Report, (Fall, 1999). 12(i3), 12.
16. Young, B. J.(2000). Gender Differences in Student Attitudes toward Computers, Journal of Research on Computing in Education, 33(2), 204-216.