2006-611: FACTORS ASSOCIATED WITH WOMEN'S INTEREST IN COMPUTING FIELDS

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Factors Associated with Women’s Interest in Computing Fields

Abstract

This paper presents a theoretically driven and empirically supported model that identifies key factors that predict high school and college women’s interest and choice in a career in information technology (IT). At the center of the model is the developmental construct of self-authorship and variables related to the process individuals use to make personal and educational decisions. For female high school and college students, the expression of interest in a career in the IT field is often made with little concrete information from sources outside of the immediate circle of trusted friends and family members. Findings have direct implications for recruiting and advising practice.

Introduction

Research since the early 1970s indicates that a different set of variables are required in models that predict women’s and men’s career interests and choice. There are particularly significant gender differences in how men and women become interested in, enter, and remain in the computing field. A number of factors are associated with women’s career interests that are not significant for men. These include self-efficacy, consideration of the needs of others, attachment to parents, and the value awarded to marriage and a family. There is a much weaker connection for women than there is for men between interests, enjoyment, and career choice.

The purpose of this paper is to explain a theoretically driven statistical model of key variables that predict high school and college women’s interest and choice of a career in a computer-related field and to identify areas where there are statistically significant gender differences. Our focus is on careers in the field of information technology (IT). By IT, we mean a full range of professional careers that are computer driven, including those that involve web design, web development, and hardware and software engineering, but exclude data processing.

Theoretical Framework

We employ the developmental construct of self-authorship as a theoretical lens to understand the cognitive processes students use to make decisions, including career decisions. Defined as “the ability to collect, interpret, and analyze information and reflect on one’s own beliefs in order to form judgments” (p. 143), self-authorship is grounded in the work of Perry and Kegan. Self-authorship is linked to decision making because it influences how individuals
make meaning of the advice they receive from others and the extent that the reasoning they employ reflects an internally grounded sense of self\textsuperscript{6,7,8}.

Individuals at different stages of cognitive development have different ways of approaching decisions. Individuals early in the journey to self-authorship -- a stage Baxter Magolda refers to as external formulas -- are likely to make decisions that reflect unquestioned faith in the views of experts and trusted others. They trust others to know what career choices best fit them. Those who have advanced to the middle point of the development of self-authorship -- what Baxter Magolda calls transitional knowers -- have lost the comfort of unquestioned trust in authorities, but have yet to develop other criteria to judge input and make decisions. They are skeptical of authorities, but have no systematic set of criteria to approach decisions or to evaluate knowledge. It is only after achieving a full measure of self-authorship that an individual can be genuinely open to the input of others, without allowing the exchange to erode a sense of self. A self-authored career decision is one that is made with the internal compass of a clear sense of self, an openness to the input of others, and a sense of the match between the demands of a field and personal interests, values, and skills.

Developmental theorists, like Baxter Magolda, provide a framework that is at odds with the assumption that high school and college students automatically accept the word of learned authorities. They offer developmental reasons for why many college students may not be in a position to genuinely engage diverse viewpoints from unfamiliar others, including from advisors and teachers. First and second year students of a traditional-age are likely to be absolute knowers\textsuperscript{11}. They are engaged in dependent relationships where decisions are made to please trusted others, like parents and friends. It is probably difficult for this group to accept advice that conflicts with the guidance provided by trusted others. College juniors and seniors are most likely to be transitional knowers\textsuperscript{7}, but still have no systematic way of approaching personal decisions and few criteria to judge the advice of others. Trust and care for the person offering advice may become the principal criteria for making a life decision\textsuperscript{14} because until the later stages of epistemological development individuals have few criteria other than the nature of the relationship to judge advice or the advice giver\textsuperscript{22}.

Methods

Research Participants and Data Collection

Data collection for this mixed method study was completed in three phases over four years. For the first year data collection in 2002, to reach the targeted participants, letters seeking cooperative agreements to participate in this project were sent to high schools, community colleges, and colleges in rural and urban locations in Virginia. We received written letters of agreement from ten high schools, two community colleges, and four colleges and distributed the survey questionnaires about participants’ computer-related attitudes, career influencers, and career decisions to these schools during spring 2002. We also completed one-on-one 30 minute telephone interviews with a total of 119 female high school, community college, and college students and 25 parents of the high school interview participants during fall 2002. A total of 467 high school, community college, and college students completed our original questionnaire (62% of response rate).
To refine the data collection instruments, we administered a follow-up survey and completed interviews with the first year participants in 2003. We revised the survey questionnaire based on the analysis of the first year survey and interview data. We developed a more comprehensive and user-friendly survey about self-authorship, parental support, information credibility, and IT career interest and choice. Also, we added questions to the interview protocol about the role of parents and the decision making processes related to IT career interest and choice. During spring 2003, we distributed the revised survey questionnaire to 423 students who had provided their mailing addresses while completing the first year survey. We received a total of 124 completed survey questionnaires (33.3% of response rate). The follow-up telephone interviews were also conducted with 13 female high school students and 12 parents and each interview took from 30 minutes to one hour.

In the third phase of data collection during 2004 and 2005, we further refined our theoretical model and subsequently revised the survey questionnaire and the interview protocols. The third version of the survey questionnaire was distributed to four high schools in Virginia and one college in Pennsylvania. To recruit high schools, we contacted the original high schools participating our first phase of the data collection. Four of the original ten high schools agreed to participate. During fall 2004, we mailed a total of 845 survey questionnaires and received 556 usable surveys returned from these four high schools (66%).

To gather survey and interview data from college students, we worked with personnel from an IT program at a large research university in the Mid-Atlantic Region of the U. S. During spring 2005, 221 out of 350 college students completed our questionnaire and 40 of these students originally signed up to participate in face-to-face interviews. We conducted face-to-face interviews with 19 female and 19 male IT students for about one hour during spring 2005. Our final questionnaire response rate for this phase was 65% (777 out of 1195). We used the data from this group to test our model statistically. Tables A1 through A3 in Appendix A provide the detailed demographic characteristics of respondents to the third year questionnaire.

**Questionnaire.** A 119 item, paper and pencil questionnaire was developed over the course of three revisions (reworded, added, and/or deleted items) between 2002 and 2005. The items from the questionnaire that remained significant in the final statistical analysis were: (a) parents’ opinions or views about the importance of a career and how to pursue information about career options, (b) information orientation features (decision orientation, receptivity, information sources, and information credibility), (c) stereotypical and positive attitudes about the attributes of toward IT workers (such as that they are hardworking, smart, and creative, or anti-social loners, geeks, and males), (d) frequency and type of computer use, and (e) IT career interest and choice. Response options were: disagree (1), slightly disagree (2), slightly agree (3), and agree (4). All measures were coded such that the higher the value, the more positive the interpretation. Items about general demographic information were included at the end of the questionnaire, such as birth years, parents’ educational levels, race, school year, family size, and employment status. A complete list of the questionnaire items for each of the scales that remained in the final model appears in Appendix B.
To address content and construct validities of each scale, all the survey scales were constructed based on the relevant literature and our team members’ expertise. We also conducted face validity tests. In particular, to address the information orientation features’ (decision orientation, receptivity, information sources, and information credibility) content and construct validities, the original items were developed in collaboration with Dr. Marcia Baxter Magolda. Each of our scales’ internal consistencies is reasonable (Cronbach’s alpha = 0.603-0.842), establishing high reliabilities of the survey measurements.

**Interview protocols.** Semi-structured interview protocols were used for telephone and face-to-face interviews. The original telephone interview protocol was designed in 2001 in collaboration with Dr. Baxter Magolda and refined for the second and the third interviews. We included a question asking participants to identify some important decisions they had made in their lives and then select one to talk about during the interviews. A question about the role of parents was also added to the revised protocol because it emerged as central to decision-making in the analysis of the first year survey and interview data. Example questions are as follows: (a) Please tell me about some important life decision you have made in the last few years. We’re going to be talking about your choice of major and career later in the interview, so I’d like you to select some decision other than that. (b) What process have you gone through or are going through to make a decision about your major and career interests? (c) Were there events or incidents in your earlier life or people who played a role in your decision? (d) Were there people who had a significant influence on your decision? Who were these people and what role did they play in the process you went through to make the decision? And (e) what role did your mother and father, if you interacted with them regularly at the time, play in the process you went through to make the decision? All the interviews were audio taped. We prepared a verbatim transcript of each audio taped interview.

**Data Analysis**

**Quantitative data.** Using the independent t-test, first, we examined gender differences in eight key variables in our research - parental support, information orientation features (decision orientation, receptivity, information sources, and information credibility), attitude toward IT workers, computer use, and IT career interest and choice - by gender, race, age, participants’ level education, and parents’ levels of education. In particular, the results of group differences by gender suggested that males and females were significantly different in each of the above-mentioned variables. Females showed significantly more positive attitudes toward the attributes of IT workers, were more receptive to others advice, and communicated with more people than males. However, male students used computers more often and were more interested in IT careers than female students. Table 1 shows the detailed results of the independent t-test analysis.

To test our theoretical model, we conducted path analysis. Due to our theoretical framework, we tested our theoretical model of IT career choice and interest separately for males and females. Path analysis is a uni-directional causal flow model, which explains relationships between observed variables by arrows. Even though it is hard to meet their assumptions that observed variables do not have measurement errors, path analysis is very useful for researchers to articulate theoretical models underlying their logic. It is also beneficial to show direct and indirect causal effects of each independent variable on dependent variables.
Table 1: Group Differences in Model Variables By Gender (N=777)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Female (n=373)</th>
<th>Males (n=404)</th>
<th>Female (n=373)</th>
<th>Males (n=404)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes Toward IT Workers</td>
<td>23.06</td>
<td>21.93</td>
<td>3.18</td>
<td>3.38</td>
<td>4.69***</td>
</tr>
<tr>
<td>Parental Support</td>
<td>28.79</td>
<td>28.52</td>
<td>5.18</td>
<td>5.19</td>
<td>0.71</td>
</tr>
<tr>
<td>Decision Orientation</td>
<td>37.85</td>
<td>37.06</td>
<td>4.58</td>
<td>4.84</td>
<td>2.32*</td>
</tr>
<tr>
<td>Receptivity</td>
<td>15.91</td>
<td>15.31</td>
<td>2.98</td>
<td>3.01</td>
<td>2.81**</td>
</tr>
<tr>
<td>Information sources</td>
<td>16.67</td>
<td>15.51</td>
<td>5.68</td>
<td>5.90</td>
<td>2.80**</td>
</tr>
<tr>
<td>Information Credibility</td>
<td>28.79</td>
<td>28.06</td>
<td>5.47</td>
<td>5.49</td>
<td>1.87</td>
</tr>
<tr>
<td>Computer Use</td>
<td>14.23</td>
<td>15.81</td>
<td>3.89</td>
<td>4.11</td>
<td>-5.51***</td>
</tr>
<tr>
<td>IT Career Interest &amp; Choice</td>
<td>20.17</td>
<td>22.03</td>
<td>4.48</td>
<td>4.14</td>
<td>-6.01***</td>
</tr>
</tbody>
</table>

* p < 0.05, ** p < 0.01, *** p < 0.001

Note. Code: females = 1 & males =2 so that negative t values mean that male students have higher mean scores than female students.

Interview data. We used both a deductive and inductive method to develop a coding scheme for the transcripts. The deductive element consisted of codes developed from the research literature. The inductive element refers to codes that emerged unexpectedly during the process of analyzing transcripts.

We used an iterative process, coding and recoding the transcripts until agreement about the codes and their definitions was reached. After agreeing on the coding scheme, we returned to the transcripts, coding them separately once again and meeting on several occasions to establish a level of agreement about the coding of the transcripts. As a final step in coding, we entered the data in the qualitative software, ATLAS TI. After that, we dealt with both the original coded transcripts and a printout that summarized responses to all of the key variables in the study.

Results

Figure 1 depicts the empirical model based on our statistical analysis. There are five key variables that directly impacted women’s IT career interest and choice. These variables were:

1. Race
2. Parental Support
3. Positive Attitudes about the Attributes of IT Workers
4. Amount of Computer Use
5. Frequency of Communication with Various Information Sources
Figure 1 demonstrates the direct relationship between race and IT career interest and choice in our model. The group of minorities includes African Americans, Asian Americans, Hispanic Americans, Native Americans, and multiracial Americans, who are not Caucasians.

Several studies have examined racial discrepancies in computer and technology use, access, attitudes, and skills\textsuperscript{19, 20, 21, 26}. While research has contributed to our understanding of existing racial differences in information technology use that begins in childhood\textsuperscript{40} through college years\textsuperscript{19, 20}, few studies have examined the relationship between race and IT career interest and choice. Differences exist in technology use and skills by race among college students\textsuperscript{19, 20}. A lack of computer competence is more clearly concentrated among minorities, especially younger females “of color”\textsuperscript{21}. However, some 4\textsuperscript{th} grade girls in talented and gifted classes, who had greater opportunities for internet access both at home and at school, showed increasing interests in computers over time. Year-to-year changes in affection for computers did not systematically vary due to race or ethnicity among the 4\textsuperscript{th} graders\textsuperscript{21}.

As an extension of prior research, our model shows that racial differences also exist in term of career interest and choice in IT. However, in our model, minority females, particularly
those at the high school level, expressed significantly more interest in an IT career than did Caucasian females.

Variable 2: Parental Support

Figure 1 demonstrates the relationship between parental support and other key variables in our model. Parental support includes nine questionnaire items relating to perceptions that parents support the importance of a career and encourage career exploration, as well as agreement with the belief that parents have an idea of what would be an appropriate career choice.

Our findings support a fairly substantial body of empirical research that documents the instrumental role of parents in career decision-making for high school and college women. Parents have a more significant impact on career choice than do counselors, teachers, friends, other relatives, and people working in the field. Parental attachment is positively associated with vocational exploration among college women. Parents who discuss issues openly and promote independent thinking in their children encourage more active career exploration.

A qualitative study by Schultheiss, Kress, Manzi and Glasscock examined family influences on both vocational exploration and career decision-making. The majority of participants felt their mothers, fathers, and siblings had played a positive role in their career exploration by indirect means such as providing emotional esteem and informational support and by more tangible means such as providing educational materials. Furthermore, 36% of our participants indicated that their mother was the most influential person in their career exploration process while 21% indicated this was true of their father.

A fairly large number of research studies provide support for the role of mother’s in women’s vocational choice and career orientation. Adolescent girls were more likely than boys to report that their mothers provided positive feedback, supported their autonomy, and were open to discussions about career decisions. Rainey and Borders determined that the career orientation of adolescent females is influenced by a complex interplay of their abilities, agentic characteristics, gender role attitudes, and relationship with their mothers.

Parental support had a direct and positive impact on women’s interest and choice of a career in IT. High school and college women who expressed an interest in an IT career believed that their parents support this career choice. One of that most significant gender differences were found on this variable. Parental support was not directly related to men’s interest in an IT career.

Consistent with what has been reported in the research literature, parental support had a significant positive impact on both men’s and women’s career information seeking behavior. Parents influenced how likely both male and female respondents valued others’ input, sought out career advice and evaluated that different sources of career information were credible.

The direct relationship for women between parental support and interest in an IT career supports the idea that sharing career information with parents or involving them, particularly mothers, in educational activities is likely to have a positive impact on IT career interest.
Findings from our qualitative research underscores that the challenge facing educators is how to design activities, such as recruiting events targeted to women, in a way that promotes trust and the ability to genuinely engage the information supplied.

**Variable 3: Positive Attitudes About the Attributes of IT Workers**

Few systematic studies have been undertaken to examine the relationship between attitudes toward IT and IT workers and interest in IT as a possible career. Most research has been framed with a broader interest in the relationship between different attitudes (likeness, confidence, usefulness, gender stereotyping, and anxiety) and science. These studies suggest that favorable or positive attitude toward computers and science influences higher level of acceptance of computer technology and enthusiasm about using specific technologies\(^\text{29}\). Positive attitudes about computers and science are also related to certain behaviors. Positive attitudes about computer strongly influence computer utilization as a professional tool, the degree of access to computers, and the number of computer-related courses taken\(^\text{1}\).

The relationship between positive attitudes about the attributes of IT workers and IT career interest and choice is illustrated in Figure 1. For both men and women, positive attitudes about the attributes of people who work in computer-related positions had a direct positive impact on an interest in IT as a career choice. High school students had significantly more positive attitudes about IT workers than did college students. Positive attitudes significantly influenced frequency of computer use and receptivity to career advice. Documenting a link between attitudes and behavior, respondents with positive attitudes about computer users used computers on a more regular basis than did those with less positive views.

Significant gender differences are evident in our variables measuring attitudes about the attributes of IT workers. Women were significantly more likely than men to agree with the list of positive attributes and disagree with a list of negative or stereotypical qualities of IT workers. However, for both men and women, positive attitudes had a significant direct impact on the dependent variable, IT career interest and choice.

The importance of positive views about the qualities of IT workers on an interest a career in IT, like beliefs about nature of IT work, differs from previous research that suggests that men, in particular, are likely to agree with stereotypical views at about IT workers and that these views deter women, but not men, from an interest in the field\(^\text{40}\). We suspect that part of explanation for the differences between our findings and previous research are related to the disappearance of significant gender differences in access to computers.

Findings from this variable endorse the implementation of activities that promote positive views about the nature of IT workers. This is a slightly different focus than programs that might explicitly seek to challenge stereotypical views about workers in the computer field. Opportunities to use computer applications that highlight creativity and problem solving, particularly related to pressing human problems, are likely to be particularly effective with women.
Variable 4: Amount of Computer Use

The connection between computer use and positive attitudes and interest has been amply supported by previous research\textsuperscript{15, 38}. While experience with computers games has been shown to be an important predictor of men’s interest in computer related fields\textsuperscript{40}, this is not the case for our women respondents. Other research has shown, however, that experience with computer programming may be an important predictor of self-efficacy and success in a computer field for women. Learning a programming language is significantly associated for women with an increased sense of computer competence\textsuperscript{38, 42}. High school programming experience has also been shown to be a significant predictor of women’s success in computer science at the college level\textsuperscript{12}. These factors probably have more to do with the prognosis for long-term success in an IT career than the measures we have developed.

The respondents to our questionnaire gauged how often they used different types of computer applications, ranging from simple communication through email and instant messaging to more sophisticated purposes, such as development or design of web pages. Not surprisingly, college students used computers on a significantly more regular basis than did high school students. The more positive the attitudes about the attributes of workers in computer fields, the more time respondents reported they spent using the computer and the greater their interest in IT as a possible career choice. This held true for men as well. What is unusual about our findings, however, is that for women, an interest in an IT career is significantly related to amount of computer use, but not necessarily type of computer use.

Our findings add to the volume of previous empirical literature that supports interventions that provide opportunities for hand-on use of many kinds of computer applications. It is very likely that experience and comfort with more sophisticated computer applications is associated with the ability to persist in an computer-related major or career, but is not, according to our findings, a prerequisite for preliminary interest in a computer-related major.

Variable 5: Frequency of Communication with Various Information Sources

Figure 1 illustrates the relationship between frequency of communication with information sources and interest and choice of a career in IT. This variable refers to how often respondents indicated they had spoken to groups of others about career options. These include parents, teachers, counselors or advisors, male or female friends, and others, including employers. There were pronounced gender differences in the impact of this variable on interest in IT.

Key findings from analysis of both our qualitative and quantitative data have led us to conclude that for female high school and college students, the expression of interest in a career in the IT field is often made with little concrete information from sources outside of the immediate circle of trusted friends and family members. To our surprise, findings from the path analysis, indicates that the more contacts our respondents made to talk about career options, the less likely they were to express an interest in an IT career. Possible explanations for the negative relationship between number and type of people consulted and an interest in a career in IT
include that female students are being discouraged from the field or that conversations further negative views about the field.

Unlike the assumption that high school and college students are open to the direction of authorities, our qualitative and quantitative data converge to suggest that women may experience considerable difficulty genuinely engaging different points of views about appropriate career options. This inclination might appear agentic or self-directed if it were not for the fact that skepticism exhibited by women may actually limit the career choices they consider. Our qualitative finding also led us to conclude that the failure to consider a broad range of information before making a career choice is not because career information is not available, as much as it is that many of our female participants seemed reluctant to genuinely consider the information or advice supplied by outsiders to the family, particularly when that advice came in conflict with the input they had received from trusted others. Our interview participants readily acknowledged the importance of seeking the input from others, but seemed reluctant to approach adults to talk about career options and to consider new and/or contradictory information once they heard it. This reliance on guidance from a narrow circle of trusted others that include parents but rarely teachers and counselors, may be one reason why many women may fail to consider a broad range of career options, including ones that familiar others have little knowledge about.

These findings support the conclusion that women who express an interest in a career in IT may be doing so with parental support, but with little information from other sources. Because this indicates that individuals are making career choices with little self-reflection and circumscribed information, this finding does not bode well for the likelihood of long-term persistence in the field. Findings also support the conclusion that one of the biggest challenges facing educators who want to promote women’s interest in IT fields is to develop a portfolio of developmentally appropriate strategies that engage young women in thoughtful reflection about career options that are good matches for their values, skills, and interests.

Conclusion

The focus in our model on information seeking and processing skills has a number of implications for practices targeted at recruiting women to the IT field. Our model demonstrates that high school and college women who expressed an interest in a career in a computer-related field share five central characteristics:

1. They are minorities, which include African Americans, Asian Americans, Hispanic Americans, Native Americans, and multiracial Americans.
2. They perceive that their parents supported this career choice.
3. They used computers frequently and in various ways.
4. They have positive views about the qualities of workers in the IT field.
5. They do not discuss career options with a variety of people.

When findings from our qualitative research and from the questionnaire are considered together, there is strong evidence to suggest that increasing the number of women interested in IT requires considerably more ingenuity than simply delivering information in an engaging way. Instead, our research suggests that these efforts are most likely to be effective when they
incorporate parents and manage to communicate personal concern and interest in young women in the audience. This can be accomplished, not by emphasizing how lucrative positions in the field are, but by discussing the creative aspects of the field and developing strategies that encourage women to gauge the match between their values, skills, and interests and those of a variety of career options. Recruiting efforts are most likely to have a significant impact when they extend over a long enough period of time so that participants can begin to feel a sense of affinity and trust for those that direct the activities.

Findings support the conclusion that one of the biggest challenges facing educators who want to promote women’s interest in careers in STEM (science, technology, engineering, and math) fields, including information technology, is to develop a portfolio of strategies that engage young women in thoughtful reflection about a range of career options that match their skills and interest. Reliance on the broad dissemination of written information about nontraditional careers for women is not sufficient to promote the genuine consideration of suitable options that is necessary to make a well-informed career decision.

Directions for Future Research

As is typical for statistical procedures like multiple regression or path analysis, the majority of the variance in women’s interest and choice of a career in IT remains outside of the ability of our conceptual model to explain. This was true for men as well. There are undoubtedly many structural variables, such as cultural factors that support racial differences, gender stereotypes and gender based occupational segregation, as well as interactions that occur in the classroom, that would add to the predictive power of the model were it possible to quantify it. Similarly, we have yet to investigate the relationship between performances in certain types of course and course taking patterns to an interest in a career in IT. We plan to pursue many of these issues in the next phases of our research project.

A constructive-developmental framework offers educators a way to understand that how students make meaning shapes their receptivity to career and academic advice. The learning partnerships model identifies principles and practices that educators can apply to promote complex decision making and problem solving to foster self-authorship. Such interventions focus on creating safe environments where students have the opportunity to reflect on the process they have used to make an important decision and to explore the role that values and identity play in personal decisions with long-term consequences. An interdisciplinary context, such as offered by block scheduling of new students in inter-related general education courses, could create opportunities for students to explore the development of identity through biographies or life stories. When reflection and interaction are built in as a regular component, internships, service-learning experiences, study abroad, leadership development and activities, and many team building experiences like “ropes courses,” can create the context for the development of skills required for complex decisions making and a safe environment for the exploration of diverse viewpoints.
References


Appendix A: Tables A1-A4. Demographic Characteristics of the Respondents to the Third Version of the Questionnaire (N=777)

Table A1: Enrollment Status of Respondents by Gender

<table>
<thead>
<tr>
<th>Group</th>
<th>Females</th>
<th>Males</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>293</td>
<td>263</td>
<td>556 (71.6)</td>
</tr>
<tr>
<td>College</td>
<td>80</td>
<td>141</td>
<td>221 (28.4)</td>
</tr>
<tr>
<td><strong>Total (%)</strong></td>
<td>373 (48.0)</td>
<td>404 (52.0)</td>
<td>777 (100)</td>
</tr>
</tbody>
</table>

Table A2: Respondent’s Race by Enrollment Status and Gender

<table>
<thead>
<tr>
<th>Race</th>
<th>Females (n=369)</th>
<th>Males (n=388)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High School</td>
<td>College</td>
<td>High School</td>
</tr>
<tr>
<td>Caucasian American</td>
<td>92</td>
<td>63</td>
<td>104</td>
</tr>
<tr>
<td>African American</td>
<td>122</td>
<td>3</td>
<td>74</td>
</tr>
<tr>
<td>Asian American</td>
<td>37</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>Hispanic American</td>
<td>11</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Others</td>
<td>27</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total (%)</strong></td>
<td>289 (38.2)</td>
<td>80 (10.6)</td>
<td>249 (32.9)</td>
</tr>
</tbody>
</table>

Table A3: Respondent’s Age by Enrollment Status and Gender

<table>
<thead>
<tr>
<th>Age</th>
<th>Females (n=373)</th>
<th>Males (n=399)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High School</td>
<td>College</td>
<td>High School</td>
</tr>
<tr>
<td>14yrs or younger</td>
<td>22</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>15– 19 yrs</td>
<td>271</td>
<td>55</td>
<td>239</td>
</tr>
<tr>
<td>20- 24 yrs</td>
<td>0</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>25 yrs or older</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total (%)</strong></td>
<td>293 (38.0)</td>
<td>80 (10.4)</td>
<td>258 (33.4)</td>
</tr>
</tbody>
</table>
Appendix B: Questionnaire Items in Each Factor

1. IT CAREER INTEREST AND CHOICE (DEPENDENT VARIABLE)

Cronbach’s alpha = 0.709 (n=7)
1. I have a good idea about what people in computer-related fields do in their jobs.
2. I feel a sense of satisfaction when I am able to use a computer to solve a problem.
3. If I chose to, I probably have the ability to be successful in a job in a computer-related field.
4. I have family, friends, and/or acquaintances who work in information technology or a computer-related job.
5. I would be comfortable working in a male-dominated occupation.
6. Working in a computer-related field is one of the career options I am considering.
7. My parents would probably consider a career in a computer-related field a good choice for me.

2. PARENTAL SUPPORT

Cronbach’s alpha = 0.692 (n=9)
1. It is important to my mother/female guardian that I have a career
2. It is important to my father/male guardian that I have a career
3. My mother/female guardian has a clear idea about careers that would suit me.
4. My father/male guardian has a clear idea about careers that would suit me.
5. My parents/guardians encourage me to make my own decisions about my future career.
6. I would like my parents to approve of my choice of career.
7. My parents have encouraged me to talk to others about career options.
8. My parents have encouraged me to explore a variety of career options.
9. When we disagree, my parents listen to my point of view.

3. COMPUTER USE

Cronbach’s alpha = 0.669 (n=7)
How often do you use a computer for the following activities?
1. Communication (such as email, instant messages, or chat rooms)
2. Games (any computer-based game)
3. General entertainment (such as internet surfing or music downloads)
4. News and current events (news sites, online magazines)
5. General tasks (such as word processing or creation of databases or spreadsheets)
6. Development or design (such as creating web pages or graphics, programming)
7. Educational purposes (such as to conduct research or complete a homework assignment)
4. ATTITUDES ABOUT THE ATTRIBUTES OF IT WORKERS

Cronbach’s alpha = 0.603 (n=7)
I think people who chose careers in computers are:
Negative Attitude
1. Geeks (Recoded)
2. Likely to be male (Recoded)
4. Loners/antisocial (Recoded)
Positive Attitude
3. Interesting
5. Hard-working
6. Smart
7. Creative

5. INFORMATION SOURCES

Cronbach’s alpha = 0.784 (n=10)
How often have you discussed your career options or plans with others?
1. Mother/female guardian
2. Father/male guardian
3. Teacher or professor
4. Counselor or advisor
5. Other family members
6. Male friends
7. Female friends
8. Significant other
9. Employer or boss
10. Family friends

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