WOMEN IN INFORMATION TECHNOLOGY: EXAMINING THE ROLE OF ATTITUDES, SOCIAL NORMS, AND BEHAVIORAL CONTROL IN INFORMATION TECHNOLOGY CAREER CHOICES

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ABSTRACT

The field of Information Technology (IT) is one of the fastest growing areas within the U.S. economy. Despite the high demand of IT workers, women and minorities are entering this field in small numbers. The focus of this study was to examine the structural, social, and attitudinal factors that influence an individual's decision to choose an IT career. The findings revealed many differences among male and female high school students' attitudes, and intentions. Although many stereotypes existed among the male and female students, perceptions appeared to be similar within the population. For boys, computer and technical skills had a stronger association with attitudes toward IT than for girls. For girls, social issues showed a strong association with attitudes toward IT. Overall, the intention to pursue IT as a career was most likely to prevail within the population of the high school boys.

INTRODUCTION

The field of Information Technology (IT) is one of the fastest growing areas within the U.S. economy. IT professionals develop applications and/or run systems that support other people or the use of computer systems in businesses (Ahuja 2001). Like many science-based occupations, men predominantly fill IT positions. Despite the high demand for IT workers, women and minorities are entering this field in small numbers (Ahuja, 2003; Newton, 2001; SESTAT, 2002). Even though numbers have increased some over the last decade they do not show a significant improvement (Ahuja, 2003; SESTAT, 2002). Here we are concerned with the following questions: Why are women and minorities underrepresented in an area that is growing so fast? What structural, social, and attitudinal factors are impeding the entrance of women and minorities into the IT fields?

Past research has suggested that certain social and structural factors may be preventing the entrance of women and minorities into IT related careers (Ahuja, 2002; Gurer and Camp, 2002; Newton, 2001; Clarke and Teague, 1996; Teague, 2002). This study proposes to examine the factors that influence individual's intention to pursue an IT career. More specifically, this study will systematically assess the causes of gender-related differences in the attraction to an IT career among high school students.

BACKGROUND: REVIEW OF LITERATURE

Many minority women in our society have not chosen to pursue a career in the field of information technology despite ample job opportunities. In 1999, three percent of the IT workers with a bachelor's degree were underrepresented minority females compared to 60 percent white male and 20 percent white female (SESTAT, 2002). These low numbers of women and minorities may be insightful of certain factors that impede these groups from choosing IT careers. The literature suggests that attitudes toward a profession, mentoring/role-models, computing environments, societal influences, and self-efficacy are some of the factors that affect an individual's career choice (Gurer and Camp, 2002; Clarke and Teague, 1996).

During the early stages of education many girls are interested in computing. However, they tend to become uninterested soon after (Gurer and Camp, 2002). This seems to occur for many reasons. Often, boys jump right into computing classes and control a large part of the teachers' time leaving the girls without much teacher attention. This may frustrate the girls because they are left alone to figure it out, thus causing them to become uninterested (Gurer and Camp, 2002); or, they begin to think that computing is too difficult (Teague, 2002).

Attitudes about computing also determine whether or not IT is chosen as a career (Gurer and Camp, 2002; Ahuja, 2002). James Stanton, who is a director of the Institute Initiative stated: "For women and minorities to see science, engineering, and technology as potential careers, we need to work with them in the middle schools" (see Lewis, 2001). Studies have shown that middle and high school girls with female computer professors perform better than those without them (Gurer and Camp, 2002). This suggests the need for role models and mentors in the school system for girls and minority students. If female students lack female role models or mentors with whom they can discuss career choices, they may decide they do not have enough information about the IT field to choose it as a career (Ahuja, 2002).

Societal influences often cause girls to have misconceptions about IT professionals. Some girls have described them as unwashed males with no social skills (Newton, 2001), perceive them as "geeky" (Newton, 2001) or perceive that IT in general is for nerds or men only (Gurer and Camp, 2002). Either way it shows that many women who may have the talent or may have previously been interested become uninterested because of the negativity that is being displayed toward them either in their misconceptions or how society views those in computing. Even movies and TV shows sometimes depict IT people as most likely male and extremely intelligent, but often without many friends or outside relationships. Girls who see these shows may try to compare themselves to the male or think to themselves that they aren't as intelligent. This may result in them believing they could never be successful in a field such as IT. Also, the lack of minority individuals depicted in these roles may influence decisions against preparing for a career in the field. Researchers say that it is important to expose children as young as preschool to computing to emphasize to them that boys and girls are equally able to do it (Gurer and Camp, 2002). Although this may be important, many schools cannot control factors that exist outside of school.

Only 19.3 percent of minorities, compared to 40.8 percent white households, own computers (Chisholm, et al., 2002). Therefore, it is conceivable that college bound minorities have less experience using computers and may not have had the opportunity to consider a career in computing-related professions. In households that do own a computer, it is most likely to reside in the boys' bedroom (Clarke and Teague, 2002). This may hinder a girl's opportunity to use it. Research suggests that children's exposure to computers is crucial in order to give them positive experiences that may cause an interest in computing (Gurer and Camp, 2002). Additionally, many minorities attend schools that do not have sufficient computers for the students to work on, which may contribute to their lack of understanding and interest in computers. The more experience a person has with computers the more confident they may feel in using them (Gurer and Camp, 2002).

In many cases the way a student uses computers in school depends upon the teachers' perception of the students' ability. Many teachers of minority students have low expectations for them and may not require them to use the type of computer programs that will help them develop the problem-solving skills that are needed (Chisholm, et al., 2002). Similarly, they often call on boys rather than girls for answers to their questions (Gurer and Camp, 2002). This leaves minority girls with the problems that they face because of their gender and their ethnicity. The effect is that minorities may be at a disadvantage from the increased dedication to technology in education and our society's growing dependence on technology for personal, social, and economic development. The technological gap has potential for disenfranchising these technologically poor segments of society.

If our schools hope to provide unbiased access to higher learning, then they must concern themselves with fair access to IT (Chisholm et al., 2002). Without the ability or interest to become involved in computing at the high school level many students will lack the opportunity and incentive to choose IT as a career or have the skills to interact well with computers.

RESEARCH QUESTIONS

Two research questions guide this study: RQ1: What type of an image do male and female high school students have about IT professionals and the profession? RQ2: What structural, social, and attitudinal factors impede female high school students from entering into IT related careers?

RESEARCH MODEL

This study attempts to systematically assess the causes of gender and race-related differences in attraction to information technology (IT) as a career. In this study, we propose a Theory of Planned Behavior–based model (see, Ajzen and Fishbein, 1980) of intention to pursue an IT career. This model incorporates work value congruence, attitudes, norms, facilitating factors, and self-efficacy. This theory of planned behaviors (TPB) has been widely used to explain individual behaviors in a variety of contexts (See Figure 1). The theory proposes that a behavior can be predicted by intentions, which are formed by one's attitude, perceived subjective norms, and the individual's control concerning the behavior. In this study, TPB suggests that an individual's intention to pursue an IT career is collectively determined by personal interests, social influences and certain factors that control one's behaviors. These factors relate to an individual's attitude toward IT and the perceived social pressures regarding an IT career, and their perceived control over choosing an IT career. The model constructs and corresponding hypotheses are briefly discussed below.
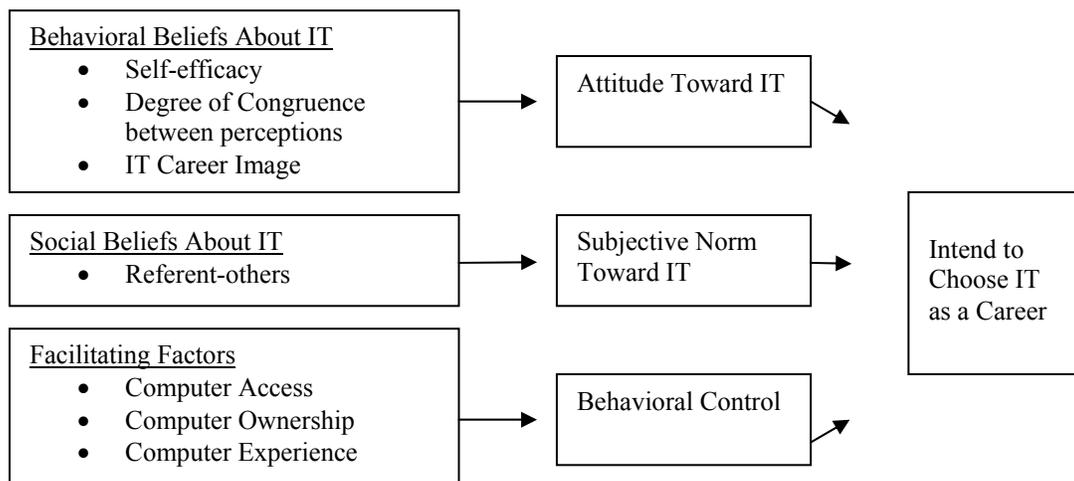
Figure 1. Theory of Planned Behavior Model

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Determinants of an Attitude toward an IT Career

An attitude toward a career in IT is formed by individuals' behavioral beliefs about the outcome of pursuing such a career and the assessment of those outcomes. In our model we posit that an individual's work values and the alignment of those values with the IT profession, along with their self-efficacy, affect the individual's attitude toward a career in IT.

Self-efficacy is described as an individual's estimate or personal judgment of his or her ability to succeed in reaching a specific goal. Here self-efficacy refers to an individual's perceptions about her or his computer-related and IT-related abilities. Self-efficacy has an important influence on choice of and persistence in careers (see, for example, Hackett and Betz, 1981). Women generally have lower self-efficacy than men for traditionally male-dominated occupations (Betz and Hackett, 1981). Moreover, women may display lower computer aptitude (Felter, 1985) and higher levels of computer anxiety (Morrow et al, 1986; Igbaria and Chakrabarti, 1990). Further, an inverse relationship exists between computer anxiety and computer self-efficacy (Hunt and Bohlin, 1993). Thus low self-efficacy, which may be especially common among women, is expected to lead to more negative attitudes toward IT as a career. In a study done in 1989, it was noted that many minorities have low personal-efficacy, which was found to be the effect of institutional inequality and discrimination. For minorities, inequality and discrimination often deprives them of opportunities that could help raise their efficacy level (Okech and Harrington 2002). In this study we examine young women's perceptions about their ability to be successful in IT. Girls generally have a perception that they are unable to succeed in math and computing. Often this inaccurate perception, in combination with other perceptions, is thought to discourage them from pursuing an interest in these areas (Clarke, Teague 1996).

> H1: On average, high school girls will have lower IT self-efficacy than boys.

*Work Value Congruency***:** Attraction to an occupation is determined in large part by an individual's perception of the instrumentality of the occupation for attaining outcomes valued by the individual. For example, if a person enjoys spending time with family and they perceive IT to be a high demand career they may not want to pursue it as a career choice.

> H2: Greater the IT work value congruence of an individual will lead to a more positive attitude toward IT careers.

Image: Society has a way of molding the way we view individuals and things. Many times we will choose what we do and do not like based on how it was described. Many images of IT professionals in our society imply that they are nerds or that it's for men. Many of the computing magazines portray users as men (Gurer and Camp, 2002). Showing this throughout our society only reinforces the notion among girls that IT as a career may not be suitable for them. For some girls, being labeled a nerd may be devastating to their self-concept. We expect that a certain amount of general social pressure may dissuade women from pursuing IT as a career.

> H3: High school girls, on average, will have more negative image of IT profession than high school boys.
>
> H4: High school girls, on average, will have less positive attitudes toward IT careers than high school boys.
>
> H5: More positive attitudes about IT careers will lead to greater intentions toward pursuing IT as a career.

Determinants of Perceived Subject Norm Regarding IT Careers

Referent Others: Referent others are the people that we see as having an opinion that matters to us in the decisions that we make. The possible salient referent for the social norms factors with respect to the intentions to pursue IT careers include family, friends, peers, teachers, and career counselors. Family work history and parental aspirations may affect one's career intentions. What career counselors and teachers think about one's computer related abilities could affect their career intentions. Women may be influenced by these salient referents to a greater extent than men (Becker, 1986; Eagly and Carli, 1981; Crawford et al., 1995).

> H6: Subjective norms will have a stronger influence on high school girl's behavioral intentions of pursuing IT careers than on high school boys.

Determinants of Behavioral Control Regarding IT Careers: Facilitating Factors

Computer Access: Despite computers becoming available to more students in schools, libraries, and at home many students still are unable to get access to a computer or learn what they are all about. In schools many times it is the boys who get to and use the computers the most leaving the girls unable to use and become familiarized with them (Gurer, Camp 2002). In homes with low incomes access to technology has been a problem as well (Chisholm, et al., 2002). White household in comparison with minority households were still six times as likely to gain computer access. (Chisholm, et al., 2002). Unfortunately, access to computers for both women and minority groups are low regardless of income; this technology access gap directly affects students being that they may be less likely to see IT as a career choice. Minority and female students' interest towards IT as a career choice will be higher if they have greater computer access.

Computer Experience: As people gain experience with a computer their level of confidence increases and they become more comfortable with jargon (Gurer and Camp, 2002). Most schools will begin to start introducing the student to computers sometime before high school. Many students will pick up computing as a hobby during this time, others use computers for homework or email. Classes where the only experience given is keyboarding and word processing may leave students feeling as though computing is boring (Clarke and Teague 1996). In some computing environments boys tend to take over as the hosts and girls as the guests (Gurer and Camp, 2002). Boys tend to take over to prove their knowledge of the subject mean while girls sit back admitting they are less knowledgeable thereby giving up valuable computing time and allowing the boys to gain more experience. As a result large numbers of women are entering college with less experience than men causing them to decide against majoring in IT (Gurer and Camp, 2002).

> H7: High school boys will have more computer access and computer experience than high school girls.
> H8: Male students, on average, will exhibit higher behavioral control than female students.
> H9: Greater behavioral control over IT career choices will lead to greater intentions toward pursuing IT as a career.

METHOD

The purpose of this study is to test the theoretical model outlined above, and to characterize the perceptions of high school students about IT professionals and profession. To accomplish this, high school students in state of Washington were surveyed.

Subjects

Students from two schools in the Washington State participated in this study. Seventy students completed the survey. The majority of the students (57 percent) in the sample are from Tacoma, Washington; the rest are from Renton, Washington. Sixty-three percent of the respondents are female and 37 percent male.

The age range of the sample population by sex is as follows: Of the high school girls five were 15 years old, 14 were 16 years old, 21 were 17 years old, and 18 were 18 years old. Of the high school boys five were 16 years old, 14 were 17 years old, five were 18 years old, and one was 19 years old. Overall the majority of participants were 17 years old.

The household family incomes of female students in our sample are as follows: 38.5 percent of the female students are from household that make less than $30,000 a year; 19.23 percent of are from households that make $30 – $50,000 a year; 38.5 percent are from households that earn $50 – $80,000 a year; and, 3.8 percent are from households that make over $80,000 a year. Among females, then, most come from poverty level/low income and middle income homes.

Among males the household incomes were: 41.7 percent from households that made less than $30,000 a year; 25 percent made $30 - $50,000 a year; and, 33.3 percent made $50 - $80,000 a year. As with females most of the males came from poverty level to low income homes.

In addition to the above, the sample was comprised of students from diverse ethnicities. A majority (40 percent) of the students identified themselves as African-Americans. The next two largest groups were Asians (20 percent) and Caucasians (19 percent). The remaining participants were Hispanics (13 percent) and Pacific Islanders (9 percent).

Data Collection Procedures

A questionnaire was developed using reliable and valid items from the past literature. The questionnaires were distributed and explained to the students in school by the classroom teacher. The students were asked to return the survey to the teacher within a week. Those who participated were given a pizza party and their names were entered into a drawing for a $50 lottery. The response rate was 56 percent.

RESULTS

Research Question I: What type of an image do male and female high school students have about an IT professional and the profession? The student perceptions about IT as a profession and IT professionals were captured by asking respondents the following two questions: 1) Briefly describe the characteristics of a typical person who works in the IT profession; and, 2) Briefly describe the nature of work that IT professionals do. What is a typical workday like?

The responses were analyzed by gender. The most frequently mentioned traits and tasks are summarized in Table 1. In addition, some interesting quotes that underscore the characterization of IT professionals and the profession are presented in Table 2.

The student responses reflect stereotypes that are commonly associated with computer science careers. However, these stereotypes do not necessarily depict all other IT careers such as information system professions.

Table 1. Characterization of and IT Professionals and Professions by Females and Males

Females	Males
Characterization of an IT Professional	
People who love technology*/ working w/computers	Smart*
Have good computer skills/knowledge*	Helps others understand computers
Smart, fast learners	Spend a lot of time on computers*
Leaders*	Interested in technology
Unsociable, not outgoing, nerdy	Nerdy
Characterization of IT Profession	
Working on computers all day*	Not much of social life.
Fixing computers*	Typical day spent on computer*
Data entry and organizing information on computers	Fixing computers*
Design/create programs, software and websites*	Building computers/web pages

Table 2. Quotes From Survey about Student Perceptions of IT Professional and the Profession

"People who work in the IT profession are *leaders and have good computer skills*. IT professionals design programs and software." 16 yr old female, Sophomore at Renton High – Renton

"Computer *nerds, interested in technology* and network engineering type stuff…Go to your desk, sit down, *work at computer all day*. Get up like twice to go the bathroom but not cause you have to but because your *bored of your job*." – 17 yr old male, Junior at Lincoln High - Tacoma

"They are constantly on a computer and some carry them around. Very knowledgeable on the newest technology…they would be in *front of some type of computer over half of the day*." – 15 yr old female, Sophomore at Renton High – Seattle

"*Boring, nerd, not much of a life…Typical workday sitting down on chair staring at a monitor all day*." – 17 yr old male, Senior

"They're mostly really *smart* and they're either *grungy or nerdy*." – 17 yr old female, Senior at Lincoln High – Tacoma

"Someone who *works on computers all* day and night. Kinda *nerdy, anti-social, smokes, anxiety*." –17 yr old female, Senior at Lincoln High -Tacoma

Research Question II: What structural, social, and attitudinal factors impede female high school students from entering into IT related careers? Due to the small sample size, it was not possible to test the fitness of the posited model. Therefore, means and correlations were used in the preliminary analysis of the posited hypotheses.

We found significant gender differences in means for high school girls and boys for the following variables: Intentions, Skills for IT, Interest in IT, Income Congruity, and Self-efficacy

Hard Skills (See Table 3). On average boys had higher intentions to choose IT as a career than girls (t value 2.19; p=0.03); higher level of skills for IT (t value –1.77; p=.08); and a higher interest in IT than girls (t value –1.85; p=.07). The degree of congruence between work values and IT career perceptions have a greater effect on girls in terms of income congruity than on boys (t value –1.83; p=.07). Lastly, on average, boys had a higher level of self-efficacy than girls regarding hard skills (t value –1.74; p=.09).

Figure 6 shows the degree of association between the theorized variables. The results show that the variable self-efficacy for hard IT related skills is significantly correlated with attitude toward IT for both girls and boys although the confidence level was higher for boys than for girls. The results also show that for girls, attitude toward IT is highly associated with intensions to choose an IT career. However, among boys there is no significant association between attitudes and intentions. Boys showed a higher correlation between referent-others and the subjective norm toward IT. This association is not significant for girls.

Table 3. Descriptive Statistics

Variables	Women (N=44)		Men (N=26)		T Test	
	Mean	**SD**	**Mean**	**SD**	**t value**	**Significance**
Intention	**4.90**	**1.58**	**3.96**	**1.95**	**2.19**	**.0316**
Attitude	4.04	1.59	4.55	2.02		NS
Subjective Norm	3.14	1.88	3.73	1.80		NS
Control over Choosing IT	5.18	2.16	5.31	2.11		NS
Skills for IT	**4.00**	**1.70**	**4.77**	**1.86**	**-1.77**	**.0817**
Interest in IT	**2.98**	**1.68**	**3.81**	**2.02**	**-1.85**	**.0681**
Degree of Congruence between work values and IT Career Perceptions						
Technical Congruity	3.01	1.66	3.04	1.78		NS
Leadership Congruity	2.82	1.79	2.56	1.66		NS
Family Congruity	3.23	1.45	3.21	1.66		NS
Security Congruity	2.80	1.69	3.00	1.70		NS
Income Congruity	**3.32**	**1.84**	**3.23**	**1.80**	**-1.83**	**.0716**
Social Interaction Congruity	3.16	1.71	3.27	1.58		NS
Social Responsibility Congruity	2.98	1.83	2.65	1.75		NS
Image						
Image Negative	3.45	1.06	3.51	1.12		NS
Self-Efficacy						
Self Efficacy-Computer	4.98	1.21	5.38	1.14		NS
Self Efficacy-Hard Skills	**.63**	**1.42**	**5.23**	**1.39**	**-1.74**	**.0869**
Normative Beliefs						
Referent Others	4.86	1.68	4.35	1.77		NS

*Intention: Higher scores indicate less intent; Attitude: Higher scores indicate more positive attitude; Subjective Norm: Higher scores indicate greater influence; Control variables: Higher scores indicate greater control; Work Value Congruity (scale 0 – 6): Higher scores indicate lower congruity; Image: Higher scores indicate more negative image; Self-efficacy: Higher scores indicate greater self-efficacy; Normative Beliefs: Higher scores indicate; Scale: 1 –7 unless specified

Among girls, the correlation between IT career control, control over skills, and interest in IT in terms of intent to choose IT as a career showed high level of significance whereas for boys the relationship was not significant. The level of significance for the degree of association regarding image was 90 percent for girls and 95 percent for boys. There were three variables for work value congruency: Social Responsibility showed a level of significance for girls and 90 percent for boys; Technical was not significant for girls, but was for boys; and Social Interaction was significant for girls, but was not significant for boys.

Self-Efficacy

Computer Skills (NS)
Hard Skills (0.32**; .64**)

Work Value Congruency
    Technical (NS; .6***)
    Social Responsibility (.33**; 0.33*)
    Social Interaction (0.33**, NS)
     (All other correlations were NS)

IT Career Image

Social Beliefs About IT
    ❑   Referent-others

Attitude Toward IT

-0.25* ;
-0.43**

-.39*

Subjective Norm Toward IT

.0.45****; NS

.22*; NS

Intend to Choose IT as a Career

IT Career Control

.26*; NS

Control – Skills

-.45****; NS

Interest in IT

-.45****; NS

* significance at 0.1
** significance at 0.05
*** significance at 0.01
**** significance at .001
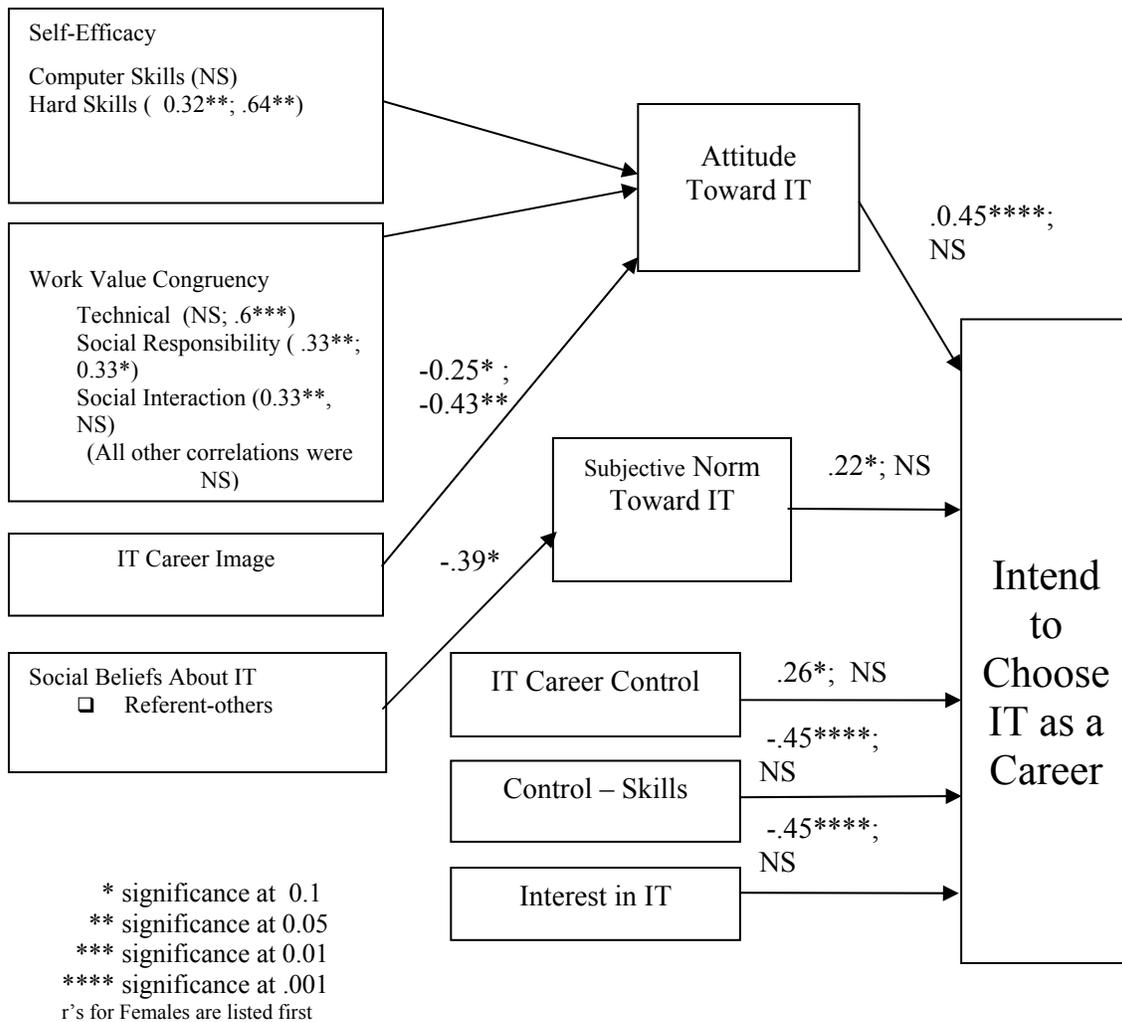r's for Females are listed first

Figure 6. Female and Male Correlation Between Theorized Variables

The charts below illustrate the results of behavioral intent, computer experience, and computer usage among male and female high school students.

Behavioral Intent of High School Students to Pursue IT as a Career
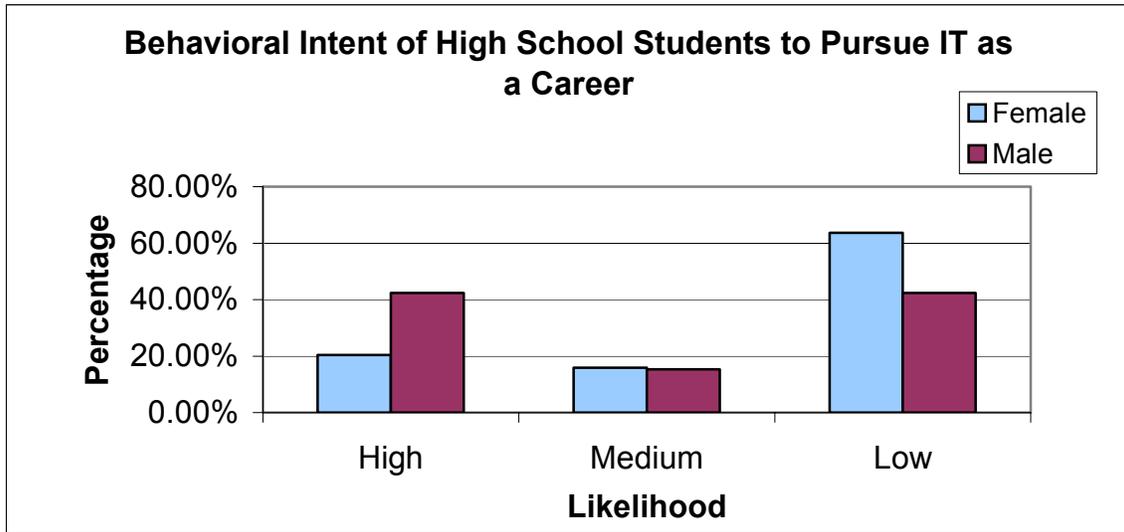
Figure 7. Male and Female Behavioral Intent to Pursue IT

The behavioral intent of male students to pursue IT as a career was much higher than the female intent. The likelihood of a male student to pursue IT was 42.3 percent opposed to 20.4 percent of the female students. These results show that male high school students may be more likely to pursue IT as a career than female high school students.

Computer Experience Among High School Students By Gender

Figure 8. Male and Female Computer Experience

Computer experience was higher among high school males (12 percent) compared to females (2.4 percent). These results indicate that male high school students have greater computer usage compared to the female high school students.

Computer Usage Among High School Students By Gender
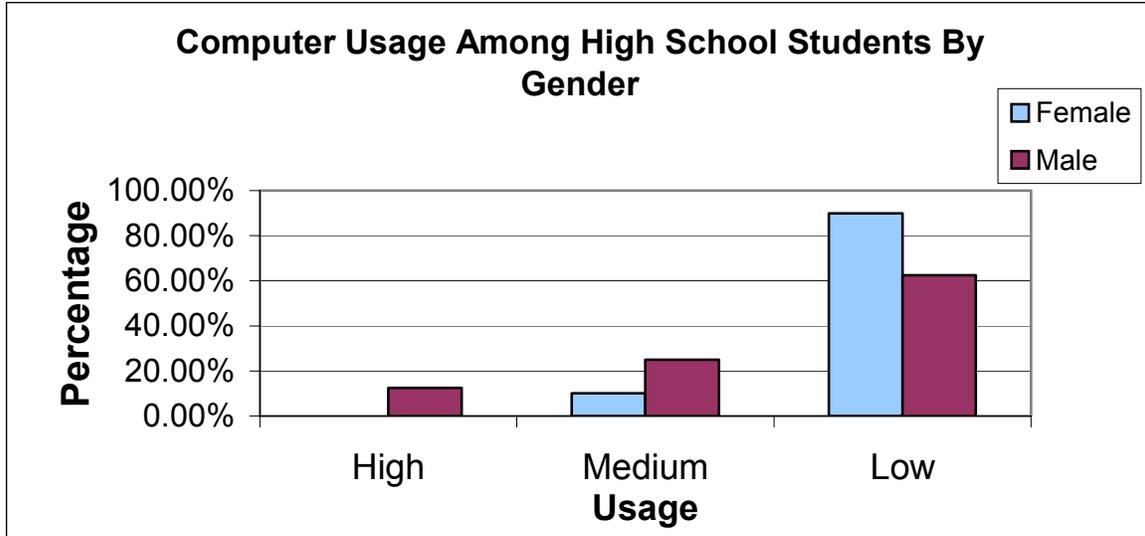
Figure 9. Male and Female Computer Usage

Males also have a higher level of computer usage than the female students. In the category considered to be a high volume of usage, none of the females were considered to a part of thi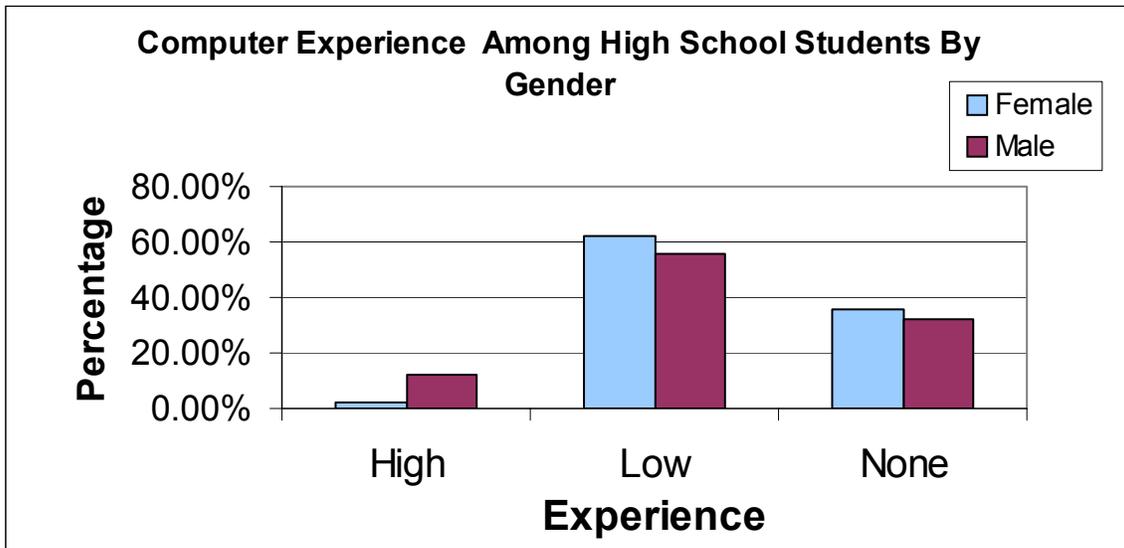s category. The male students did respond to having a higher usage of computers at a rate of 12.5 percent. These results suggest that high school females are not using computers nearly as much as the high school males are.

Table 4: Preliminary Evidence for the Posited Hypotheses

Hypotheses	Preliminary Results
Hypothesis 1	This hypothesis is partially supported. There is some evidence that girls on average have lower self-efficacy regarding IT hard skills, such as programming.
Hypothesis 2	Not Supported
Hypothesis 3	Not Supported. Girls had a more positive image of IT than boys, but the difference was not significant.
Hypothesis 4	Not Supported
Hypothesis 5	Some support for this hypothesis for girls, not supported for boys.
Hypothesis 6	Not Supported
Hypothesis 7	Some Support for this hypothesis
Hypothesis 8	Supported
Hypothesis 9	Some support for this hypothesis for girls, not supported for boys.

SUMMARY

The study reveals that stereotypes commonly associated with IT related professions and IT professionals (especially computer science and computer engineering) appear to persist among our sample population. However, male and female student perceptions about IT profession and professionals appear to be congruent. For both boys and girls, the IT career image is significantly associated with the attitude toward IT careers, but the association is stronger for boys. It appears from the open-ended responses that the students do not have full knowledge of the scope and variety of career paths available within the field of IT.

IT hard-skills self-efficacy, such as programming skills, has a stronger association with attitudes toward choosing an IT related career for males than for females. For boys, technical work value congruence is strongly associated with attitudes toward choosing an IT related career. For girls this association is statistically insignificant. Work value congruency for social responsibility has a stronger association with attitudes toward choosing an IT related career for both boys and girls. Work value congruency for social interaction has a strong association with attitudes toward choosing an IT related career for girls. However, statistically, this association is not significant for boys.

For girls, a sense of control over choosing an IT related career has a positive association with their intentions toward pursuing IT as a career. This association is not statistically significant for boys. For girls, the perception of whether they have the skills and abilities to pursue an IT career has a positive association with their intentions toward pursuing IT as a career. Again, this association is not statistically significant for boys. For girls, an interest in IT related careers has a positive association with their intentions toward pursuing IT as a career, but this association is not statistically significant for boys.

For boys, attitudes toward IT careers are strongly associated with their intentions to choose an IT career. However, this association is not significant for boys. The association between social norms toward IT careers and intentions to choose an IT career is not statistically significant.

In conclusion, on average, boys have greater intentions toward pursuing IT related careers than females. Based on the results of our study it appears that, on average, females are less interested in IT careers possibly because they do not perceive that they have the IT related skills and abilities to pursue this career path. This, in turn, may be because of the difference in the nature and extent of computer experience and usage which is greater among boys than girls.

LIMITATIONS

One of the problems encountered during this study is the small sample size. This was due, in part, to lack of participation by schools during their end of year school schedule. Also, the lack of a diverse population made it difficult to find sufficient evidence of ethnically oriented differences that may affect a student's choice to pursue IT as a career. Lastly, the lack of adequate awareness about IT careers among the sample population may have affected the efficacy of our results.

CONCLUSION

The critical importance of attracting women and other minorities to IT careers has been widely recognized given concerns about worker shortages and the importance of diversity in this key component of the American economy. This exploratory study examined some factors underlying gender differences in attitudes toward IT careers. The findings suggest that policy makers should develop policies and programs that assist raising the awareness and appeal of IT as a career option especially among minorities and women. Students should be exposed to the various career paths available within IT. Moreover, schools should design and develop IT related classes, or incorporate IT oriented projects that are engaging and appealing to both men and women.

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Appendix I
WELCOME

Welcome to the survey on career preferences and attitudes about IT (Information Technology) careers. We thank you for participating and hope you will find this survey interesting and useful. This survey will ask you questions about your work values and your beliefs and attitudes about Information Technology.

Please understand that your answers are completely PRIVATE and CONFIDENTIAL. No one other than the researcher will ever see your individual responses. Washington State University supports the practice of protection of the rights of research participants. Accordingly, this project was reviewed and approved by the WSU Institutional Review Board. The information in this consent form is provided so that you can decide whether or not you wish to participate in this study. Your participation is considered voluntary. Even if you agree to participate, you are free to withdraw from the study at any time. If you decide not to participate in the survey, then please return the survey to your teacher. It will probably take you about 30 minutes to complete this survey.

Students within the selected classrooms will be given a pizza party as an incentive for their participation in this study. In addition to the party, students who participate will also be eligible for a $50 lottery drawing. Students who wish to be entered into the drawing must provide their name, phone number, and address so they may be contacted in the event that they win any prize money. In order to be eligible for the pizza party, and/or $50 lottery you have to complete the survey.

For the $50 lottery drawing, two students will be selected at random from all the completed surveys and will be notified by mail, email, or phone. If you have any questions or concerns regarding this project, you can contact the investigator Tiffany Brinkley, tiffany_brinkley_wsu@hotmail.com (509) 332-7223.

Thank you for your participation. **Informed Consent**

"I have read the preliminary description of this study and agree to participate. I understand that there are no anticipated risks, and I am free to discontinue my participation at any time without penalty."

Name:_____

Gender: **M**   **F**

Ethnicity:_____

Address:_____

Phone Number:_____

Email Address:_____

Parent's Signature (if under age 18):_____

Your Signature: _____

Please **check** here if we can contact you for a follow up interview: ___**Section I.**

In the following section you will be asked to describe some aspect of IT, please be as descriptive as possible.
1.   Please briefly describe the characteristics of a typical person who works in the IT profession.
2. Please briefly describe the nature of the work that IT professionals do. What would a typical workday be like?
3. What career do you plan to pursue? Why?
4. Have you ever considered Information Technology as a career? (Circle one):

Yes   No   I don't know about this career

Section II.

Definition of an IT Profession

IT is short for Information Technology, a broad term covering all aspects of managing and processing information. IT professionals design, develop, support and manage computer software, hardware, and networks, such as the Internet. The applications of these technologies are all around us. In fact, IT is probably already a part of your life in ways you aren't even aware of. Computer software used to write a term paper, computer generated animation in a blockbuster movie, networks and programs that let you order books over the Internet, and satellites and systems that enable NASA to conduct remote space exploration are all developed by creative and dedicated IT professionals
A few examples of IT related jobs are listed below:
- Computer Engineer: Computer engineers work with the hardware and software aspects of systems design and development. They usually apply the theories and principles of science and mathematics to design hardware, software, networks, and processes and to solve technical problems.
- Computer Programmer: Computer programmers write, test, and maintain the detailed instructions, called programs or software that computers must follow to perform their functions. They also conceive, design, and test logical structures for solving problems by computer.
- Computer Scientist: The title computer scientist can be applied to a wide range of computer professionals who usually design computers and the software that runs them, develop information technologies, and develop and adapt principles for applying computers to new uses

- Database Administrator: Database Administrators are the keepers of database accuracy, efficiency, maintenance and development. Largely, they control access to the information, ensuring that it is updated accurately and regularly.
- Interface Designer: Human-computer interaction is a relatively new field of research in computer science, which addresses ergonomic and interaction issues in computing. Interface designers use human factors engineering, graphic design theory and other methodologies to design the user interface of a computer system.
- Network Specialist: Network specialists are responsible for the security and administration of the networks that are now prevalent in many companies. They also design and implement systems that keep networks functioning in the event of a power failure or other emergency.
- Software Engineer: Software engineers or software developers working in applications development analyze users' needs and design, create, and modify general computer applications software or specialized utility programs. These professionals also possess strong programming skills, but they are more concerned with analyzing and solving programming problems than with writing code for programs.
- Systems Analyst: Systems analysts solve computer problems and enable computer technology to meet individual needs of an organization. They help an organization realize the maximum benefit from its investment in equipment, personnel, and business processes. This process may include planning and developing new computer systems or devising ways to apply existing systems' resources to additional operations.
- Web Designer: A web designer is the general contractor/team leader for the creation and management of websites. They are responsible for creating and maintaining Internet sites for organizations, corporations and individuals.

Section III.

In this section you will be asked about your career preferences. Below is a list of outcomes that might be achieved in your future job or career. Rate the outcomes according to how important or desirable they are to you. Try to distinguish between what is truly most important and what is less important to you. ***Please select only one option.***

1	2	3	4	5	6	7

Very unimportant   **Very important**

1. Being able to work with the newest and most innovative computer technology
2. To be in a position of leadership and influence
3. Having friendly co-workers
4. Being able to achieve a balance between work and family life
5. Having time to engage in satisfying personal and leisure activities
6. Being able to supervise, lead and influence others
7. Being able to work for an organization that I can expect to stay at for a long time
8. Being able to use my programming skills
9. Using my skills to make an organization a better place for people to work
10. Reaching a level of organizational responsibility where my decisions really make a difference
11. Becoming in expert in a particular field of technology
12. Earning a high income
13. Being able to apply and develop my technical skills
14. To rise to a high position in management
15. Having job security
16. Having good social climate (people I can talk to and socialize with at work)
17. Being able to meet my family and personal responsibilities as well as work responsibilities
18. Seeing other people change and learn because of my effort
19. Having a chance to benefit society through my work

Section IV.

Please select only one option.

1	2	3	4	5	6	7

Strongly disagree   **Strongly agree**

1. I find computers easy to use
2. I can learn to use different computer software packages to solve problems
3. I can learn programming languages
4. I find it hard to get computers to do what I want it to do
5. I often need assistance to do computer related tasks/assignments
6. I usually find computer-related assignments difficult/hard

Section V.
Please respond to the following questions about your perceptions of someone working in the IT profession. ***Please select only one option.***

1	2	3	4	5	6	7
Very likely						**Very unlikely**

1. In your opinion, how likely is it that someone working in IT would earn a high income?
2. In your opinion, how likely is it that someone working in IT would have the opportunity to exercise leadership?
3. In your opinion, how likely is it that someone working in IT would have high job security and stability?
4. In your opinion, how likely is it that someone working in IT would have a good balance between work and personal/family activities?
5. In your opinion, how likely is it that someone working in IT would need to use and develop strong technical skills to be successful?
6. In your opinion, how likely is it that someone working in IT would have good friends and social interaction at work?
7. In your opinion, how likely is it that someone working in IT would have a positive impact on other people?

Section VI. *Please select only one option.*
If I were to choose an IT career, then may other people may perceive me as a person:

1	2	3	4	5	6	7
Strongly disagree					**Strongly agree**	

1. Who is "geeky" and "nerdy".
2. Who is not outgoing.
3. Who is socially oriented.
4. Who is boring to be around.
5. Who lacks social skills.
6. Who spends much of their time programming.
7. Who is an effective communicator.
8. Who is not cool.

Section VII.
Please select only one option.

1	2	3	4	5	6	7	Not Applicable
Strongly agree						**Strongly disagree**	

1. My close friends think I should choose an IT career.
2. My mother thinks I should choose an IT career.
3. My father thinks I should choose an IT career.
4. My brothers think I should choose an IT career.
5. My sisters think I should choose an IT career.
6. My teachers think I should choose an IT career.
7. My career counselor/advisor thinks I should choose an IT career.
8. My boy-friend/girl-friend thinks I should choose an IT career.

Section VII.
Please select only one option.

1	2	3	4	5	6	7
Bad idea					**Good idea**	

1. For me to major in IT would be a:
2. For me to major in IT would be:
3. For me to major in IT would be:

1	2	3	4	5	6	7
Strongly disagree				v	**Strongly agree**	

4. Most people who are important to me think I should major in IT.
5. Most people who influence my behavior think I should major in IT.
6. Choosing an IT career is entirely under my control.
7. I have the skills and abilities to pursue an IT career.
8. I am interested in choosing an IT career.

Section VIII.

Unless specified, please select only one option.

1	2	3	4	5	6	7

Strongly agree   **Strongly disagree**

1. Assuming I get admitted at a university, I intend to pursue an IT related career.
2. Assuming I get admitted at a university, I would pursue an IT related career.
3. I use the computer:

   Daily   **Weekly Monthly**   **Few times in a year**   **Never used a computer**

        1a. If you use the computer daily, then how many hours do you spend on the computer?

             Less than one hour   **2-3 hours**   **more than 3 hours**

4. What do you use the computer for?
5. Do you have a computer in your house?   **Yes**   **No**
6. Where in the house is the computer located? (Check all that apply)

   Office _____   **My Bedroom**_____   **Brother/Sisters Bedroom**_____   **Living Room**_____

   Dining Room_____   **Parents Bedroom**_____   **Other** (specify)_____

   If you **don't have a computer** at home then please answer the following three items:

7. Do you have access to a computer? **Yes**   **No**

        7a. Where: **School Library Friends house Neighbor Other family's house**

                  Other (specify)_____

8. My family/I plan to buy a computer: **Yes**   **No**
9. My family/ I can afford a computer: **Yes**   **No**

Section IX.

1. Have you taken any computer related courses? **Yes**   **No**

        1a. If **yes**, then describe what you learned in that class: _____
2. Have you taken any programming courses? **Yes**   **No**   **Don't know what it means**

        2a. If **yes**, then please list the names of the programming languages you have learned:
3. Do you buy software for the computer? **Yes**   **No**

        3a. If **yes**, then what type of software have you bought in the past year?

Section X.

Unless specified, please select only one option.

1. City:_____
2. State:_____
3. School:_____
4. Status: **Freshman**   **Sophomore**   **Junior Senior**
5. Age: **15**   **16**   **17**   **18**   **19**   **Other** (specify):_____
6. Gender: **Male**   **Female**
7. Ethnicity: **African-American**   **Caucasian**   **Hispanic**   **Pacific Islander Asian Middle-**

        Eastern Native American Eskimo Indian

        Other (please specify):_____
8. Household income? : **Below $20,000**   **20,000 – 30,000 30,000-40,000 40,000-50,000**

     50,000- 60,00 60,000-70,000 70,000 – 80,000 80,000 – 90,000

     90,000-100,000 100,000 +
9. Parents occupation: **Mom**_____

               Dad_____
10. Parents Education:

        <u>**Mom:**</u>

        Did not go to school   **finished high school**   **2 year college**   **4 year college**

        Masters Ph.D.   **Not applicable**

        <u>**Dad:**</u>

        Did not go to school   **finished high school**   **2 year college**   **4 year college**

        Masters   Ph.D.   **Not applicable**