TECHNOLOGY SELF-PERCEPTIONS: THE EFFECTS OF GENDER, EDUCATION PROGRAM AND JOB TYPE

by

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Abstract

This study explores gender and education effects on self-perceptions of technology self-efficacy and locus of control. Three steps were used to approach the issue: (1) testing for gender and education influences on individual's feelings of self-efficacy and control with technology, (2) assessing intentions to update job and technology skills, and (3) whether prior experience with technology positively influenced self-perceptions. The self-perception measures used were versions of Rosenberg's self-esteem scale, Spector's work locus of control scale, and Ajzen's theory of planned behavior. These scales were modified to reflect job and technology domains, and administered in an online questionnaire. The respondents were classified into technology and non-technology jobs, and technology (computer science, engineering, and interactive arts) and non-technology education programs. There were 49 men and 34 women with technology education, and 41 men and 55 women from non-technology education programs.

The study findings revealed men have higher technology self-efficacy compared to women, and women with a technology education had higher technology self-efficacy compared to women with a non-technology education. An unexpected result of the study is women with technology jobs have lower technology self-efficacy when compared to women with non-technology jobs. The theory of planned behavior accounts for less than 30% of the variance, and was not a powerful predictor for updating job or technology skills.

The main contribution of this study is finding evidence of a positive influence of technology education among women. Although the results confirm prior research showing women have lower self-evaluations on all scales—and technology scales in particular--the women-only results suggest an overall positive influence of technology education on technology self-efficacy. The study used quantitative data and samples from an employed population, thereby expanding the knowledge area beyond high school and university student samples used in many gender and technology studies.

Keywords: women and technology; gender and technology; technology education; technology self-efficacy; Rosenberg's self-esteem, work locus of control scale; theory of planned behavior

Education is the most powerful weapon which you can use to change the world.

Nelson Mandela

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Table of Contents

List of Figures

List of Tables

Glossary and Abbreviations

ICT	Information and communication technologies
pbc control	perceived behavioral control - controllability
pbc efficacy	perceived behavioral control – efficacy
RSE	Rosenberg's self-esteem scale (Rosenberg, 1965)
SET	Science, engineering, and technology
sn family	subjective norms – family
sn work	subjective norms - work
STEM	Science, technology, engineering, and math
TAM	Technology acceptance model
Technology education	Technology education is used as a noun referring to an education program involving the design, modification, and creation technology. In contrast, technological education may refer to educational technologies used in delivery methods and not the course subjects.
Technology job	A technology job is used as a noun referring to a job involving the design or creation of technology that is then used or consumed by others.
TPB	Theory of planned behavior[1] (Ajzen, 1991)
UN	United Nations
WLOC	Work locus of control scale (Spector, 1988)

[1] The theory of planned behavior is a proper noun title. Therefore, for consistency with the theory's author and previously published work, the U.S. spelling of behavior is used throughout this thesis. The exception is the references where behavior is used as published in the journal or article's title.

1: Introduction

The purpose of this research is to compare self-perceptions of self-efficacy and locus of control; and to test for moderating effects of gender, education program, and job type. Specifically, this study assesses gender differences in job and technology self-efficacy, and job and technology locus of control, by comparing alumni from technology education programs to those from non-technology programs. This study aims to contribute to the understanding of gender differences in technology self-perceptions.

There are fewer women compared to men in technology education programs, such as computer science and engineering, and technology careers. Despite several programs aimed at increasing the number of women in technology areas, over the past ten years the numbers have decreased (U.S. Department of Education, 2010). Prior research explains female enrolment in traditional computing science programs is lower because women are interested in the social aspects of technology, and not in technology alone (Diamond & Whitehouse, 2007; Phipps, 2007). Suggested causes for this range from general cultural norms surrounding technology (Hughes, 2001; Hyde & Linn, 2006) to organizational techno-culture (Sappleton & Takruri-Rizk, 2008). The consequences of such lack of participation result in negative effects on women's job opportunities (Campbell, 2009; Sappleton & Takruri-Rizk, 2008; A. Williams, 2010), long-term disadvantages in economic participation, and lack of influence on technology design (Rosser, 2009; Wajcman, 2007).

1.1.1 Research problem.

Research exploring the causes of female underrepresentation focuses mainly on choice of technology education programs (Langen & Dekkers, 2005; Varma, 2009) and organizational cultures of women who leave technology careers (Margolis & Fisher, 2003; Woodfield, 2002). Very few prior studies examine women who have chosen technology education and technology jobs. In addition, the majority of self-efficacy and technology studies sample from student populations, and there is limited information available about technology self-perceptions gender differences in the workplace.

The self-perceptions people have about their jobs and the technology used in their jobs is important because of the correlation between self-efficacy and work performance (Stajkovic & Luthans, 1998). Specifically, “unless people believe that they can produce desired effects by their actions, they have little incentive to act” (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996, p. 1206). Without strong technology self-efficacy and locus of control, many women will not pursue technology-based careers; and women who do choose technology education and careers may have low self-perceptions that negatively influence their work performance.

1.2 Study Description

Underlying the premise of this study is a social cognitive perspective that the underrepresentation of women in technology jobs may be the result of women perceiving their technology skills as lower compared to men (Zeldin, Britner, & Pajares, 2008). This study tests for influences of gender and education on feelings of competence and control by measuring domain specific self-efficacy and locus of control.

Self-perception scales fall into three categories: (1) global, (2) domain, and (3) trait or task. Global self-perceptions are about the self as a whole and are usually stable constructs. Examples of global self-perceptions include self-esteem (Rosenberg, 1965) and global self-efficacy (Sherer, 1982). Domain specific self-perceptions are those that relate to an area of competence, such as academic self-esteem (Gentile et al., 2009) or occupational self-efficacy (Schyns & von Collani, 2002). Task specific self-perceptions are those related to a specific task, such as task self-efficacy (Bandura, 1977).

This study uses two domain level scales and a task specific scale. Self-efficacy and locus of control measure self-perceptions in job and technology domains, and the theory of planned behavior measures intentions to update skills at a task level. Self-efficacy refers “to a person’s beliefs concerning his or her ability to successfully perform a given task or behavior” (Betz & Hackett, 1997, p. 385). Locus of control measures “a person’s belief in personal control in life (internality) rather than in control by outside forces or individuals (externality)” (Spector et al., 2002, p. 454). The task specific scale, theory of planned behavior (Ajzen, 1991), measures intentions to update job and technology skills. Chapter 3 explains each theory more fully.

This study takes three approaches: comparisons across domains, intentions to update skills, and effects of mastery experiences on self-efficacy and locus of control.

Shown in *Figure 1-1*, the first step models the moderating effects of gender, job type, education program, education level, and age on self-efficacy and locus of control; and compares these effects across job and technology domains.

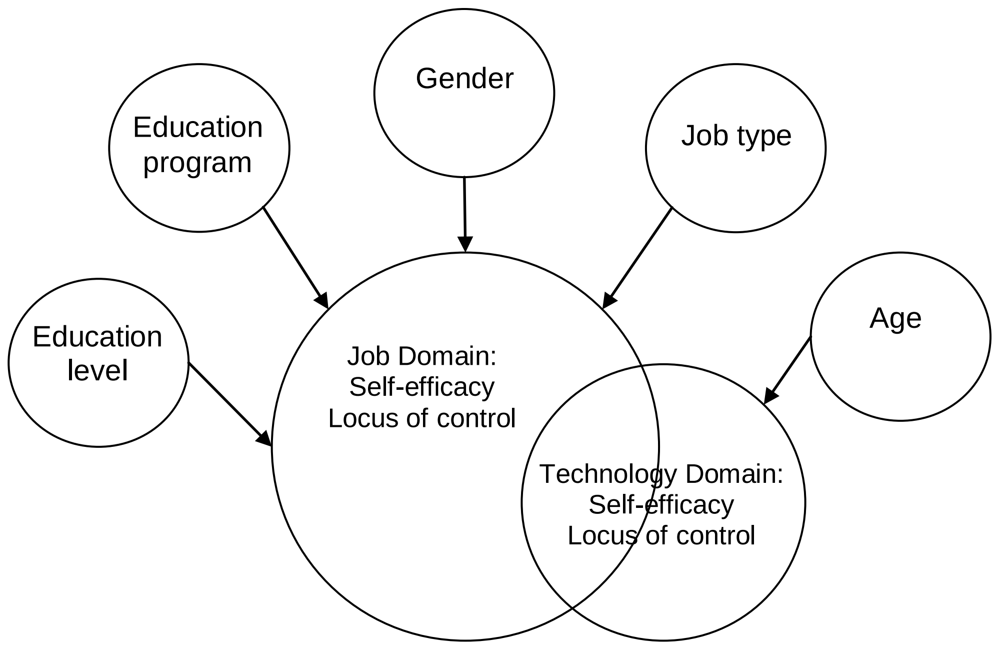

Figure 1-1. Model 1: Variable influence on self-efficacy and locus of control across domains.

The second step uses a modified model of the theory of planned behavior (Ajzen, 1991) to test for intentions to update job and technology skills. As shown in *Figure 1-2*, the theory of planned behavior uses three antecedent variables—attitude, subjective norms, and perceived behavioral control–to predict intention. The Step 2 model uses the same moderating variables as Step 1, and self-efficacy and locus of control are added to the theory of planned behavior.

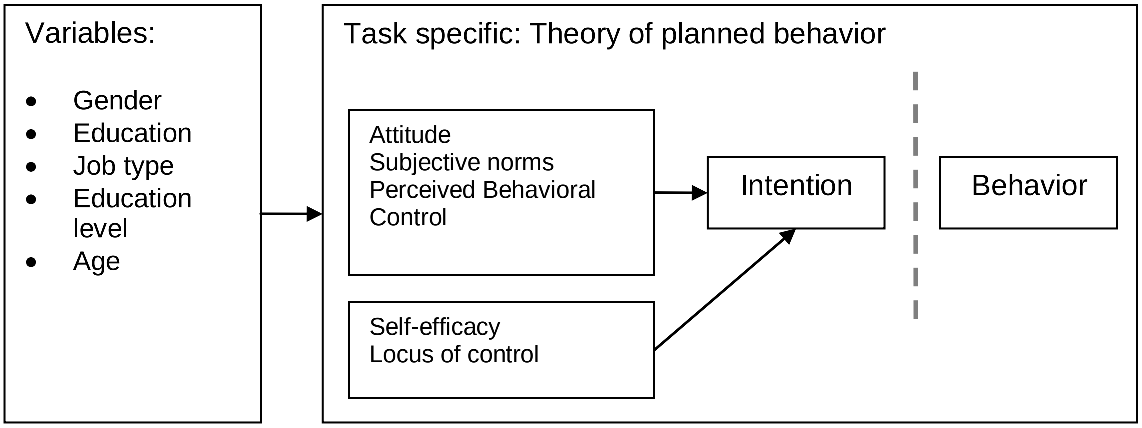

Figure 1-2. Model 2: Factors influencing intention.

Step 3 assesses the influence of updating skills on self-efficacy and locus of control. Because the study questionnaire was completed in a single session, it was not possible to test the relationship between intention and actual behavioral outcome as shown in *Figure 1-2*. Instead, respondents were asked if they had updated their job or technology skills during the past year. Referred to as mastery experiences by Bandura, (1977), prior learning experiences are expected to have a positive effect on self-efficacy and locus of control, as shown in *Figure 1-3*.

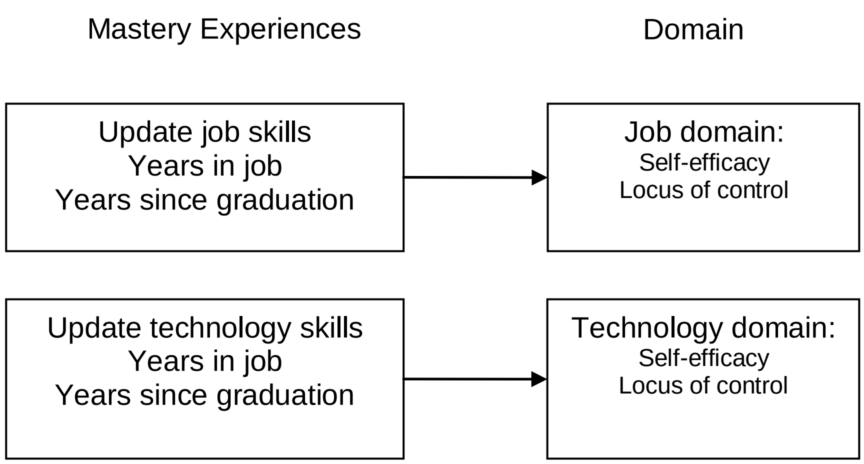

Figure 1-3. Model 3: Influence of mastery experiences.

While the three models are inter-related, they approach the problem of underrepresentation of women in contrasting ways. Model 1 explores factors that may influence technology self-perceptions. Model 2 uses the theory of planned behavior antecedent factors, and the factors from Model 1, to test intention to update job and technology skills. Model 3 proposes updating skills will influence self-perception and locus of control. With an aim at highlighting gender differences in technology self-perceptions, all three approaches include questions for job and technology domains.

1.2.1 Thesis outline.

Chapter 2 presents background to the research problem and assesses relevant gender and education research related to technology. Broad issues, such as underrepresentation and career concerns for women, contextualize the research and establish the usefulness of the study. Specific barriers involving organizations and culture provide a rationale for the current underrepresentation of women in technology careers. Previous studies also uncover theoretical dilemmas with gender and technology research. The review concludes with gender influences on educational program choice. Questions arising from the literature review form the basis of this study.

Chapter 3 is the literature review and theoretical support for the hypotheses developed in this study. The first section of Chapter 3 explains levels of self-perceptions and domain schema that form the conceptual basis of this study. Next is an assessment of the research on the two domain measures: self-efficacy and locus of control. Following the discussion of the underlying constructs are the hypotheses for each approach; Model 1 explores the influence of each variable, Model 2 argues the predictive relationship of the theory of planned behavior, and Model 3 proposes a positive relationship between updating skills and self-perceptions.

Chapter 4 outlines methods and data gathering. Question development is explained for each scale, including wording variations and scaling. This chapter explains sampling, pretesting, and data collection. In addition, the statistical tests for the hypotheses are reviewed.

Chapter 5 presents the results. The first section provides statistical violations and sample characteristics, and the results for each model follow. Due to space considerations, some tables in this chapter only show statistically significant results. These tables are noted, and complete results are included in the appendices.

Chapter 6 contextualizes the findings of this study into the main themes of gender differences and education effects. The limitations section describes issues with the current study. The future research section explains methods for overcoming the limitations of the study and suggests next steps to move the research forward.

Chapter 7 discusses the contributions of this study, practical implications for educational programs, and some of the larger societal issues underscored by the study.

2: Problem Background: Gender, Education, and Technology

Recent technology research shows women to be less interested in entering technology education programs and technology careers compared to men (Margolis & Fisher, 2003; Phipps, 2007; Rosser, 2009; Sappleton & Takruri-Rizk, 2008; A. Williams, 2010). The reasons for a lack of female participation in science, technology, engineering, and math--commonly referred to as STEM in gender research--careers and education include: “sex role conditioning and stereotyping; the perception of computing as the domain of ‘geeks’ and ‘nerds’; the lack of a critical mass of women in ICT [Information and Communication Technologies] and the rate of change in the industry” (Crump, Logan, & McIlroy, 2007, p. 350). Prior research claims the “interaction of gender stereotyping with the masculine image of SET [Science, Engineering, and Technology] disciplines and workplaces prevents girls and women from choosing SET subjects” (Phipps, 2007, p. 768). Without participating in STEM areas women not only miss job opportunities, but also lack participation in decisions that shape the development of technology. Unfortunately for women not participating in STEM, these areas, “particularly computer science and engineering, represent fast-growing areas with the greatest workforce demand in our increasingly technological society” (Rosser, 2009, p. 67).

This chapter analyzes issues relating gender to technology education and technology jobs. The first section explains the lack of participation and the disadvantages caused by underrepresentation of women in technology. It also discusses the cultural issues contributing to barriers for women in technology, including detrimental organizational cultures and negative social discourses. The first two sections outline factors affecting women entering technology education and careers, and the need to address negative gender stereotypes. The discussion then turns to review theoretical dilemmas within gender and technology research. Dichotomous and deficit views of gender influence not only the research, but also technology education programs and attitudes of students. The chapter concludes with an explanation of the study questions proposed to address issues not explained by current literature.

2.1 Implications for Women and Organizations

The general importance of this study relates to gender inequities currently seen in technology careers. Gender-related work issues, such as unequal wages, non-rewarded work, and underrepresentation, are having negative consequences for women (Walters & McNeely, 2010, p. 323). Specifically, "Men's and women's lives could become increasingly different and potentially more unequal unless women gain greater economic and political power" (Arnot, 2000, p. 300). Instead of increasing opportunities, employment of women in STEM areas has actually dropped (Rosser, 2009). Female underrepresentation is an issue because of the political and power relationships supported by science and technology (Campbell, 2009).

2.1.1 Expertise and lack of participation.

Complicating the power dynamics of gender in the workplace are media portrayals of technology as being beyond the understanding of the public:

> Experts associated with new technology, particularly those who have developed it, are regularly portrayed in the media as not only rich and powerful, but dedicated and even eccentric personalities. They obviously control their own destinies as well as ours, and the impression conveyed is that this is basically acceptable since these men are far more knowledgeable than the rest of us. (Leonard, 2003, p. 44)

Such portrayals, create a culture where individuals abdicate control and the expectation is to "defer to expertise" (Nelkin, 1995, p. 162), an expertise typically seen as male (Johnson, 2009).

Lack of expertise becomes a problem because expert knowledge influences the income, careers, opportunities, patents, and decision-making roles for women. Women need to be involved in all aspects of technology and not just passive users: "Drawing more women into design–the configuration of artefacts–is not only an equal employment opportunities issue but is also crucially about how the world we live in is designed, and for whom" (Wajcman, 2007, p. 296). Although the number of people using technology has increased, gender equity and technology is still a highly debated issue:

> For all the hyperbole about the network society, it has not led to women's full integration into its design. The Internet does not automatically transform every user into an active producer, and every worker into a creative subject. The potential for empowerment offered by ICTs will largely be realized by those groups with technical knowledge who understand the workings of the machine. Acquisition of this know-how will become ever more critical, and gender imbalance in technical expertise ever more telling. (Wajcman, 2007, p. 295)

For example, one consequence is women in STEM are not gaining research funding or patents at the same rates as men. The lack of participation in technology development can lead to disadvantages in financial rewards and career opportunities (Rosser, 2009). In addition, female contributions to technology research provide different perspectives, which result in product characteristics specifically designed to address the needs of women and children (Rosser, 2009).

2.1.2 Obsolescence and accumulated disadvantage.

The effects of non-participation in technology extend to work environments, as technology change is making obsolescence an issue more quickly over the course of a career than it has in the past. Defined as "the extent to which [an employee's] knowledge and skills have failed to keep pace with the current and likely future requirements of his job" (Jones & Cooper, 1980; as cited in Chauhan & Chauhan, 2009, p. 648), obsolescence is increasing in concurrence with technological advancement. This means employees must engage in continuous learning. The "shelf-life" of work skills and knowledge is getting ever shorter given the pace of technological change, globalization and increasing job mobility, and therefore the ability to learn is as important as the repertoire of skills or knowledge acquired (Pang, Chua, & Chu, 2008, pp. 1384-1385).

In addition to the challenge of keeping up with technological changes, mobility and boundary-less careers have "shifted the responsibility for career management and development from the organization to the employees" (Pang et al., 2008, p. 2). Companies no longer guarantee employment and look for ways to cut costs by outsourcing (Flinders, 2010) and reducing training programs (Dowdal, 2009). The result is individuals are responsible for their own employment and for having the skills needed for securing contract jobs.

More than just initial access, maintaining employability and participation in technology fields requires continuous learning and upgrading. Women in particular are susceptible to accumulative disadvantages over a career (Babcock & Laschever, 2007), as they are not involved in technology at the beginning of their careers, and the culture surrounding technology creates barriers during women's careers.

2.2 Technology Culture and Barriers to Women

Despite women making up the majority of the student population (Zeldin et al., 2008, p. 1036) and strategies aimed at increasing women in STEM (Faulkner, 2006), barriers have resulted in ever-decreasing numbers of women: "[The] percentages of women [in engineering and computer sciences] have reached a plateau or dropped during the last decade" (Rosser, 2009, p. 67).

Table 2-1 shows U.S. data for gender composition of undergraduate degrees earned in five subject areas, beginning in 1990, and presented for every fifth year until 2009 (U.S. Department of Education, 2010). The percentage changes are comparisons from the highest percentages of women in an area compared to the 2009 data. Engineering has the fewest degrees earned by women, at 16%. Computer science has the largest decrease in women, dropping from 29% in 1995 to 18% in 2009.

Table 2-1 *U.S. undergraduate degrees by gender: Technology, Math, & Engineering*

	Technology, Math & Engineering					
	Computer and Information Sciences			Mathematics and Statistics		
Year	Total	Male	Female	Total	Male	Female
1990-91	25,159	71%	29%	14,393	53%	47%
1994-95	24,737	71%	29%	13,494	53%	47%
1999-00	37,788	72%	28%	11,418	52%	48%
2004-05	54,111	78%	22%	14,351	55%	45%
2008-09	37,994	82%	18%	15,496	57%	43%
Highest	1991-1995		29%	1998-2001		48%
Change			-11%			-5%

	Engineering and Engineering Technologies		
Year	Total	Male	Female
1990-91	79,751	86%	14%
1994-95	78,569	84%	16%
1999-00	73,419	81%	19%
2004-05	79,743	82%	18%
2008-09	84,636	84%	16%
Highest	1999, 2003-2004		19%
Change			-3%

Table 2-2 *U.S. undergraduate degrees by gender: Sciences, Business & Communications*

	Sciences					
	Biological and Biomedical Sciences			Physical Sciences and Science Technologies		
Year	Total	Male	Female	Total	Male	Female
1990-91	39,377	49%	51%	16,334	68%	32%
1994-95	55,790	48%	52%	19,161	65%	35%
1999-00	63,005	42%	58%	18,331	60%	40%
2004-05	64,611	38%	62%	18,905	58%	42%
2008-09	80,756	41%	59%	22,466	59%	41%
Highest	2002-2005		62%	2004-2005		42%
Change			-3%			-4%

	Business & Communications					
	Business			Communications		
Year	Total	Male	Female	Total	Male	Female
1990-91	249,165	53%	47%	53,047	39%	61%
1994-95	233,895	52%	48%	48,969	42%	58%
1999-00	256,070	50%	50%	57,058	39%	61%
2004-05	311,574	50%	50%	75,238	36%	64%
2008-09	347,985	51%	49%	83,109	38%	62%
Highest	2002-2003		51%	2003-2004		65%
Change			-2%			-3%

These differences in educational programs are explained by some researchers as differences in vocational interests: "Men generally showed more Realistic and Investigative interests as well as stronger interests in the STEM areas; in comparison, women tend to have more Artistic, Social, and Conventional interests and to express less interest in the STEM fields" (Su, Rounds, & Armstrong, 2009, p. 871). In addition to lower numbers in undergraduate programs, female participation in STEM is lower than the number of women in STEM undergraduate programs:

> Female participation in undergraduate [SET] programs remains low [and] their representation in SET [Science, Engineering, and Technology] occupations is lower still, implying that the route or "pipeline" for female progression through

SET professions suffers from an increasing level of attrition at specific points after the entry stage. (Sappleton & Takruri-Rizk, 2008, p. 286)

Consequently, “the emphasis of research in the field has shifted slowly from recruitment to focusing on issues relating to retention” (Sappleton & Takruri-Rizk, 2008, p. 286). A recent UN panel on the status of women summarized this change and identified possible causes of attrition: institutional barriers (work hours, lower pay, stereotypes, and unconscious bias) and attitude bias (cultural) (Williams, 2010).

2.2.1 Institutional barriers.

One institutional issue contributing to declining numbers of women staying in STEM occupations is the unattractiveness of STEM culture (Margolis & Fisher, 2003; Woodfield, 2002). Poor communication and social skills are considered the norm for the stereotypical male “tech geek” (Crump et al., 2007). Technology stereotypes are defined as the “norms or arrangements that serve to manufacture and reproduce gender distinctions and ultimately contribute to the composition and culture of workplaces” (Sappleton & Takruri-Rizk, 2008, p. 287). Therefore, the cultural conditions represent the gender subtext of organizations (Benschop & Doorewaard, 1998) and manifest as stereotypical “tech geek” behaviors.

A second factor inhibiting women from STEM occupations are workplace conditions. Reported as very “demanding and inflexible” (Langen & Dekkers, 2005, p. 341), jobs within the STEM sector have long working hours: “anything less interpreted as a lack of commitment to [one’s] career” (Williams, 2010, p. 4). Women wanting maternity leave or part-time work to care for children find it “more difficult in this sector to work part-time or take a few years out” (Langen & Dekkers, 2005, p. 336), and the rate of change in the industry “makes it difficult for women to re-enter after a break for childbearing and rearing” (Crump et al., 2007, p. 350).

Across technology industries, gender stereotypes (discrimination), family responsibilities, and lack of flexible work/hours are barriers to women (Allen, Armstrong, Riemenschneider, & Reid, 2006; Rosser, 2009).

2.2.2 Cultural influences.

In addition to an unsupportive industry culture, societal expectations and stereotyping surrounding STEM negatively influence women. Evidence of negative discourse is very visible throughout society, especially in marketing. In particular, media campaigns in technology magazines depict technology as increasing agency for men, but depict women as victims who use technology for “increased mobility, escape, and safety” (Dempsey, 2009, p. 47). These contrasting viewpoints on technology demonstrate the culturally constructed subtext of gender. The “gender subtext is the set of often concealed power-based processes (re)producing gender distinction in social practices through organizational and individual arrangements” (Benschop & Doorewaard, 1998, p. 5). While neither “boys nor the girls seemed to have much trouble rejecting dominant readings of gendered stereotypes surrounding technology... the many comments surrounding the profile of boys’ interest and competence in technology suggests the permeation or infiltration of gendered discourses” (Johnson, 2009, p. 379).

Because of the gender subtext, damaging discourses are common in technology organizations. Woodfield (2002) describes two of these:

> The first posits that women should ‘naturally’ have the ‘soft’ skills so integral to being a hybrid/bridger worker, and so they receive little or no recognition for their abilities in such areas (see also Kelan, 2008). The second posits that men are ‘naturally’ better technicians, a view in which technical ability and technical confidence being reassessed as ultimately more important than ‘soft’ skills since they ‘get the deal closed. (Woodfield, 2002, p. 129; as cited in Moore, Griffiths, Richardson, & Adam, 2008, p. 530)

Unfortunately, despite awareness of these discourses, women are “failing to challenge” stereotypes: “Well-educated and sometimes highly qualified women did not question the gendered division of labour, rather attributing it to male and female essentialist traits” (Crump et al., 2007, p. 367).

2.3 Gender Research

Belief in essentialist traits and a deficit myth permeates much gender research.

2.3.1 Dichotomous Model.

Most research regarding gender and technology takes a dichotomous view (Johnson, 2009). Adam, Howcroft, & Richardson (2004), in their review of the literature on gender and technology research, are critical of quantitative studies because a dichotomous gender variable tends to emphasize differences between men and women. This leads to essentialism, or the belief in "essential, fixed, and probably biological, male and female characteristics" (Adam et al., 2004, p. 228). In addition, it influences the formulation of research questions: "Gender is seen as a dichotomous variable, where specific differences in the genders are looked for and where corresponding hypotheses are of the broad form: women will do some behavior less or more than men do the same behavior" (Adam et al., 2004, p. 229).

This type of "gender determinism" exists in the culture at large. For example, it is evident in research studies "[That construct] boys as synonymous with technical and girls as synonymous with social interests and pursuits" (Phipps, 2007, p. 778). Especially in computing culture, critics argue these types of dichotomous categories are "aligned with a biological, essentialist idea of masculinity and associated practices within a masculine computing culture (Faulkner, 2006; Wajcman, 2007) that have been culturally constructed" (Cassell & Jenkins, 1998; as cited in Johnson, 2009, p. 367).

2.3.2 Deficit Myth.

Adding to the difficulty of formulating research questions that avoid comparison of women to men, evidence suggests male traits are more valued and believed to be 'correct.' Men are more valued because they have better technical skills, which are "ultimately more important than 'soft' skills" (Moore et al., 2008, p. 530). The traits associated with expertise--"talent, elitism, skill, paternalism, specialization, industrialism, credentialing (degrees, licensing, etc.), technology, rationalism (especially, 'technical rationality'), professionalism, age, hubris, experience, band-aid solutions, maleness, Western culture, authority, objective truth" (Johnson, 2009, p. 368)--are also associated with masculinity and power (Johnson, Rowan, & Lynch, 2006). These comparisons produce expectations and discourses that negatively affect women" (Lynch & Nowosenetz, 2009).

The "characteristics associated with men (whether they are founded on psychological research or not) are usually valued more in society than characteristics associated with women, “which is evident in the workplace where female occupations such as secretary or personal assistant are paid less than ‘male’ occupations such as manager” (Adam et al., 2004, pp. 228-229). Workplace occupational issues extend to technology in the workforce and educational institutions because studies of gender and technology use further exacerbate the female deficit:

> These studies tend to position girls as in some way “lacking” and generally suggest that if society is to be equitable, then girls need to change so that they are the same as boys regarding computer usage. It is assumed that because girls and women tend to use computers differently from boys and men, they are automatically disadvantaged and therefore, should change and be like men to keep up with them: a deficit model. (Johnson, 2009, p. 371)

Most of the literature on gender “states that ‘girls should change to be like boys,’ and ... this denies detailed discussion of the forces that routinely position girls and computers in opposition” (Johnson, 2009, p. 371). The gender deficit model places responsibility for “girls’ and women’s under-representation in SET in girls and women themselves” (Phipps, 2007, p. 780).

The criticism of this model argues socialization is the underlying construct of the theoretical framework (Phipps, 2007). This means:

> Children and young people are slotted in to predetermined sex roles throughout their educational and social lives. As a result, it is argued, they develop sex-specific skills and interests, which drive girls away from science and technology fields. (Phipps, 2007, p. 780)

On the other hand, downplaying gender differences may “encourage women to ‘play the male game’” (Knights & Kerfoot, 2004, p. 243).

The effect of the deficit model, when transferred to educational settings, is STEM subjects are viewed as “masculine” (Hughes, 2001), and attempts to increase the number of women are made without changing the nature of STEM programs:

> This devolution of responsibility onto the girls, rather than critically assessing the role model strategy itself, uncovers a conceptual circularity at the heart of the ‘Women in SET’ framework. Because its model of the problem is one of female lack, the framework is set up to reproach girls and women who do not respond to

the strategies developed for their benefit, since their perceptions are seen as misunderstandings and their preferences a result of ignorance. Thus, the validity of the discourse as an explanation and a source of solutions is preserved. (Phipps, 2007, pp. 777-778)

Often the focus on gender has a reverse effect than intended. Women are even more unlikely to pursue STEM education or careers because of how they are perceived. For example, "[instead] of creating awareness of the need for female participation in SET, female students perceive these debates as overemphasizing gender differences and reinforcing notions of women requiring 'special treatment'" (Lynch & Nowosenetz, 2009, p. 374).

The most disturbing issue is the lack of truth to the deficit model: "[On] average, males and females differ very little in mathematics achievement[2]" (Else-Quest, Hyde, & Linn, 2010, p. 125). Studies have found "no significant gender differences in ability as measured by the English and mathematics subtests" (Zeldin et al., 2008, p. 1038), and that boys and girls have similar cognitive abilities (Hyde & Linn, 2006). Studies on gender and education in technology-related fields have yielded mixed results. Tai-Sheng Fan, Yi-Ching Li, and Niess (1998) report women outperformed men in a study of computer science courses. Nevertheless, other studies found "only cumulative GPA was found to be a significant predictor ($p < .001$)" of total points earned in a computer class (Chenoweth, 2005, p. 26).

Given the absence of substantiated deficits in girls' or women's ability with technology, the issues faced by women in STEM must be socially and culturally constructed. The masculine or feminine characteristics related to technology are "in the interpretations made of masculinity and femininity and not in the technology itself" (Adam et al., 2004, p. 229). As an alternative to cognitive ability as a determinant of interest in technology programs, researchers are investigating reasons why women choose technology education programs.

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[2] Research has shown women to have lower mental rotation skills (Linn & Petersen, 1985; Voyer, Voyer, & Bryden, 1995). This is changing, however, as girls gain more experience with video games (Else-Quest, Hyde, & Linn, 2010).

2.4 Gender and Education

Focusing on the nature of STEM educational programs, researchers are finding decreasing numbers of women participating in STEM due to curriculum as well as gender roles.

The structure of many traditional computer science programs discourages the interests of many women. For example,

> The early semesters are narrowly focused on the technical aspects of programming, and applications and multidisciplinary projects are deferred to the end. This, unfortunately, gives beginning students, male and female, the false massage that computer science is only ‘programming, programming, programming’ and removed from real-work context and concerns. (Margolis & Fisher, 2003, p. 56)

Although some gains occur immediately after implementation of government programs meant to increase participation of women in technology education, gender segregation in computer and information sciences is evident. Data gathered prior to 2005 shows “female students account for 31.1% of science, engineering, technology and mathematics graduations in the UK and 33.5% in the USA” (van Langen & Dekkers, 2005; as cited in Lynch & Nowosenetz, 2009, p. 567). U.S. degree completion data shows a downward trend in the numbers of women in computer science and information systems programs: 26.7% of all degrees for computer and information science awarded in 1996-1997 were to women, but that number declined to 18.6% in 2006-2007 (U.S. Department of Education, 2007). This data suggests women in general are not attracted to traditional computer science programs.

> Strategies to address this “problem” of the limited representation of women in the design and application of computer systems have focused largely on the educational pipeline and efforts to encourage girls into information technology (IT) course in school and post-school education (see, for example, Levelson, 1990; Fountain, 2000; Ahuja, 2002). (Diamond & Whitehouse, 2007, p. 321)

Unfortunately, these programs have not yielded significant results (AAUW Educational Foundation, 2000). For most women, “the technical aspects of computing are interesting, but the study of computer science is made meaningful by its connections to other fields" (Margolis & Fisher, 2003, p. 49).

In contrast to the declining numbers of women in computer science programs, women graduating from education programs with technology integrated into the curriculum have increased. Women represent 57.5% of all degrees granted in graphic communications, and the percentage of total degrees in instructional media granted to women has increased from 40.6% to 43.2% (U.S. Department of Education, 2010). This change in participation alludes to the importance of technology-integrated education, and possibly to other curriculum changes for increasing the participation of women.

2.4.1 Educational choices and STEM issues.

Current research shows the previously discussed gender constructions sway choice of education. Extrinsic factors influencing education decisions include the education system's characteristics, the job market and the economy, social views and traditions, and government policy (van Langen & Dekkers, 2005). Intrinsic factors include natural interests, learned stereotypes, and early influences. For example, boys have intrinsic (Margolis & Fisher, 2003) and instinctive (Varma, 2009, p. 42) interest in machines, while girls are more "interested in wider range of social and art activities with computers…[and they rank] humanities as most important, and reported higher self-perceptions in that academic area" (Rudasill & Callahan, 2010, p. 322).

The "stereotype that computers are for males shapes the expectations of parents, family members, and students themselves" (Varma, 2009, pp. 38-39), but it is not limited to beliefs about differences in abilities. The stereotype extends to expectations about which type of education to choose. The findings of one study suggest planning to take courses follows "historical and stereotypic patterns in the general population, with boys reporting plans to take more math courses than girls, even though no differences in self-perceptions of ability were detected" (Rudasill & Callahan, 2010, p. 321).

Other studies of STEM subjects claim the courses are "inaccessible, not relating to young people's everyday world and not paying enough attention to the relevance for society and the future" (van Langen & Dekkers, 2005, p. 336). Other criticisms of the courses include "traditional" teaching methods and "a competitive atmosphere" (van Langen & Dekkers, 2005, p. 336).

Researchers find the same computer culture influencing organizational culture and career choices exists in educational influences of school-age girls. A common general theme is that girls are not interested in traditional computer science, and therefore, do not see themselves as part of computer culture:

> Computer culture refers to the social, psychological, educational, and philosophical meanings associated with information technology. As we argue that the computer culture, or the technological mystique, can have a significant and negative impact on education. The cultural emphasis on technical capacity, speed, and efficiency when discussing computers estranges a broad array of learners, many girls included, who do not identify with the wizardry of computer aficionados and have little interest in the purely technical aspects of the machines. (AAUW Educational Foundation, 2000, p. 7)

These features of the educational system are important for girls "owing to the former's greater need [preference] for a sense of social usefulness, and practical orientated and cooperative education" (van Langen & Dekkers, 2005, p. 336). Girls adopt a "we can, but don't want to philosophy" (AAUW Educational Foundation, 2000, p. 7), and see themselves as "engaged with the world, while boys are engaged with computers" (AAUW Educational Foundation, 2000, p. 8). The same attitude extends to technology careers, which are described by the girls in the study as "materialistic and short-sighted" (AAUW Educational Foundation, 2000, p. 8). Once enrolled in STEM subjects, differences in attitude remain. For example, Margolis & Fisher (2003), found women to feel less prepared than men when entering college computing courses.

2.5 Problem Summary

These educational choices are an issue because of the long-term consequences. Accumulative disadvantage research, well documented in gender gap studies, demonstrates significant disadvantages occurring over time (Valian, 1999), and gender and technology research shows the effects of a lack of participation. Most girls and women choose paths other than STEM, but some still choose to work in technology jobs. If girls choose a technology education or job, does the exposure to technology influence their self-perceptions about their abilities with technology? The post-education effects of choosing a technology program remain unclear.

2.5.1 Research questions.

There is abundant research on gender differences related to interest in technology education and technology career choices. The discussion in this chapter explains girls' lack of interest in traditional STEM education. Programs aimed at increasing the number of women have not addressed gender issues inherent in STEM fields. Prior research explains underlying attitudes contributing to, and the consequences of, underrepresentation of women in STEM fields. It is unclear if current education and recruitment programs are effective in countering negative discourses. Determining any post-education effects will help establish the value of technology programs for women. Therefore, the general research questions of this study are:

> If gender differences exist, does technology experience mitigate social and cultural expectations?
>
> Do women experience positive effects from experience in a technology education program, or from experience in a technology job?

Prior research has only focused on women entering into STEM education or remaining in STEM careers. No studies consider women from non-STEM education programs in STEM jobs and women from STEM education in non-STEM jobs. Therefore, a sample of women working in technology jobs will be helpful to assess the differences in technology self-perceptions.

In summary, the purpose of this study is to explore the effects of gender, education, and type of job on self-perceptions of efficacy and locus of control with technology. The study extends the educational aspect into continuous learning and professional development activities, providing a better understanding of the effect of experience with technology.

3: Literature Review: Domain Differences in Self-perceptions

This chapter includes the literature review and argument for the hypotheses. This study uses three approaches to assess gender and education influences on self-perceptions in job and technology domains. The conceptual framework relies on the premise of multiple levels of self-perceptions and multiple domain schemas. A discussion of self-efficacy and locus of control scales explains the relationships between self-perceptions in work and technology domains. Concluding the conceptual basis is a discussion of the moderating variables: gender, education program, job type, age, and education level.

The hypotheses are formed using three steps. The first is an exploratory analysis of the self-efficacy and locus of control differences between job and technology domains. Step 2 uses the theory of planned behavior (Ajzen, 1991) to predict intentions to update job and technology skills. The last step assesses the influence of experience on levels of self-efficacy and locus of control in job and technology domains.

3.1 Conceptual Framework

Two theoretical concepts form the base of the study. The first is self-perceptions form on three levels. The second is job domain schema differs from technology domain schema, and different domain schema will result in different self-perceptions.

3.1.1 Levels of self-perceptions.

There are three levels of self-perceptions: global, domain, and task. The global level represents core evaluations about the self. For example, self-esteem represents how a person “evaluates the entire self” (Crocker & Wolfe, 2001, p. 594). Domain self-perceptions refer to how people judge or assess their competence or skills in specific areas (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995; Woike & Baumgardner, 1993). This type of self-perception consists of a “category of outcomes on which a person has staked his or her self-esteem, so that person's view of his or her value or worth depends on perceived successes or failures or adherence to self-standards in that domain" (Crocker & Wolfe, 2001, p. 594). Examples of domain specific self-efficacy are academic (Rosenberg et al., 1995; Woike & Baumgardner, 1993) and occupational (Schyns & von Collani, 2002). Finally, there are task specific self-perceptions. These relate to a specific task or behavior such as math self-efficacy (Usher & Pajares, 2009).

As shown in *Figure 3-1*, the levels are related. For example, task level self-perceptions may be subsets of domain level self-perceptions.

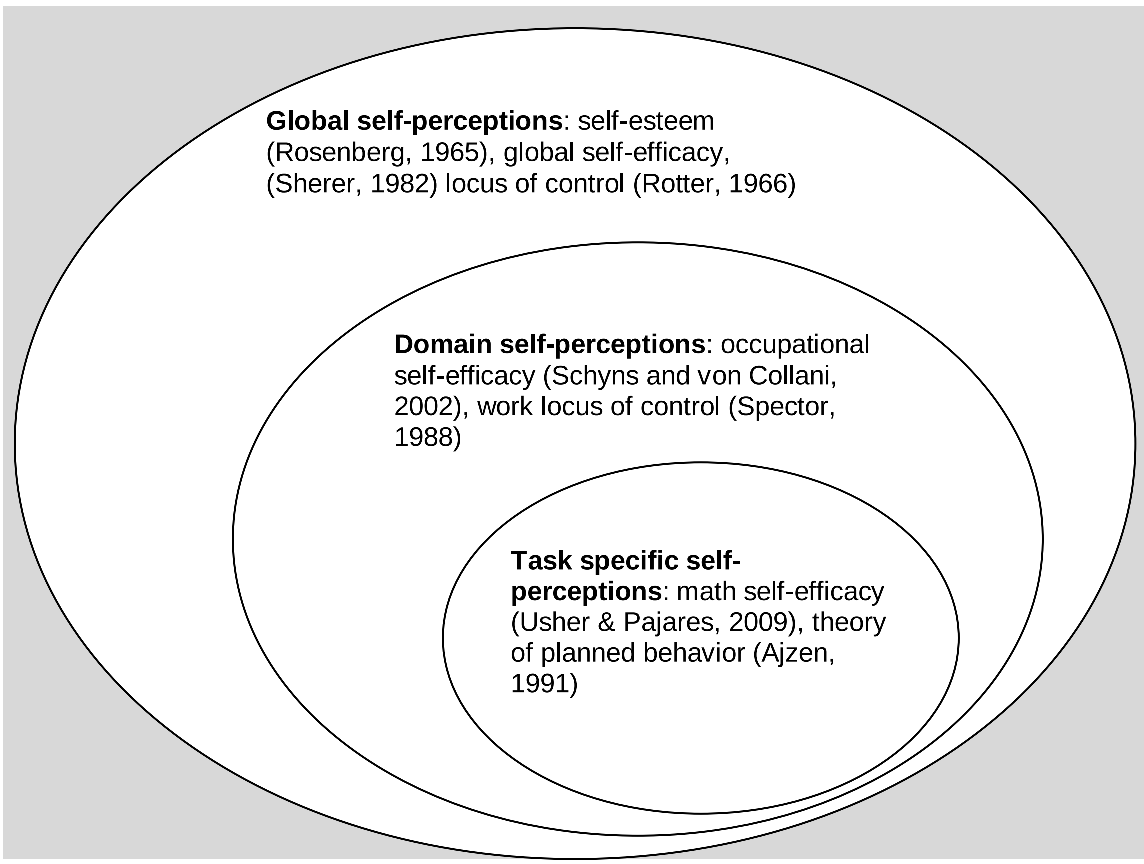


Figure 3-1. Levels of self-perception.

There may also be overlap within a level. For example, "when different spheres of activity are governed by similar sub-skills there is some inter-domain relation in perceived efficacy" (Bandura, 2006, p. 307). This study focuses on self-efficacy and locus of control at the domain level, and the theory of planned behavior at the task-specific level.

3.1.2 Domain schemas.

Psychological schemas explain domain differences in self-perceptions. Domain differences mean one schema (such as a job) may relate to a different schema (such as technology used to do a job), but different self-perceptions may result. Different schemas may represent different cultural pressures, norms, and educational effects that cause gender differences in perceptions of competence with, and control of, technology.

Schemas about one's self are defined as "your internal sense of who you are and what you are like -- an interior self-portrait made up of how you experience your own personality and how you believe other people see you" (Babcock & Laschever, 2007, p. 130). Valian (1999) describes a social schema as a hypothesis "we use to interpret social events" (p. 103).

> A [social] schema is a mental construct that, as the name suggests, contains schematic or abbreviated form someone's concept about an individual or event, or a group of people or events. It includes the person's or group's main characteristics, for the perceiver's point of view, and the relationship among those features…Schemas may be accurate or inaccurate, and they may be positive, negative, or neutral. (Valian, 1999, pp. 103-104)

Similar to social schema, wide ranges of organizational and societal factors influence the creation of domain schema. For example, self-perception can change because of changes in context: "People's behavior and their beliefs often change radically when their circumstances change" (Babcock & Laschever, 2007, p. 175). In response, individuals create multiple schemas based on experiences. This means prior education, work experience, and cultural norms influence the creation of job and technology domain schema.

In addition, domain schema can be co-developed:

> Even if different activity domains are not sub-served by common sub-skills, the same perceived efficacy can occur if development of competencies is socially structured so that skills in dissimilar domains are developed together. For example, students are likely to develop similar high perceived self-efficacy in dissimilar academic subjects, such as language and mathematics in superior

schools, but similarly low perceived efficacy in ineffective schools, which do not promote much academic learning in any subject matter. (Bandura, 2006, p. 307)

This thesis assumes skills developed separately, but used together, do not necessarily cause the same self-perceptions. Specifically, it is possible self-perceptions in job and technology domains are different if the domain schema form separately.

The proposition that people have different domain schema forms Step 1 of the study. Even though general self-efficacy and locus of control transfer from one task to another (Stanley & Murphy, 1997), confidence in one's job may not include all tasks done in the job, such as tasks with technology.

3.2 Self-efficacy and Locus of Control

It is necessary to compare self-perceptions across domains in order to assess the influence of domain schema. This study uses self-efficacy and locus of control scales to represent core self-perceptions. These include "fundamental, subconscious conclusions that individuals reach about themselves, are thought to consist of four factors: self-esteem; locus of control; neuroticism; generalized self-efficacy" (Johnson, Marakas, & Palmer, 2008, p. 172).

Perceived self-efficacy "is a judgment of capability ... [locus] of control is concerned, not with perceived capability, but with belief about outcome contingencies – whether outcomes are determined by one's actions or by forces outside one's control" (Bandura, 2006, p. 309). In other words, "[beliefs] about one's own ability are not identical to beliefs about the likely outcome that one's actions will produce" (Usher & Pajares, 2009, p. 89). Both self-efficacy and locus of control are important aspects of human agency: "Unless people believe they can produce desired effects by their actions, they have little incentive to act, or to persevere in the face of difficulties. Whatever other factors serve as guides and motivators, they are rooted in the core belief that one has the power to effect changes by one's actions" (Bandura, 2006, p. 170).

The next two sections explain domain specific self-efficacy and locus of control.

3.2.1 Self-efficacy.

Self-efficacy refers to “people’s beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives” (Bandura, 1991, p. 257). Self-efficacy beliefs “affect whether individuals think in self-enhancing or self debilitating ways, how well they motivate themselves and persevere in the face of difficulties, the quality of their emotional well-being and their vulnerability to stress and depression, and the choices they make at important decisional points” (Bandura & Locke, 2003, p. 87).

Four types of experiences create these beliefs: personal mastery experiences, vicarious experiences, verbal persuasion, and emotional arousal (Bandura, 1977). Because mastery experiences usually form in specific domains of behavior, focusing on a specific context or skill is generally a better predictor of behavior compared to general self-efficacy scales (Stanley & Murphy, 1997).

3.2.1.1 Self-efficacy and specific domains.

Self-efficacy “was initially brought to the career literature to explain the underrepresentation of women in traditionally male college courses, majors, and careers, including those in science, technology, mathematics, and engineering” (Zeldin et al., 2008, p. 1038). Prior research has shown high self-efficacy positively influences adaption to IT change. Self-efficacy is “one of the most significant predictors or positive adjustments to any major technological change” (Bruque, Moyano, & Eisenberg, 2008, p. 182). Research has also found self-efficacy positively influences job performance (Stajkovic & Luthans, 1998) and job satisfaction (Judge, Erez, Thoresen, & Bono, 2002). An example of self-efficacy in the job domain is Schyns and von Collani’s (2002), occupational self-efficacy, a general scale comparable across jobs. In addition to general scales to predict general self-efficacy, researchers have created domain specific scales. For example, math self-efficacy predicts science or math related college majors (Betz & Hackett, 1983).

Table 3-1 summarizes the findings of examples from three areas of self-efficacy research: technology use, career and work, and academic. Each row summarizes the observed relationship found in that particular study.

Table 3-1 *Examples of self-efficacy studies and findings*

Study	Findings
	Technology Use
Compeau & Higgins (1995)	Path coefficient for self-efficacy and computer use $\beta = 0.225$ $p < .01$
Hasan (2006)	Computer self-efficacy is correlated with perceived ease of use r=0.49 $p < .01$ and far transfer learning r= 0.53 $p < .01$
Hill, Smith, & Mann (1987)	Behavioral intentions predicted computer efficacy beliefs—men, X^2 (l, N = 147) = 12.99, p < .001, and women, X^2(l, N = 157) = 15.34, p < .001
Igbaria & Iivari (1995)	Self-efficacy is correlated with computer anxiety r=-0.14. p<.001, perceived ease of use r=0.38 p<.01, perceived usefulness and usage r=0.22 p<.01
	Career and work
Abele & Spurk (2009)	After seven years of professional experience, occupational self-efficacy at graduation correlates with salary r=0.18 p<.001, and career satisfaction r=0.19 p<.001
Matsui (1994)	Self-efficacy for women is higher than men in female-dominated occupations t=3.95 p<.01, but lower for male-dominated occupations t=2.84 p<.01
Sadri & Robertson (1993)	Meta-analysis of self-efficacy and performance resulted in correlations between self-efficacy and performance r=0.36 and behavioral choice/intention r=0.30
Stajkovic & Luthans (1998)	Meta-analysis of 114 studies found a correlation between self-efficacy and work performance r=0.38 p<.01
	Academic
Bandura et al., (1996)	Academic efficacy correlates with scholastic achievement r=0.45 p<.001
Betz & Hackett (1983)	Women have lower scores than men for mathematics self-efficacy t=-3.4 p<.001, math confidence t=-2.8 p<.01, and usefulness of math t=-2.4 p<.05; and math self-efficacy correlates with math confidence r=0.66 p<.001 and usefulness of math r=0.47 p<.001

3.2.1.2 Self-efficacy and self-esteem.

This study uses modified versions of Rosenberg's (1965) self-esteem scale to test self-efficacy in context. A scale similar to, but shorter than, the occupational self-efficacy scale was needed to keep the survey to a reasonable length. Rosenberg's self-esteem scale was chosen for its brevity and limited need for modification. Below is an explanation of the relationship between self-efficacy and self-esteem. Chapter 4 has a complete explanation of the scale modifications and reliability.

Similar to self-efficacy, self-esteem transfers across contexts. Global or trait "self-esteem is most commonly used to refer to the way people characteristically feel about themselves...it is relatively enduring, both across time and situations" (Hu, Yang, Wang, & Liu, 2008, p. 125). Some researchers distinguish between self-efficacy and self-esteem (Levy & Baumgardner, 1991). Specifically, "Self-esteem usually is considered to be a trait reflecting an individual's characteristic, affective evaluation of the self (e.g., feelings of self worth or self-liking). In contrast, self-efficacy is a judgment about task capability that is not inherently evaluative" (Gist & Mitchell, 1992, p. 185).

Other research on general self-efficacy scales shows a high correlation with self-esteem. For example, Stanley & Murphy (1997) report GSE scales were highly correlated with Rosenberg's self-esteem (RSE) Scale (-.69). This suggests the scales are measuring the same construct (Stanley & Murphy, 1997).

Correlations between GSE and self-esteem from Stanley & Murphy (1997) and Judge et al. (2002) are in Table 3-2.

Table 3-2 *Correlation to Rosenberg's self-esteem scale (RSE)*

Study	Correlation to RSE*
Coppel (1981)	-.74
Judge et al. (2002)	-.85
Sherer (1982)	-.69
Tipton & Worthington (1984)	-.62

* $p < .01$ for all reported values

Given the high correlations between GSE and self-esteem, as well as the lack of predictive validity of general GSE scales, this study uses a contextualized version of Rosenberg's self-esteem scale to measure self-efficacy. Even though Rosenberg's is a global self-perception scale, contextualized questions reflect performance within a domain.

The remainder of the study refers to self-efficacy, unless specifically mentioning Rosenberg's original scale.

3.2.2 Locus of control.

The second measure of domain self-perceptions is the locus of control scale. Self-efficacy and locus of control are interrelated: attributing success to their own skills (internal orientation) and not luck (external orientation) enhances an individual's self-efficacy (Bandura, 1977), and individuals with higher self-perceptions feel more in control of their environment (Rosenberg, 1965).

Locus of control "reflects a person's belief in personal control in life (internality) rather than control by outside forces or individuals (externality)" (Spector et al., 2002, p. 454). This means individuals "with an internal locus of control are, therefore, more likely to have high self-efficacy expectations than those with an external one" (Sherer, 1982, p. 667).

Rotter (1966) argues locus of control is a stable psychological construct. The behavioral patterns of individuals with an internal locus of control typically support the perception of control in most situations:

> People who strongly believe that the locus of control is internal ("internals") believe that they have control over change events. If they see a reasonable probability of success, they are not afraid of change. Even if high internals attribute changes to external causes, they may still feel able to influence the course of change or feel confident about coping with it. (Lau, McMahan, & Woodman, 1996, p. 539)

Extending this to job and technology, general attitudes toward control may not remain stable across contexts. Similar to self-efficacy, technology control may change with differing schema resulting in a change in locus of control.

3.2.3 Domain differences hypotheses.

Differences for self-efficacy or locus of control between job and technology domains are the focus of the first step in the study. It is possible to have high job self-efficacy, but lower self-efficacy in a technology specific domain. For technology related jobs, the required technology skills relate closely to the required job skills. Therefore, job self-efficacy may be very similar to technology self-efficacy. For example, people in technology jobs will be more likely to have overlapping job and technology domain self-perceptions.

Figure 3-2 is an example of the possible overlap of domain schemas for a non-technology job compared to a technology job.

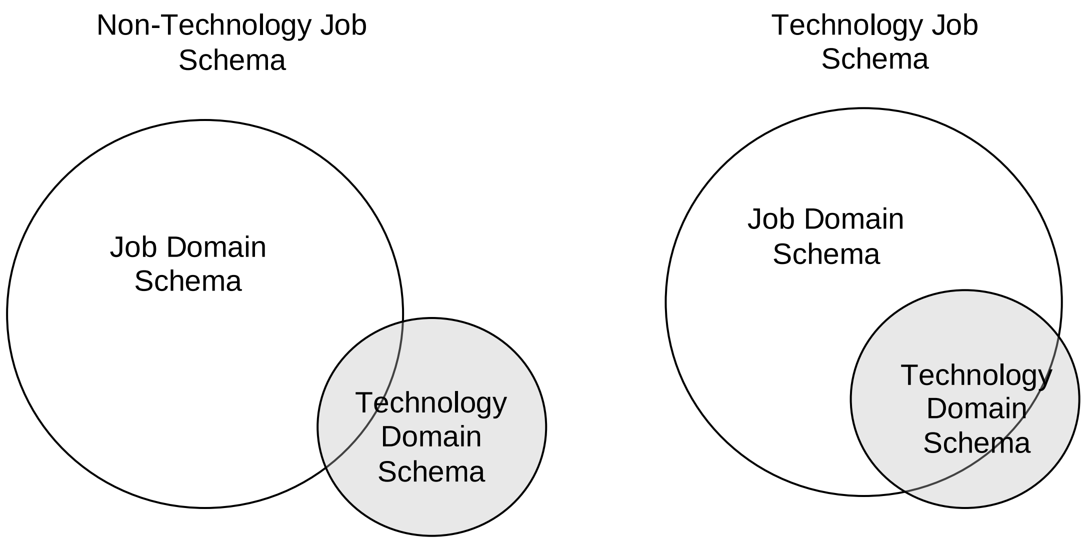


Figure 3-2. Comparison of job and technology domain schema.

Therefore, step one of the study is an exploratory approach aiming to uncover differences between job and technology domain self-efficacy and locus of control, and assesses the moderating effects of gender, education program, job type, age, and education level.

Hypothesis (a): There are differences between self-efficacy and locus of control means by variable.

Hypothesis (b): There are differences between job and technology self-efficacy and locus of control means by variable.

For example, Hypothesis (a) tests for higher technology self-efficacy scores for men compared to women. Hypothesis (b) tests for differences between job and technology domains within the same variable, such as women having higher job domain self-efficacy compared to technology domain.

The hypotheses use self-efficacy and locus of control, and the subscales of the theory of planned behavior (discussed in Step 2) to test the moderating effects of each variable. Table 3-3 summarizes the hypotheses combinations.

Table 3-3 *Hypotheses format*

Variables	Hypothesis	Scales
1. Gender (male/female) 2. Education Program (technology/non-technology) 3. Job Type (technology/non-technology 4. Interactions: Intra-Gender (e.g. female/female) and Intra-Education 5. Age 6. Education level	a. Between group differences by variable b. Within group differences by domain	Self-esteem Locus of control TPB: • attitude • subjective norms • perceived behavioral control

3.3 Moderating Variables

As previously discussed, job and technology domain schemas are influenced by societal and organizational factors, and self-efficacy and locus of control are formed by previous experiences. This study tests the following variables as possible influences on job and technology self-perceptions: gender, education program, job type, age, and education level.

3.3.1 Gender.

Analyzing gender differences is the main goal of this study. Chapter 2 presented qualitative studies about the underrepresentation of women in technology education and careers. This section argues for gender differences in technology self-efficacy and technology locus of control. In general, there are contradictory results regarding gender differences in global scales. Rosenberg (1965) found girls to have lower scores on average, whereas Hensley (1977) found no significant differences. Once self-perceptions become domain specific, however, there is evidence of men rating themselves higher than women.

Several studies confirm gender schemas contribute to self-evaluation differences. For example, rating a C.V. higher because it has a man’s name (Bailyn, 2003), or women having lower occupational self-efficacy even when they have the same GPA's as men (Abele & Spurk, 2009), demonstrates the effects of psychologically constructed gender differences.

Beyer (1990) found "men tend either to be accurate or to overestimate, whereas women tend either to be accurate or to underestimate" (p. 967). More specifically, men tend to rate themselves higher on "stereotypically masculine domains" (Bennett, 1997, p. 541) and "masculine tasks" (Beyer, 1990, p. 962), including math and technology. In other research, men give higher self-evaluations of intelligence in all areas, and not just in stereotypical male domains (e.g. math): "Men awarded themselves not only higher scores in male-normative abilities (spatial and logical reasoning), but also in verbal ability which women tend to exceed in" (von Stumm, Chamorro-Premuzic, & Furnham, 2009, p. 439). Evidence suggests men may also have a greater internal locus of control for questions related to academic achievement (Strickland & Haley, 1980).

In general, the research shows men are more likely to be overconfident about their performance, especially in male domains. This suggests men are also more likely to self-evaluate higher compared to women. Given technology is viewed as a male domain, male scores for technology schemas will likely be higher than job schema.

3.3.1.1 Hypothesis 1 Gender.

Hypothesis 1a. Men have higher self-efficacy and locus of control compared to women.

Hypothesis 1b. Men have higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but women have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

3.3.2 Education and job.

Prior research of women and education suggests more exposure to technology results in greater interest and higher technology self-evaluations (Igbaria & Iivari, 1995; Johnson, 2009; Varma, 2009; van Langen & Dekkers, 2005). Although research has shown statistically significant correlations between mastery experiences, vicarious experiences, social persuasions, physiological arousal, and self-efficacy, only mastery experiences were statistically significant predictors of science self-efficacy (Britner & Pajares, 2006, p. 485). Mastery experiences “typically prove to be the strongest and most consistent predictor of academic self-efficacy” (Britner & Pajares, 2006, p. 488), but vicarious experiences have also been shown to predict academic performance (Matsui, 1994; Usher & Pajares, 2009). In this study, education and job type are the factors used to assess exposure to technology.

The type of education program provides different technology experiences and thereby, influences technology schema. Given exposure to technology results in higher self-evaluations (Igbaria & Iivari, 1995; van Langen & Dekkers, 2005), students from a technology-integrated program are more likely to have realistic expectations of technology and technological changes. Having chosen a technology program, graduates will expect to have a certain level of skill with technology, and an expectation to understand and use technology related to their work. Technology program graduates will expect to be knowledgeable of, and capable of using, technology. This experience suggests technology program graduates will have higher scores in a technology context.

3.3.2.1 Hypothesis 2 Education.

Hypothesis 2a. Individuals with a technology education have higher self-efficacy and locus of control compared to those with a non-technology education.

Hypothesis 2b. Individuals with a technology education have higher technology self-efficacy and locus of control, but those with a non-technology education have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

Industry effects and organization type account for a larger percent of financial performance (McGahan & Porter, 1997). Therefore, job type, being technology or non-technology, may influence technology beliefs and behaviors. As with increased efficacy because of exposure to technology through education (Beyer, 2008), experience in a technology job will lead to higher scores in technology contexts.

3.3.2.2 Hypothesis 3 Job.

Hypothesis 3a. Individuals with a technology job have higher technology self-efficacy and locus of control compared to those with a non-technology job.

Hypothesis 3b. Individuals with a technology job have higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control; and those with a non-technology job have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

3.3.3 Gender interactions.

As discussed in chapter 2, gender comparisons of men to women make the study susceptible to the deficit model: assumptions women are lacking compared to men. Instead of using men as the benchmark, intra-gender analysis divides the sample to test men and women separately. Additionally, jobs and educational programs (STEM or NON-STEM) group each gender.

Even though the studies previously discussed demonstrate male and female differences, there is evidence of expectancies influencing self-evaluations. Intra-gender research in STEM areas finds women who have chosen to go into MIS are more similar to men than they are to women in other management streams:

> Significant gender differences in accuracy of self-evaluations were found (the masculine task and the character-detection task), the gender difference became non-significant after I controlled for expectancies. On the three tasks on which no gender difference in the accuracy of self-evaluations was found, there had been no gender difference in expectancies. This suggests that the gender difference in accuracy of self-evaluations was mediated by expectancies (self-consistency). (Beyer, 1990, p. 964)

When comparing women with differing technology experience, researchers found greater experience with technology led to higher perceived self-efficacy: “Female majors compared to female non-majors had more computer experience, much higher computer self-efficacy, more positive attitudes towards MIS, and more positive stereotypes” (Beyer, 2008, p. 307).

Given no evidence supports men having higher intrinsic abilities with technology (Chenoweth, 2005; Else-Quest et al., 2010; Hyde & Linn, 2006; Tai-Sheng Fan et al., 1998), education and job experience are expected to predict self-evaluations. Experience from a technology education program, or from having a technology job, should mitigate some of the initial gender differences.

The previously reported data on underrepresentation of women in traditional computer science programs does not reflect the contextually based curriculum of some technology programs. In particular, the enrolment of women in communications, education, and media arts programs has increased (U.S. Department of Education, 2010). These programs engage women by integrating technology into other topic areas women prefer or in which they excel. This study includes women from non-traditional technology programs. Female graduates from technology programs are likely to be more technologically confident than those in educational programs with no specific technology focus.

3.3.3.1 Hypothesis 4 Gender Interactions.

Hypothesis 4a. Individuals with technology education and technology jobs have higher self-efficacy and locus of control compared to those without technology education or jobs.

Hypothesis 4b. Women with a technology education or a technology job have higher technology self-efficacy and locus of control compared to women with a non-technology education or job.

Hypothesis 4c. Women with a technology job have higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but women with a non-technology job have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

3.3.4 Age.

Research on age and technology has contradictory findings. Although there may be some negative effects of age on cognitive abilities, and there is a common belief that younger people are good with technology, increased experience may lead to increased confidence.

A common theme of research examining age and technology use is younger employees are better with technology, but research has not fully explained differences between popular delineation of generations: Millennials, Generation X, and Boomers. Nevertheless, popular press articles still gush in awe about Millennials' capabilities, especially with technology (Slowik, 2009). Some research supports these age-related perceptions. For example, a study using the Technology Acceptance Model (TAM) found "lower perceived ease of use for the baby boomer cohort lead[s] to lower attitude and behavioral intention to use mobile data services than was found for the gen Xer cohort" (Yang & Jolly, 2008, p. 276). Other research shows fear of negative stereotypes "may lead older workers to reject precisely those tasks that society expects them to fail at" (Buyens, Van Dijk, Dewilde, & De Vos, 2009, p. 105).

In addition, the "limited research to date has only considered highly specific conditions which are certainly not generalisable to the entire modern workspace" (Bannister & Remenyi, 2009, p. 10). Many younger workers believe they are adept with technology, but the same technology multitasking that creates "feelings of control, efficiency, engagement and assimilation," can also create "inefficiency, chaos, disengagement and enslavement" (Rohm, Sultan, & Bardhi, 2009, p. 22).

Research indicates there are some age-related issues of cognitive abilities: "Several studies report that beyond a certain point (approximately early adulthood), there is an inverse relationship between age and cognitive ability. Thus, older individuals take longer to assimilate new information than younger ones" (Rupp, Vodanovich, & Cred, 2006, p. 1353). There is also a suggestion that younger employees are more likely to get assistance with performance problems due to a "tendency of our participants to see the poor performance of older employees as being a result of stable causes (e.g., personality traits, memory loss), which would not be altered easily by the use of a specific intervention" (Rupp et al., 2006, p. 1353). Extending this concept to technology, older employees may not get the opportunity to update technology skills because employers perceive them as neither benefitting from training, nor capable with technology.

Considerable research, however, contradicts the opinions that older employees are less capable:

> Images of the older employee as offered by popular and professional literature is incongruent with those offered by empirical research. In the media and within organizations older workers are perceived as much less skilled than scientific studies prove them to be. (Buyens et al., 2009, p. 105)

In terms of self-perceptions, research shows self-efficacy increases until middle age, with minimal, if any, decline after age sixty (Gecas, 1989, p. 307). Research also indicates there are gender differences for some age groups, however, these "tend to fluctuate, however, by age and stage of family life cycle" (Gecas, 1989, p. 306). For example, there are more differences during parenting stages, while "sex differences in self-efficacy [are] less evident with increasing age (see Bengston et al., 1985 for a review of this research)" (Gecas, 1989, p. 306).

In terms of expertise and experience, there is "age-related stereotyping ... where assessments concerning professional expertise are made by supervisors (van der Heijden, 2001, p. 309). One study shows older workers avoided "employers' negative attitudes in relation to their skills, training, adaptability or flexibility, and higher perceived monetary costs by staying up-to-date with their skills and training and changing their work-related expectations" (Berger, 2009, p. 329). This suggests older employees expect to engage in more training (mastery experiences), and this ability to keep up-to-date may result in higher self-efficacy and locus of control.

Even though there are stereotypes about older employees' technology skills, there are no performance-based studies to show these stereotypes as true. Research does show, however, older workers have higher self-efficacy and engage in mastery experiences to keep their skills current. Therefore, it is proposed older workers will have higher self-efficacy and locus of control compared to younger workers.

3.3.4.1 Hypothesis 5 Age.

Hypothesis 5a. Older age groups have higher self-efficacy and locus of control compared to lower age groups.

Hypothesis 5b. Younger age groups have higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but older age groups have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

3.3.5 Education level.

The control variable, education level, is an indicator of experience and knowledge. Experience with technology positively influences self-efficacy and decreases computer anxiety (Igbaria & Iivari, 1995; Johnson, 2009; Varma, 2009; van Langen & Dekkers, 2005). Specifically, computer experience has a “positive direct effect on perceived ease of use” and on “perceived usefulness” (Igbaria & Iivari, 1995, p. 599). This means experiences with technology gained from a technology education, or in a technology job, will have a positive effect on technology self-efficacy and locus of control.

3.3.5.1 Hypothesis 6 Education level.

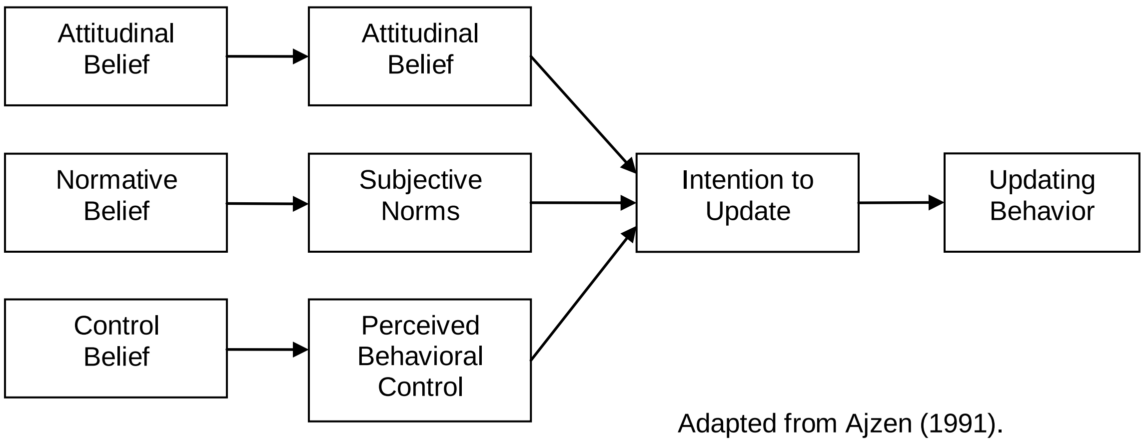
Hypothesis 6a. The highest level of education group has higher self-efficacy and locus of control compared to lower level of education groups.

Hypothesis 6b. The highest level of education group has higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but the lower level of education group will have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

3.4 Step 2 Updating Skills

The second step in this study is to assess domain self-perceptions leading to skill updating behavior. In addition to having schemas multiple domains, schemas allow for “multiple, interacting goals, and of modelling how goals may be stored and represented cognitively” (Garcia & Pintrich, 1993, p. 3). Schemas create a view of the “possible self” (Garcia & Pintrich, 1993, p. 3) as they represent “conceptions of how we are now and how we could become” (Garcia & Pintrich, 1993, p. 3). Therefore, domain schemas are important to learning because self-perceptions within a domain schema contribute to intentions and behavior.

The theory of planned behavior (TPB) is a generic model incorporating attitude, subjective norms, and perceived behavioral control, and is applicable to any consistent behavior (Ajzen, 1991). Developed from the Theory of Reasoned Action (Fishbein, 1967; Fishbein & Ajzen, 1975), the TPB, shown in *Figure 3-3*, incorporates three antecedents to predict behavioral intentions.



Adapted from Ajzen (1991).

Figure 3-3. Theory of planned behavior.

The three antecedent factors are attitude, subjective norms, and perceived behavioral control.

> The first is the attitude toward the behavior and refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question. The second predictor is a social factor termed subjective norm; it refers to the perceived social pressure to perform or not to perform the behavior. The third antecedent of intention is the degree of perceived behavioral control which, as we saw earlier, refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles. (Ajzen, 1991, p. 188)

The model is “designed to predict and explain human behavior in specific contexts” (Ajzen, 1991, p. 181). It assumes people with higher perceived behavioral control, such as self-efficacy, will have higher perceived behavioral control in most contexts. This efficacy will make engaging in a specific behavior more likely (Ajzen, 2002). Some researchers define self-efficacy and perceived behavioral control as similar constructs that do not predict behavior independently (Terry & O’Leary, 1995), while others find they are separate factors (Manstead & van Eekelen, 1998). Despite the opposing views, it is clear "both are concerned with perceived ability to perform a behavior" (Ajzen, 2002, p. 668).

TPB has shown predictive validity in many contexts, including: using credit cards (Rutherford & DeVaney, 2009), job search activities (Zikic & Saks, 2009), food choices (Armitage & Conner, 2009), and hotel choices (Han, Hsu, & Sheu, 2010). Related to technology, TPB has shown predictive validity for the adoption of new technology (Taylor & Todd, 1995), information use (Klobas, 1995), and continued use of technology (Meng-Hsiang Hsu & Chao-Min Chiu, 2004). The model is effective at measuring use because it "considers factors that measure more direct influences on intended use than the other models" (Klobas, 1995, p. 112). These studies have tested behaviors over time, such as "post-adoption cognitive beliefs and factors influencing one's intention to continue using (continuance) electronic services (e-services)" (Meng-Hsiang Hsu & Chao-Min Chiu, 2004, p. 359).

Applications of the theory of planned behavior also predict factors relating to education; including performance, adopting technology, and intentions to learn. Examples of each area are: predicting academic achievement intention and actual achievement (Armitage, 2008), teachers adopting technology to use in classrooms (Sugar, Crawley, & Fine, 2004), and intentions of students to enroll in classes (Crawley & Black, 1992) and complete high-school (Davis, Ajzen, Saunders, & Williams, 2002). Table 3-4 presents examples of intentions and behavior, and the variance explained.

Table 3-4 *Examples of R-square for intention and behavior*

Source	Intention/Behavior	
Ramayah, Yusoff, Jamaludin, & Ibrahim (2009)	Tax filing intention	R^2=.565
Taylor & Todd (1995))	Technology use intention	R^2=.57
de Groot & Steg (2007)	Park & Ride intention	R^2=.47
Godin, Amireault, Bélanger-Gravel, Vohl, & Pérusse (2009)	Exercise behavior	R^2=.59
Taylor & Todd (1995)	Technology use behavior	R^2=.34
Elliott, Armitage, & Baughan (2007))	Driving behavior	R^2=.67

3.4.1 Intention and behavior.

The intent to learn something new is explained as a measure of motivation: "Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform a behavior" (Ajzen, 1991, p. 181). In other words, individuals have intention relating to their relationship with technology. Constructed similarly to job, family, or gender schemas, the influences on intentions are previous experience, cultural norms, and perceptions of a possible future self. In addition, the "relative importance of attitude, subjective norm, and perceived behavioral control in the prediction of intention is expected to vary across behaviors and situations" (Ajzen, 1991, p. 188). Therefore, technology and job domain schema should be captured in this study by comparing two models of the TPB: one representing updating job skills, and another representing updating technology skills.

3.4.1.1 Hypothesis 7 Theory of planned behavior.

Hypothesis 7a. Job attitude, subjective norm, and perceived behavioral control predict job skill updating intentions.

Hypothesis 7b. Technology attitude, subjective norm, and perceived behavioral control predict technology skill updating intention

3.4.2 TPB gender, education, and job differences.

Given external conditions and perceptions of self, there is a likelihood of conflicting intentions within an individual's employment role. The conflicting beliefs correspond to the three antecedent factors that influence the intention and behavior of updating skills. The importance of working with technology and the need to maintain current technology skills make technology workers more likely to update their technology skills. Because TPB also fits within the job and technology schemas, gender, education program, and job type will influence intentions.

Gender research related to intentions and goals shows men have a tendency to translate higher efficacy into higher objectives: "difficult goals were selected by high esteem males" (Levy & Baumgardner, 1991, p. 535). This suggests men will likely engage in more updating behaviors in order to advance higher goals.

As previously discussed, experience increases efficacy with technology use (Igbaria & Iivari, 1995; van Langen & Dekkers, 2005). Therefore, people with technology experience from an education or a job will have higher technology efficacy. Higher efficacy should predict higher intentions to update technology skills.

3.4.2.1 Hypothesis 7c TPB moderating variables.

Hypothesis 7c. Gender, education program, job type, age, and education level influence intentions to update job and technology skills.

3.5 TPB Subscales

This section describes the antecedent factors of the theory of planned behavior. Because attitudes and self-perceptions form the basis of the antecedent factors, the subscale hypotheses have the same pattern as self-esteem and locus of control.

3.5.1 Attitude.

The first antecedent in the TPB model is attitude. Attitude "refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188). Measured by perceived ease of use and perceived usefulness in the TPB, attitude is a perceived value. For example, a "person's attitude toward an information system refers to the extent to which he or she feels the system is evaluatively good or bad" (Hartwick & Barki, 1994, p. 442).

Attitude in this research relates to the context of the job or technology used in the job. Given the two contexts, it is possible to have a general attitude toward updating job skills, but different attitudes toward updating technology skills. For example, "A person may have a general attitude or orientation toward change but at the same time possess different attitudes about specific changes" (Lau et al., 1996, p. 541). For those in technology jobs, technology is integral to the job context. Therefore, a measure of attitude toward the job will produce similar results as a measure of attitude toward technology used in the job. In contrast, for those in non-technology jobs, technology is infrequently used; therefore, technology will have less influence on technology attitudes.

3.5.2 Subjective norms.

Subjective norms (sn) are "perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p. 188). These beliefs are based on the perceived expectations of "important referent others" (Ajzen, 2006, p. 2), such as supervisors, peers, experts, and friends (Karahanna, Straub, & Chervany, 1999). The subjective norm antecedent includes several different comparisons because people self-assess by making social comparisons to more than one individual or group (Karahanna et al., 1999). In all work environments, colleagues and supervisors influence expectations of work-related education. Compared to non-technology work environments, supervisors and co-workers of technology workers will likely have more influence on updating behaviors.

3.5.3 Perceived behavioral control.

The last antecedent factor, perceived behavioral control (pbc), "refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacle" (Ajzen, 1991, p. 188). PBC is predictive of both intention and behavior:

> People intend to engage in behaviors if they perceive that they can carry them out. Similarly, intention alone is not sufficient to carry out behaviors. People need to have the ability to carry it out. (Notani, 1998, p. 263)

Some researchers refer to PBC as a second order factor "formed by two distinct dimensions: [Self-Efficacy] and controllability" (Pavlou & Fygenson, 2006, p. 133). For example, researchers using the decomposed models (Armitage & Conner, 1999a; Meng-Hsiang Hsu & Chao-Min Chiu, 2004; Taylor & Todd, 1995) consider PBC to be two factors. Perceived efficacy means the subject believes they are able to perform the specific behavior. Controllability refers to "people's beliefs that they have control over the behavior that its performance is or is not up to them" (Ajzen, 2006, p. 7).

This approach "[allows] the role of [PBC] two underlying dimensions to vary depending on the relative importance of SE and controllability for different behaviors" (Pavlou & Fygenson, 2006, p. 133). Ajzen (2002) suggests, "Rather than making a priori assumptions about the internal or external locus of self-efficacy and controllability, this issue is best treated as an empirical question" (p. 680). As opposed to single factor assessment, testing for two factors will provide a greater understanding of perceived behavioral control.

This study takes Ajzen's approach and treats PBC as one factor, but tests for two sub-factors: perceived efficacy (pbc efficacy) and controllability (pbc control). These two factors are similar to self-esteem and locus of control discussed in the beginning of the chapter, but TPB perceived efficacy and control relate specifically to updating skills.

3.5.4 Subscale hypotheses.

Because the TPB subscales are similar to self-esteem and locus of control, the hypotheses format is the same. Below is an example of the hypotheses for the attitude subscale:

3.5.4.1 Hypothesis 8 Theory of planned behavior attitude subscale example.

Hypothesis 8a. Men have higher attitudes compared to women.

Hypothesis 8b. Men have higher technology attitudes compared to job attitude, but women have lower technology attitude compared to job attitude.

Appendix 1 contains the complete list of hypotheses.

3.6 Step 3 Mastery Experiences

Four types of experiences create self-efficacy beliefs: (1) personal mastery experiences, (2) vicarious experiences, (3) verbal persuasion, and (4) emotional arousal (Bandura, 1977). Bandura (1986, 1997) suggests “enactive mastery is the most important and influential self-efficacy source because it provides the most authentic evidence of information about success in a specific domain” (Zeldin et al., 2008, p. 1052).

There is ample evidence in the literature of a relationship between self-efficacy and performance. A meta-analysis of 40 studies found there is a “positive relationship between self-efficacy expectancies and both performance (r = 0.36) and behavioral choice/intention (r = 0.30)” (Sadri & Robertson, 1993, p. 144). Recent research, however, shows academic ability (self-efficacy and capability) increases self-esteem, and not the other way around:

> Although self-efficacy and self-esteem are distinct concepts, domain-specific self-esteem has some overlap with self-efficacy, because it addresses confidence in a certain area of competence. Some of these areas, like academics and athletics, are performance domains that may show a reciprocal relationship between performance and self-esteem, with each influencing the other.” (Gentile et al., 2009, p. 35)

Gentile (2009), using the competencies model from James (1890), argues “people draw self-esteem from accomplishments in certain areas” (Gentile et al., 2009, p. 35). This is supported by Igbaria & Iivari (1995), who found computer experience was “strongly correlated with self-efficacy (r = 0.33, p < 0.001)” (p. 598). Igbaria and Iivari further add:

> Computer experience and support affect self-efficacy. The results also support Bandura's [6-8] conjecture of experience as the most influential determinant of self-efficacy. This suggests that as users evaluate their experiences with the system, perceptions of computer self-efficacy and outcome expectations change. (Igbaria & Iivari, 1995, p. 600)

A second example of experience increasing self-efficacy is found in a study of math: “Students who feel they have mastered skills and succeeded at challenging assignments experience a boost in their efficacy beliefs (Bandura, 1977). Mathematics teachers should therefore aim to deliver instruction in a way that maximizes the opportunity for such experiences" (Usher & Pajares, 2009, p. 100).

Given evidence showing the relationship between self-efficacy and experience, it suggests mastery experiences, such as learning new skills, will have a positive influence on self-efficacy and locus of control.

3.6.1.1 Hypothesis 9: Mastery experiences.

Hypothesis 9. Updating skills and experience in a job positively influences self-efficacy and locus of control.

4: Methods

The purpose of the methods chapter is to describe the procedures and instruments used for gathering and analyzing the data. Discussions of Rosenberg's (1965) self-esteem scale, Spector's (1988) work locus of control, and Ajzen's (1991) theory of planned behavior explain the job and technology versions of the scales. Explanations of pre-testing and data collection conclude the chapter.

4.1 Survey Construction

The approach used for choosing instruments was to find existing, well-validated measures and make minimal modifications to assess self-efficacy and locus of control in job and technology domains. Researchers using similar methods have adopted scales for contextualized use (Greenberger, Chen, Dmitrieva, & Farruggia, 2003).Well-validated scales corresponding to the hypotheses provide greater generalizability and help avoid method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

4.1.1 Rosenberg's self-esteem scale.

Rosenberg's (1965) self-esteem scale[3] is a ten-item scale designed to measure "one's overall sense of self-worth" (Jackson et al., 2009, p. 437). The scale is popular because of "its long history of use, its uncomplicated language, and its brevity (it only takes 1 or 2 min to complete)" (Schmitt & Allik, 2005, p. 623). The internal reliability of the scale is from .85 to .88 (Rosenberg, 1965). Tested across cultures, the RSE is internally consistent. Schmitt and Allik (2005) tested the scale across 53 nations, and concluded "the internal reliability and factor structure of the RSES [is] largely replicated across a large and diverse sample of human languages and culture" p. 637). In addition, validity of the scale has been established in studies of specific countries, such as the Spanish study by Martín-Albo, Núñez, Navarro, Grijalvo, & Navascués (2007).

[3] The Rosenberg family has given permission for all academic use of the Rosenberg self-esteem scale. The family asks that the following reference be used and that they be informed: Rosenberg, Morris. 1989. *Society and the Adolescent Self-Image*. Revised edition. Middletown, CT: Wesleyan University Press.

Researchers have used both Guttman scaling (e.g. Rosenberg, 1965) and total score (e.g. Hagborg, 1996; Shahani, Dipboye, & Phillips, 1990). Rosenberg originally used a Gutman scale method. In contrast, many researchers use an average scoring method of totalling and dividing by the total number of items. This method has reported internal consistency coefficients of α=.74 to .77 (Hagborg, 1996, p. 1072). This study used an average score method for ease of comparison and data analysis.

Modifications to the original scale were minimal; only the focus of the statement (direct object) was changed to reflect job and technology contexts. For example:

Original: On the whole, I am satisfied with myself.

Job version: On the whole, I am satisfied with **my ability to do my job.**

Technology Version: On the whole, I am satisfied with my ability to use **technology**.

The original, job, and technology versions are available for comparison in Appendix 5.

4.1.2 Work locus of control scale.

The work locus of control scale[4] is a sixteen-item scale that measures locus of control in a work setting: “Items were generated from a conceptual analysis of the locus of control construct and how it related to work behavior” (Spector, 1988, p. 336). Responses range from ‘strongly disagree’ to ‘strongly agree’ on a six-point scale. Half of the items represent internal control; the other half represent external control. Spector’s study of six US samples resulted in coefficient alphas of .75 to .85. Locus of control has been adapted into situation-specific scales, such as the sales locus of control scale (Chung & Ding, 2002) and the work locus of control scale (Spector, 1988).

In this research, modifications to the original version reflect the technology context by changing ‘job’ to ‘technology’. For example:

Original (Work version): A job is what you make of it.

Technology Version: **Technology** is what you make of it.

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[4] The work locus of control scale is reproduced with permission from the author, Professor Paul E. Spector (University of South Florida), and the Journal of Occupational and Organisational Psychology, © The British Psychological Society

The original work locus of control scale and the technology version are in Appendix 5.

4.1.3 Theory of planned behavior.

The questions for the theory of planned behavior[5] follow the guidelines in Ajzen's (2006) paper, "Constructing a TpB Questionnaire: Conceptual and Methodological Considerations." The sample questions below are for the job skills version. Sample questions for the theory of planned behavior measuring technology usage are in Appendix 3. The complete survey, with the corresponding technology version, is in Appendix 4.

4.1.3.1 Behavior of interest.

The "behavior of interest is defined in terms of its Target, Action, Context, and Time (TACT) elements" (Ajzen, 2006, p. 2). Past research provides "an empirical case to support past behavior as a predictor of unique variance in intentions and behavior in the TPB" (Conner & Armitage, 1998, p. 1438). Even though the theory is well established, it is important to consider compatibility and specificity because the behavior elements may be somewhat arbitrary (Ajzen, 2006). Compatibility refers to all of the "constructs (attitude, subjective norm, perceived behavioral control, and intention) [being] defined in terms of exactly the same elements" (Ajzen, 2006, p. 2). Specificity refers to how narrowly the behavior is defined: the action, context or time aspects of the behavior must balance being too restrictive or being too general.

To ensure the behavior description was valid for the sample in this research, suggestions for updating behaviors were collected from ten respondents (five people in non-technical jobs and five in mixed-skill jobs) to determine the types of activities to be included in the description of the behavior. The recommendations of the ten participants fell into three broad categories of activities: informal learning on an as-needed basis; participation in professional groups; and formally documented learning activities. Examples of these activities were included at the beginning of the survey.

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[5] Permission for academic use of the theory of planned behavior given by the Author: Professor Icek Ajzen (University of Massachusetts), http://people.umass.edu/aizen/faq.html.
The author has posted permission on his website: "No permission is needed to use the theory in research, to construct a TPB questionnaire, or to include an original drawing of the model in a thesis, dissertation, presentation, poster, article, or book."

The questions about updating are general in nature, but are specific in time (a year) and the outcome of the updating behavior. Adding a new skill to a C.V. represents learning for continuous upgrading. The behavior is more than a minor change in knowledge; it represents a change in the skill set.

The two questions focusing specifically on behavior were:

1. Last year, I learned new job skills informally but nothing I would add to my C.V.
2. Last year, I updated my job skills and added my new skills to my C.V.

Although semantic differential questions (bipolar adjectives) are commonly used, "any standard attitude scaling procedure (Likert scaling, Thurstone scaling) can be used to obtain a respondent's evaluation of the behavior" (Ajzen, 2006, p. 4). For consistency with the modified self-esteem and locus of control scales, a six-point Likert scale was used for TPB questions.

4.1.3.2 Intention.

Intention questions should show internal consistency and closely relate to behavior questions:

1. I intend to update my job skills within the next year and add my new skills to my C.V.
2. Within the next year, I will probably only do informal updating such as asking a colleague or referring to an on online resource.

4.1.3.3 Attitude toward behavior.

The job attitude and technology attitude scales are non-specific regarding the type of technology used in the job. Asking about a specific technology would narrow the sample to only jobs using that technology. Because the purpose of the research is to assess updating behavior, the survey asked about technology in general, and across multiple jobs.

The attitudes toward behavior questions are similar to those used by Taylor and Todd (1995) to predict technology use.

There is a balance of positive and negative (*) responses:

1. There are more advantages than disadvantages to updating my job skills.
2. It is easy to update my job skills.
3. I enjoy learning new job skills.
4. *Updating my job skills will be unpleasant.
5. It is a good idea to update my job skills.
6. *It won't help my career to update my job skills.

4.1.3.4 Subjective norms.

Subjective norms are difficult to assess, and the items often have "low variability because important others are generally perceived to approve of desirable behaviors and disapprove of undesirable behaviors" (Ajzen, 2006, p. 6). On the other hand, some researchers find the effects of social desirability are minimal, and norms predict technology usage (Armitage & Conner, 1999b; Karahanna et al., 1999).

Referents for this study included top management, supervisors, peers, experts, and friends (Karahanna et al., 1999); family are also included because they may have a strong influence on educational choices (Varma, 2009).

The subjective norm questions were:

1. My friends think that I should update my job skills.
2. The people in life whose opinions I value would approve of my updating my job skills.
3. My supervisor thinks that I should update my job skills.
4. Top management thinks that I should update my job skills.
5. My family would approve of my updating my job skills.
6. I should update my job skills because my peers think I should.
7. Specialists in my organization think I should update my job skills.

4.1.3.5 Perceived behavioral control.

The perceived behavioral control questions aimed to capture self-efficacy and controllability beliefs: "A direct measure of perceived behavioral control should capture people's confidence that they are capable of performing the behavior under investigation" (Ajzen, 2006, p. 7). Items were designed to assess the perceived capability and controllability to account for the multidimensionality of this item. Using both efficacy and control questions were intended to provide higher reliability. The questions are similar to those used by Taylor and Todd (1995), and reflect self-efficacy and controllability.

Self-efficacy

1. It is difficult to keep my job skills current.
2. When thinking about changes related to my work, I am concerned about my ability to keep up in the future.
3. It is easy to learn new skills for work.
4. Overall, I am confident in my ability to keep pace with changes related to my work.
5. It would be impossible for me to keep up with the changes in my job.

Control

6. It is mostly up to me if I update my job skills to keep up with changes in my job.
7. I have the resources I need to update my job skills.
8. The materials to update my job skills are available to me.
9. It is difficult to find resources to help me update my job skills.

4.1.4 Scaling, forced response, and ordering.

The work locus of control scale was designed with a six-point Likert scale. To ensure consistency and comparability between scales, all items used a 6-point Likert scale. Scoring was reversed from the original locus of control and self-esteem scales; the original scales use lower scores for higher internal control and high self-esteem. This allows a comparison between high internal locus of control and high self-esteem. Reversed scoring of the scales makes the differences in absolute scores, and the resulting graphs, easier to interpret.

The survey did not use forced-response (forcing a response before the computer allows respondents to move to the next question) except for a required response for the type of education program. Forced-response increases dropout rates and can cause reactance, such as a change strength or direction of response (Stieger, Reips, & Voracek, 2007). The technology program variable was a forced-response because it was necessary to separate the sample into technology and non-technology education programs.

The TPB questions were in order of antecedent factors (attitude, subjective norms, and perceived behavioral control) and then outcomes (intention and behavior). Research "indicates that the impact of questionnaire format and social desirability on models such as the theory of planned behavior is minimal" (Armitage & Conner, 1999b, p. 261). Therefore, randomization is not required, and because the research aim is to capture differences between job and technology versions, ordered questions were preferred.

There was a priming effect to the ordering of questions because the instructions told respondents the second questions related to the larger context of their job. This made respondents aware of one aspect of work, which could influence the second set of questions (Salancik & Pfeffer, 1977). The order was intended to influence respondents to think about the technology questions in relation to their responses to the work questions. For this study, the priming effect is not a limitation, but a desired part of the design.

4.2 Variables

Five variables were used in the testing.

4.2.1.1 Gender.

As previously discuss in chapter 2, there are several issues with dichotomous gender variables (Adam et al., 2004; Crump et al., 2007; Hughes, 2001). Inter-gender comparison, "which is usually narrowly based on heterosexuality ... [lacks] consideration of other power relations based on ethnicity or class, tends to mask complexity" (Hughes, 2001, p. 276). In an effort to provide a more complex understanding than just comparisons of men to women, this analysis also tested women and men separately.

4.2.1.2 Education program.

Education program is the post-secondary subject area taken by the respondent. It was categorized into technology and non-technology. Technology programs involve manipulating, modifying, or creating technology. Examples of such programs are applied science, computer science, engineering, interactive arts, or media labs. Some programs may have heavy use of technology, such as science and health sciences, but the primary focus of the area of study is a science and not the technology.

4.2.1.3 Job type.

Job type required separating participants into non-technical and technical jobs. Questions to measure level of information technology and computer technology use was based on Bloom's Taxonomy of the Cognitive Domain (Bloom, Englehart, Furst, Hill, Walker, & Krathwohl, 1956) and definitions of users by Gantt and Nardi (1992). The questions represent comprehension, application, analysis, synthesis, and evaluation from Bloom's scale. Examples of Bloom's Taxonomy are shown in Appendix 6.

Questions asking about the type of user provide further distinction. Gantt and Nardi (1992) distinguish end-users from those who provide customized macros or programs for a whole group (called "gardeners"): "End users have little or no programming education and tend to lack an intrinsic interest in computers; they are focused on their own domain interests" (p. 107). Those in technology jobs will have more knowledge about technology; and they will use that knowledge in ways that influence the work of others. For example, a question corresponding to technology jobs involves more than use; it reflects how creating or customizing the technology then influences others:

> I create technology tools (software programs, hardware) that other artists use to create their works

The cognitive level of use and percentage use questions combine with the job description and industry to determine technology or non-technology jobs. The initial sort included technology jobs having more than 60% time using technology with a high level of use in at least one cognitive category. Next, the researcher reviewed the job descriptions and reclassified six jobs. For example, an English teacher had very high use ratings, but was reclassified as non-technology based on the description of the job. The complete list of technology use questions are in Appendix 9.

4.2.1.4 Age and education level variables.

The last two variables are age and education level. Three age categories were created from the original five because the oldest and youngest age categories were too small. Education level included some post-secondary, undergraduate, and graduate degrees.

4.3 Data Analysis

Statistical testing was completed for the three approaches. Step 1 used analyses of variance (ANOVA) to test hypothesis (a) (i.e. comparison of male and female job self-efficacy), and repeated measures ANOVAs were used to test hypothesis (b) (i.e. comparison of female job self-efficacy and technology self-efficacy). Testing for Step 2 used regression analysis to examine effects of the theory of planned behavior subscales (predictor variables) and behavior intent (dependent variable). Step 3, assessing mastery experiences, used correlations to test for relationships between self-efficacy, locus of control, and updating behavior.

4.4 Survey Design Stage

The survey design phase included two stages: defining the behaviors and pilot-testing the questionnaire.

4.4.1 Defining behavior.

The description of updating behaviors was created using input from five technology and five non-technology colleagues. The email sent to the ten colleagues listed examples of updating behavior and asked: “Are there other activities you think should be added to this list? I am looking for any activity that someone would do to learn something job related.” The examples given to the ten (10) colleagues were:

- Taking university, college or professional institute courses related to your job (online or Face-to-face)
- Attending work related conferences and seminars
- Learning a new skill from a book Reading a job related book
- Learning a new skill from online resources

After sorting through the complete list of suggestions, the following options were added to the survey:

- Participating in a professional organization (speakers, lectures, workshops) Vendor training
- Certifications (MCP, ITIL, IEEE, etc.)

- Joining and participating in an online community of practice
  Joining and participating in a professional organization
  Internal courses or training provided to employees (either assigned or requested)

The complete list of suggestions and the job titles of participants are in Appendix 8.

4.4.2 Pilot study.

A pilot study assessed internal consistency and dimensionality. Twenty-six (26) graduate students in communications, business administration, computer science and interactive arts at the Simon Fraser University (SFU) were the pilot study sample. Graduate students received a request for participation with a link to the survey. Cronbach's Alpha tested internal consistency for each subscale.

Table 4-1 *Pre-test Cronbach's alpha*

Job scale	α	Technology scale	α
Job self-efficacy	.772	Technology self-efficacy	.892
Job locus of control	.904	Technology locus of control	.615
Job attitude	.707	Technology attitude	.713
Job subject norms	.876	Technology subject norms	.879
Job perceived behavioral control	.809	Technology perceived behavioral control	.844

The self-esteem scales have acceptable alphas. The locus of control scale is high for the job version ($\alpha = 0.904$) and low for the technology version ($\alpha < 0.615$). All items remain because the job version is exactly the same as Spector's (1988) original work locus of control. The TPB subscales fall within an acceptable range of 0.70 to 0.90.

4.5 Data Collection

The first group of respondents were alumni from the School of Interactive Arts and Technology (SIAT) undergraduate and graduate programs at Simon Fraser

University. This group was over 19 years of age and has, at a minimum, an undergraduate degree. SIAT alumni were contacted for participation via the SIAT alumni email list[6] and through the SIAT alumni Facebook group.

The SIAT group forwarded the survey link to two or three of their peers. This group was also over 19 years of age, and most have completed an undergraduate degree. Although this method did not produce a truly matched sample, it created a large sample across job types (technology and non-technology) and education (technology and non-technology programs). For example, SIAT students sent the survey link to co-workers to recruit participants. These recruits had non-SIAT education, but work in similar jobs. SIAT students also posted the link in their Facebook pages, which resulted in participants who were non-co-workers (e.g. friends and family members), but who are similar in other demographics areas, such as age and education level.

Of the approximate 700 students who had graduated from the SIAT program over the five-year period 2003-2008, the total directly contacted via Facebook or email was 248. This resulted in 72 responses, or a 29% response rate.

[6] The graduate and undergraduate alumni lists are maintained by the School of Interactive Arts and Technology. Permission has been granted by the Director of the school, Professor John Bowes, to contact the alumni. These lists are not for public use and only those with access granted by SFU are able to send emails.

5: Results

5.1 Introduction to the Results

The results show limited support for gender and education differences in self-efficacy and locus of control. Additionally, the antecedent factors of the theory of planned behavior have little influence on skill updating behaviors. The repeated measures tests demonstrate self-efficacy differences occurred between job and technology domains. Gender differences are statistically significant for self-efficacy, and men scored higher on all scales. Some statistical violations occurred due to the limited numbers in the sample.

5.1.1 Statistical analysis and violations.

Repeated measures ANOVAs were used to compare the job domain of the scale to the technology domain by gender, education program, job type, age, and education level. Due to the small sample size, some categories have N's less than thirty (30). While violations of normality do not usually occur when there are at least 20 per cell and the cells are balanced, this sample has some uneven distribution of cells in addition to cells less than 20.

Multivariate tests are acceptable for all data, but there are some violations of Levene's and Box's tests. Box's test of covariance matrices determines if the dependent variable covariance matrices are the same across groups. If Box's M is statistically significant, there is a violation of the MANOVA. Due to the sensitivity of Box's M, a cut-off point of $p<.005$ was used (Field, 1998). Levene's test of equality of error variances produces a significant p-value when there are violations of the assumption of error variances. Box and Levene's violations are noted at the bottom of the charts, where applicable.

5.1.2 Theory of planned behavior (TPB) sub-scales.

The final (TPB) subscales were determined using Cronbach's alpha. Subjective norms and perceived behavioral control were both divided into two factors. The alphas for the final model are in Table 5-1. Complete Cronbach Alpha rotated matrices and Kaiser-Meyer-Olkin unidimensionality tests are in Appendix 10.

Table 5-1 *Cronbach's α*

Job scales	α	Technology scales	α
Job self-efficacy	.828	Technology self-efficacy	.900
Job locus of control	.867	Technology locus of control	.734
Job attitude	.616	Technology attitude	.769
Job sn work	.848	Technology sn work	.869
Job sn family	.773	Technology sn family	.803
Job pbc efficacy	.750	Technology pbc efficacy	.785
Job pbc control	.820	Technology pbc control	.831

5.1.3 Overview of the results presented.

The remainder of the chapter is divided into sections for each of the main hypotheses. The first section shows respondent characteristics, and self-efficacy and locus of control correlations. This is followed by the statistically significant ANOVAs and repeated measures to test for job and technology differences between the independent variables: gender, education type, job type, age, and education level. The TPB regressions and mastery experiences correlations are at the end of the chapter.

The tables in this chapter show the statistically significant outcomes. All other outcomes of the tests, including degrees of freedom, exact p values, and means for all variables, are in Appendix 11.

5.2 Respondent Characteristics and Correlations

5.2.1.1 Gender and age.

The sample had almost the same number of male and female participants: 90 and 89 respectively. Table 5-2 shows the number of men and women in each job type.

Table 5-2 *Demographics for education program and job type by gender*

		Non-technology job	Technology job	Total
Non-technology education	Male	23	18	41
	Female	17	38	55
	Total	40	56	96
Technology education	Male	23	26	49
	Female	24	10	34
	Total	47	36	83

Table 5-3 shows the distribution of participants over age and education level categories. Participants are not evenly distributed by age or education level.

Table 5-3 *Age and education level by gender*

		Age			
Education level		20-34	35-44	45 and over	total
Some post-secondary	Male	4	2	1	7
	Female	6	4	6	16
	total	10	6	7	23
Undergraduate	Male	32	14	3	49
	Female	26	5	3	34
	total	58	19	6	83
Postgraduate	Male	10	11	13	34
	Female	13	15	11	39
	total	23	26	24	73

Table 5-4 shows the uneven distribution across age groups and education programs.

Table 5-4 *Education program for age group and gender*

Age	20-35		35-44		45-over	
	Non-tech education	Tech education	Non-tech education	Tech education	Non-tech education	Tech education
Male	13	33	18	9	10	7
Female	20	25	18	6	17	3

Three programs were classified as technical education: applied science, computer science, and interactive arts/media lab. Although other programs may have technological components, they are not specifically focused on design and development of technology. Table 5-5 shows the distribution of participants across education programs and job types.

Table 5-5 *Education Program and Technical Job*

	Non-tech education		Tech education		
	Non-tech job	Tech job	Non-tech job	Tech job	Total
Applied Science			5	5	10
Arts	13	24			38
Business	7	11			18
Communications	3	1			4
Computer Science			6	8	14
Fine Arts	1	3			4
Health Sciences		2			0
Interactive Arts/Media Lab			36	23	59
Other	10	12			19
Science	5	3			8
Total	39	56	47	36	178

5.2.1.2 Mean years for graduation and in job.

Table 5-6 shows the mean number of years in the current job is similar for most categories, except education level. Those with some post-secondary education have only been in their *current* positions a mean of 2.87 years, (*SD*=1.66). Inexperience and recent graduation could be confounding variables when assessing perceived self-efficacy and locus of control in work situations; however, the mean time since graduating is 14.14 years, (*SD*= 9.7) and, of the nine people who completed school less than one year prior to the study, only one had been in their current job less than two years. Therefore, inexperience is not a concern.

Table 5-6 *Means years since graduation and years in job*

		N	Mean years after graduated	SD	N	Mean years in jobs	SD
Gender	Male	90	8.20	7.30	96	4.67	4.89
	Female	89	7.41	7.91	83	5.19	5.15
Education program	Non-technical education	89	10.31	9.01	96	5.19	5.03
	Technical Education	81	5.05	4.25	83	4.63	5.01
Job type	Non-technical job	80	7.03	6.99	87	4.99	5.51
	Technical job	90	8.50	8.08	92	4.87	4.52
Age	20-34	86	4.51	2.65	91	5.10	6.19
	35-44	48	8.38	6.04	51	5.37	3.62
	Over 45	36	14.92	11.57	37	3.88	2.95
Education level	Some post-secondary	21	14.14	9.70	23	2.87	1.66
	Undergrad	79	7.80	6.98	83	4.94	4.97
	Graduate	70	5.91	6.59	73	5.56	5.60

5.2.2 Correlations.

The listwise Pearson correlations in Table 5-7 show job self-efficacy and job locus of control are correlated $r(175) = .437$, $p <.001$. Technology self-efficacy and technology locus of control are correlated $r(175) = .372$, $p < .001$. These correlations are slightly lower than the self-efficacy and locus of control correlation reported in a meta-analysis by Judge et al. (2002) of $r(14{,}691) = .52$, $p < .05$. The job and technology self-efficacy scale correlation $r(175)= .517$, $p < .001$) is lower than job and technology locus of control, $r(175) = .691$, $p < .001$.

Table 5-7 *Self-efficacy and locus of control correlations*

	M	*SD*	1	2	3	4
1. Job self-efficacy	4.88	.722	--	.437***	.517***	.339***
2. Job locus of control	4.29	.653		--	.323***	.691***
3. Technology self-efficacy	4.90	.840			--	.372***
4. Technology locus of control	4.32	.558				--

***p< 0.001 level

N=175

The lower correlation confirms the self-efficacy and locus of control scales are measuring different aspects of self-perception. Correlation tables for all variables are in Appendix 12.

5.3 Variable Effects on Self-efficacy and Locus of Control

The first approach to the data is to test for the effects of gender, education program, job type, age, and education level on self-efficacy and locus of control in job and technology domains:

> Hypothesis (a): There are differences between self-efficacy and locus of control means by variable.
>
> Hypothesis (b): There are differences between job and technology self-efficacy and locus of control means by variable.

Hypothesis (a) was tested using one-way ANOVA, and Hypothesis (b) using repeated measures ANOVA. Table 5-8 contains the one-way ANOVAs for the five independent variables: gender, education program, job type, age, and education level.

Table 5-8 *One-way ANOVAs*

	Independent Variables				
	Gender	Education Program	Job Type	Age	Education level
Dependent	*F*	*F*	*F*	*F*	*F*
Job self-efficacy				5.22**	
Technology self-efficacy	13.42***	6.58*			
Job locus of control				4.44*	
Job sn work				3.10*	3.75*
Technology sn work		5.50*		3.36*	3.77*
Job sn family					4.23*
Technology sn family					5.02**
Technology pbc efficacy	10.98***				
Job pbc control	12.94***				
Technology pbc control	6.30*	4.00*			

*p<.05, **p<.01, ***p<.001
sn = subjective norm
pbc = perceived behavioral control

Gender effects are seen for technology self-efficacy, technology perceived behavioral control (pbc) efficacy, and job and technology (pbc) control. Education program has an effect on only technology scales: technology self-efficacy, technology subjective norm (sn) work, and technology pbc control. The variables have no effect on the locus of control scales, except age influencing job locus of control. Age is also statistically significant for job self-efficacy, and job and technology sn work. Education level shows effects for the four subjective norm (sn) scales: job and technology sn family, and job and technology sn work. The variable job type is not statistically significant for any of the scales.

Table 5-9 *Repeated measures**

Repeated	Control	Within Subjects			Between		
		F	η^2	*p*	*F*	η^2	*p*
Self-efficacy	gender	9.59	2.77	.002	7.29	6.47	.008
	teched	20.73	5.65	.000			
	age	3.38	1.00	.036			
Locus of control	age	4.71	0.53	.010			
Attitude	age				3.08	2.03	.048
Subjective norm – work	techjob	4.88[b]	1.60	.028			
	age				3.82	7.44	.024
	edlevel				4.43	8.59	.013
Subjective norm – family	techjob	6.03	2.34	.015			
	edlevel	3.42	1.33	.035	5.13	10.43	.007
pbc efficacy	gender	6.37	1.63	.012	6.57	9.75	.011
pbc control	gender				11.90	20.04	.001

*Statistically significant only
[b] Box's test is statistically significant

5.3.1 Gender.

There is strong evidence to support the hypotheses of gender differences in self-efficacy and perceived behavioral control: Men have higher self-efficacy and pbc efficacy and control. Men have higher self-efficacy, pbc efficacy, and pbc control in the technology domain compared to job domain. The repeated measures ANOVAs show gender differences in self-efficacy, pbc efficacy, and pbc control. There are no gender effects on locus of control.

Self-efficacy is statistically significant within each gender ($F[1,177] = 9.59$, $p = .002$) and between men and women ($F[1,177] = 7.29$, $p < .008$). *Figure 5-1* shows men have a higher technology self-efficacy mean compared to job self-efficacy; while women show the opposite with lower technology self-efficacy.

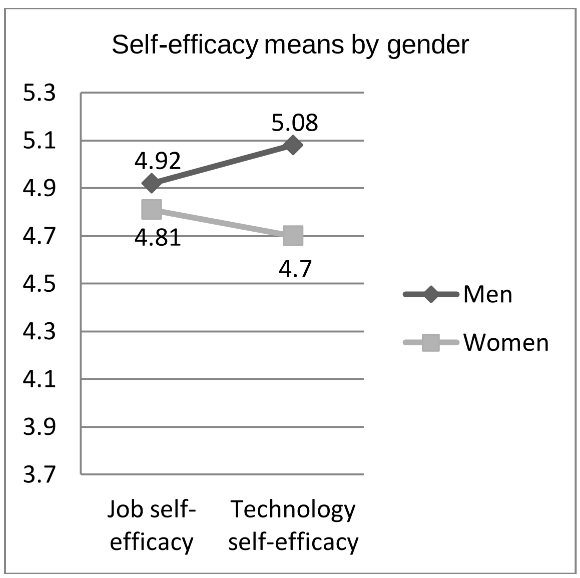

Figure 5-1. Self-efficacy means by gender.

Figure 5-2 shows the effects of gender on pbc efficacy are similar to those of self-efficacy. There is a statistically significant difference within each gender ($F[1,177] = 6.37$, $p = .012$) and between men and women ($F[1,177] = 6.57$, $p = .011$).

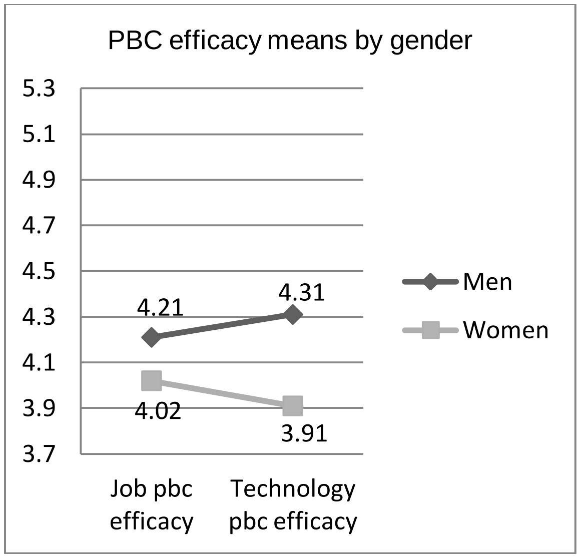

Figure 5-2. PBC efficacy means by gender.

5.3.2 Education program.

The education program hypotheses have mixed support. The one-way ANOVAs show technology education programs have a positive effect on technology self-efficacy, subjective norms (sn) work, and pbc control.

For the repeated measures tests, only self-efficacy is influenced by education program, $F[1,177] = 20.73$, $p < .001$.

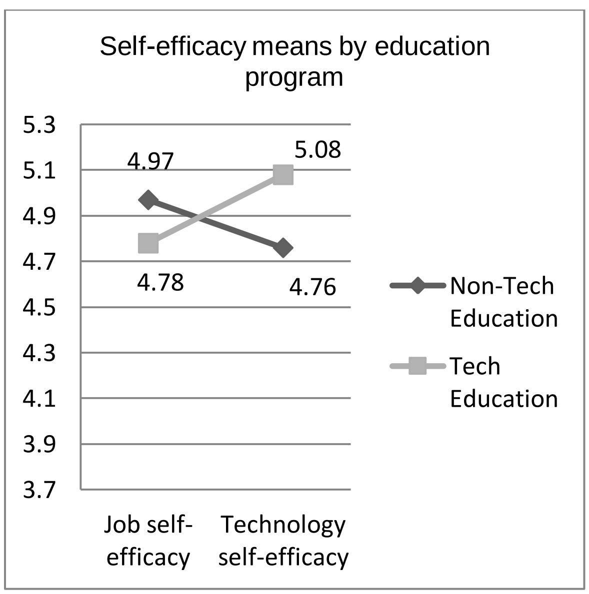

Figure 5-3. Self-efficacy means by education program.

Figure 5-3 shows having a technology education has a positive influence on technology self-efficacy. Those with a technology education have lower job self-efficacy, but higher technology self-efficacy. Having a non-technology education results in the opposite, higher job self-efficacy and lower technology self-efficacy. The increase in technology self-efficacy for those from a technology program is expected and supports the hypothesis that a technology education will positively influence technology self-efficacy.

Similar to gender, education hypotheses are supported when testing for the effects on job and technology self-efficacy; however, education program has no statistically significant effect on locus of control.

5.3.3 Job type.

The hypotheses for job type are not supported well. There is no evidence people in technology jobs have higher means for the technology scales, and there are no statistically significant differences between technology and non-technology job types.

The only statistically significant repeated measures show subjective norm scores change from job to technology.

5.3.4 Age.

Age had a significant influence on job self-efficacy and job locus of control, as well as subjective norm (sn) work, in both job and technology contexts. In contrast to gender and education program variables that are statistically significant for technology self-efficacy, age influences only the job domain.

The repeated measures shows age effects within groups for self-efficacy and locus of control. Between groups, age had a statistically significant effect on attitude and sn work between groups.

5.3.5 Education level.

There are statistically significant effects of education levels on all four subjective norm variables: job and technology sn work, and job and technology sn family. The sn work repeated measures are statistically significant between education levels, while the sn family is statistically significant within and between education levels.

5.4 Gender, Education Program, and Job Type Interactions

In addition to the single variable effects, the hypotheses include interaction effects of gender, education program, and job type: Men and women with technology education and jobs have higher self-efficacy and locus of control.

Table 5-10 *Self-efficacy ANOVA by gender, education program and job type*

	Job self-efficacy			Technology self-efficacy		
Variable	F	η^2	p	F	η^2	p
Gender	.481	.227	.489	2.72	1.77	.102
Tech education	.066	.031	.797	3.25	2.12	.074
Job type	.539	.255	.434	.443	.289	.507
Gender*tech education	.096	.045	.757	.001	.001	.973
Gender*job type	.002	.001	.961	.083	.054	.774
Tech education*job type	2.30	1.08	.132	2.85	1.86	.094
R^2	.337			.330		
Adjusted R^2	.085			.075		
df	1, 178			1, 178		

Table 5-10 shows one-way ANOVAs for job and technology self-efficacy. Table 5-11 shows the one-way ANOVAs for job and technology locus of control. None of the interactions are statistically significant.

Table 5-11 *Locus of control ANOVAs by gender, education program and job type*

	Job locus of control			Technology locus of control		
Variable	*F*	η^2	*p*	*F*	η^2	*p*
Gender	.328	.134	.568	.299	.103	.585
Tech education	1.88	.764	.173	.170	.058	.681
Job type	.146	.059	.703	.074	.025	.786
Gender*tech education	.808	.329	.370	.209	.072	.648
Gender*job type	1.10	.449	.295	1.90	.625	.171
Tech education*job type	3.24	1.32	.074	1.23	.423	.269
R^2	.307			.202		
Adjusted R^2	.044			.102		
df	1, 178			1, 174		

5.5 Interactions with the Sample Split

The second type of interaction hypotheses requires women-only and men-only samples to test the effects of education program and job type:

> 4b. Women with a technology education or job will have higher self-efficacy and locus of control compared to women with a non-technology education or job.
>
> 4c. Technology self-efficacy and locus of control will be higher than job self-efficacy and locus of control for women with a technology job.

The sample was split by variable levels: male/female, technology/non-technology education, and technology/non-technology job. Table 5-12 shows the one-way ANOVAs for each of the sample splits. As with the full sample, gender influences self-efficacy. None of the variables influence locus of control.

Table 5-12 *Split gender, education, and job samples ANOVAs*

		Gender		Education program		Job type	
		Men	Women	Non-tech ed	Tech ed	Non-tech job	Tech job
Dependent	Variable	*F*	*F*	*F*	*F*	*F*	*F*
Technology self-efficacy	gender			9.41**		9.96**	4.64*
	teched		4.71*				7.36**
Technology sn work	teched	4.78*					
Job sn family	teched	4.62*					
Technology sn family	teched	5.19*					
Job pbc efficacy	teched	5.16*		4.84*			
Technology pbc efficacy	gender			10.12**		18.05***	
	techjob		7.79**				
Job pbc control	gender					7.89*	
Technology pbc control	teched					4.07*	

*$p<.05$, **$p<.01$, ***$p<.001$

5.5.1 Women-only and men-only.

Table 5-13 shows the repeated measures for women and men.

Table 5-13 *Repeated measures for men-only and women-only*

		Gender			
		Men		Women	
Dependent	Variable	Within	Between	Within	Between
		F	*F*	*F*	*F*
Self-efficacy	teched	3.93*		15.41L***	
	edlevel	3.54*			
Locus of control	teched			3.91*	
	age			3.97*	
sn work	techjob			4.02B*	
	edlevel				4.12*
sn family	teched		6.02*		
	techjob			5.16*	
	edlevel		4.31*		
pbc efficacy	techjob		4.35*		5.06L*
	edlevel				3.05*
pbc control	age		3.39*		

*$p<.05$, **$p<.01$, ***$p<.001$
L= Levene's is statistically significant at $p < .05$
B=Box's is statistically significant at $p < .01$

5.5.1.1 Gender and technology education.

Men and women's self-efficacy is statistically significant by education program. *Figure 5-4* shows women with non-technology education have lower technology self-efficacy compared to women with technology education. Women with a technology education have an increase from job to technology self-efficacy similar to men.

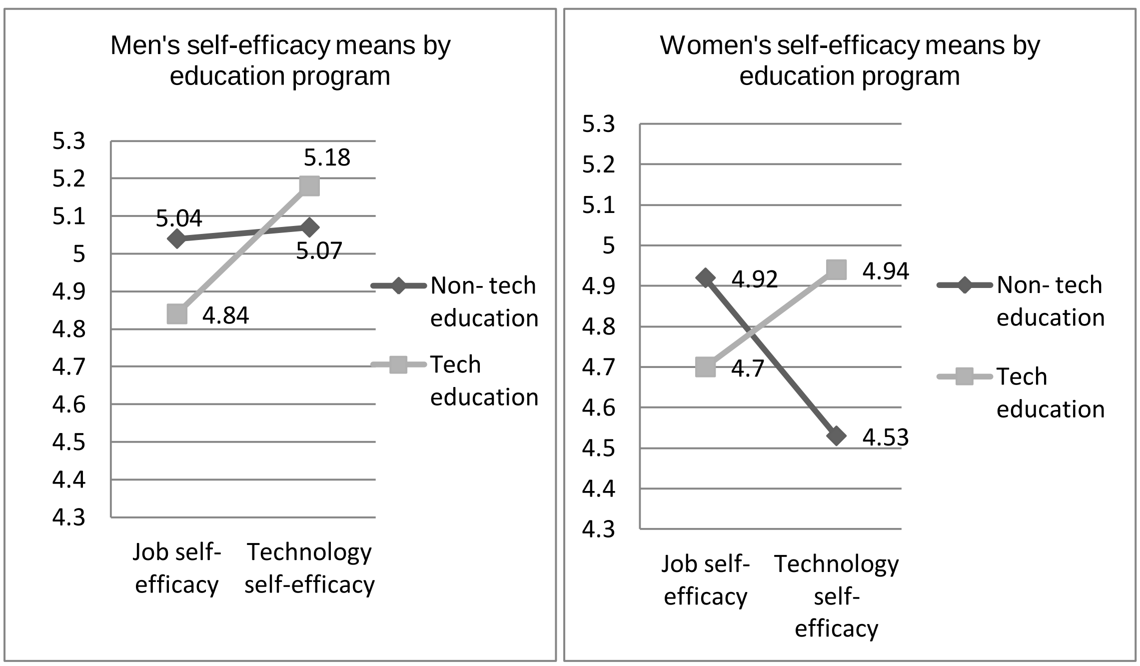

Figure 5-4. Men's and women's self-efficacy means by education program.

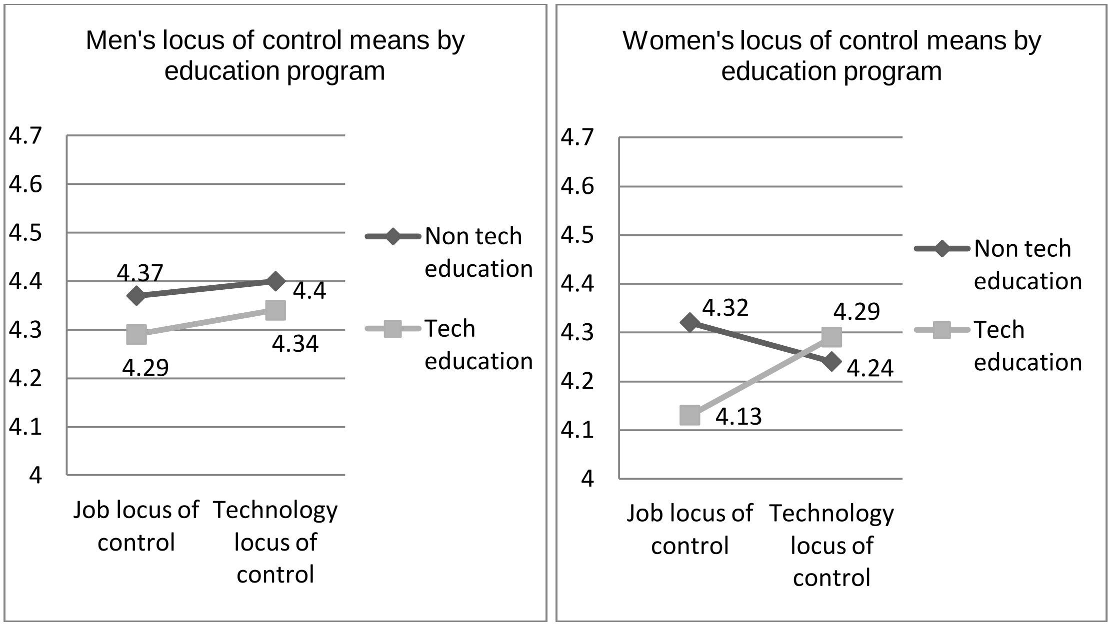

Figure 5-5. Men’s and women’s locus of control means by education program.

Figure 5-5 shows women with technology education have higher locus of control means in the technology domain. This is one of the few statistically significant scores for locus of control, other than age. The uneven distribution of the women over 45 group may be the cause of this outcome: There are 17 women from non-technology education programs compared to three from technology education programs.

5.5.1.2 Gender and technology job.

The non-technology jobs repeated measures ANOVAs are similar to non-technology education: gender is statistically significant within and between for self-efficacy and pbc efficacy, and between control.

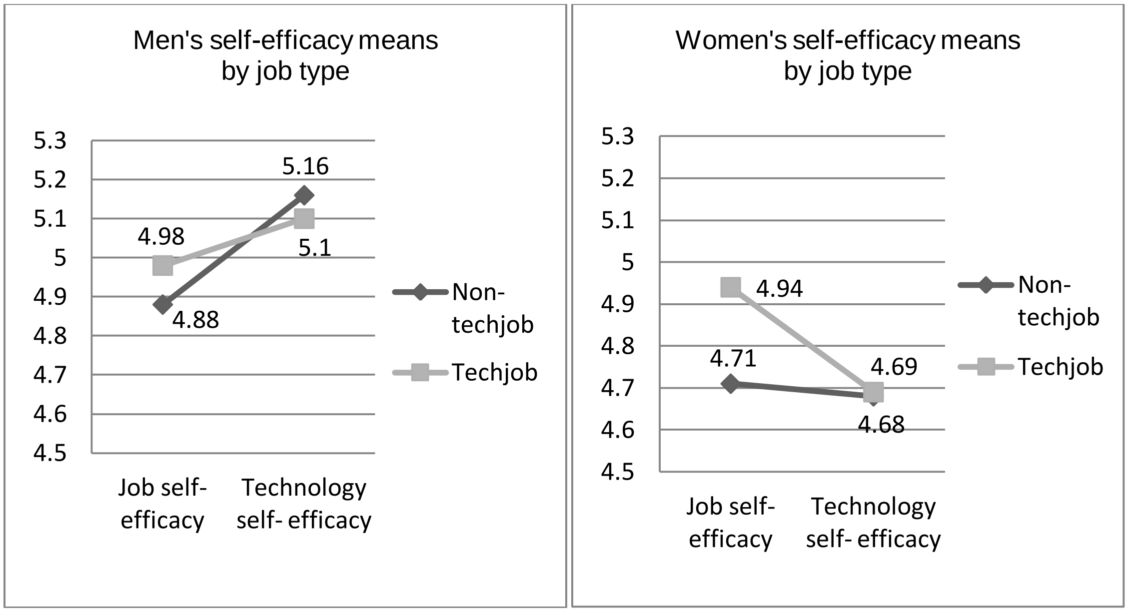

Figure 5-6. Men's and women's self-efficacy means by job type.

Job type effects on self-efficacy, shown in *Figure 5-6*, are opposite for men and women: technology self-efficacy, for both technology and non-technology jobs, is higher than job self-efficacy for men and lower for women. The decrease in technology self-efficacy for women in technology jobs is not statistically significant, but is unexpected. Although the absolute value of technology self-efficacy means is similar for women in technology (M = 4.68, SD = .725) and non-technology jobs (M = 4.69, SD = 1.01), women in technology jobs have a large decrease from job to technology self-efficacy.

5.5.1.3 Gender and age.

Figure 5-7 shows all women's age groups have similar technology locus of control, but women over 45 have lower technology locus of control compared to job locus of control. This represents a change from internal control in the job domain to external control in the technology domain.

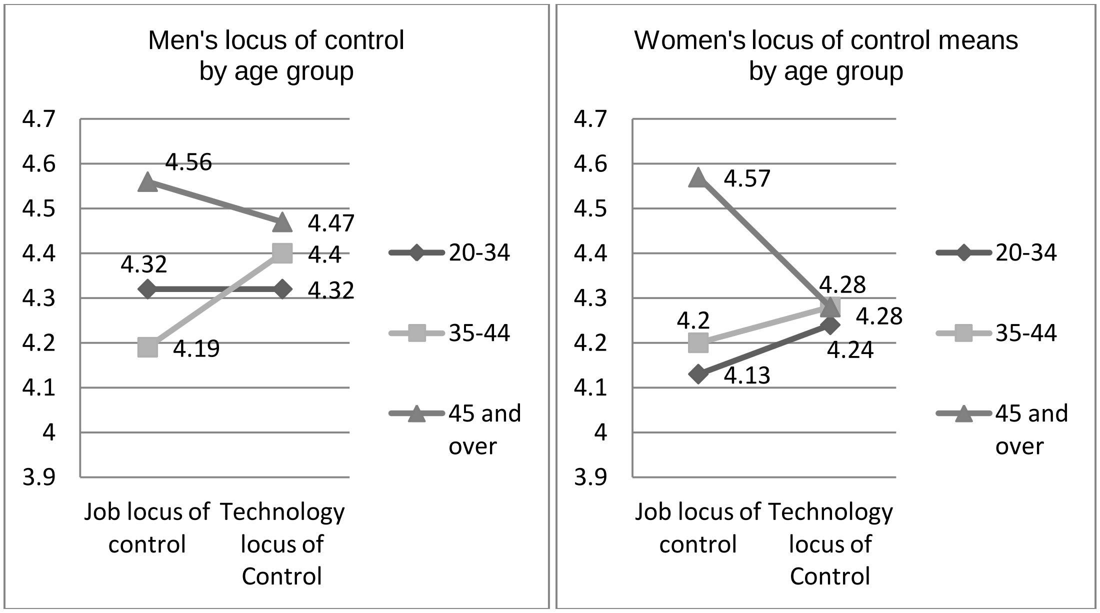

Figure 5-7. Men's and women's locus of control means by age.

5.5.1.4 Gender and education level.

Figure 5-8 shows education level influences men's self-efficacy. Undergraduate degrees have the highest technology self-efficacy. There is one inconsistency for men: non-university graduates are the only group of men to have *lower* technology self-efficacy than job self-efficacy.

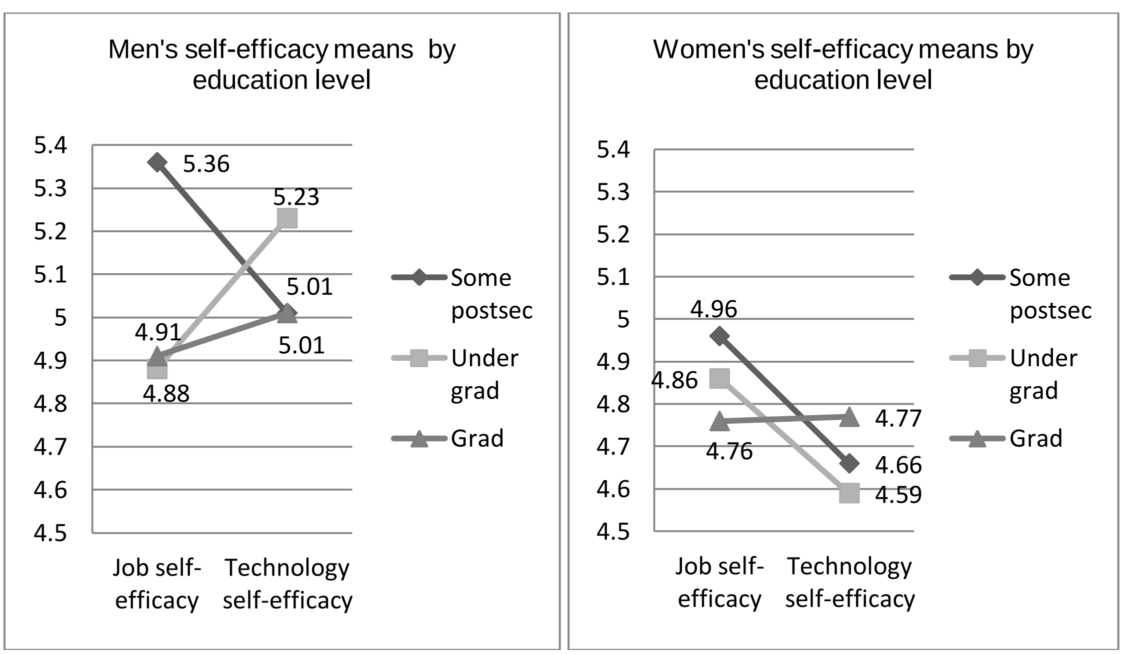

Figure 5-8. Men's and women's self-efficacy means by education level.

For women, education level has a statistically significant effect on pbc efficacy. Education level is statistically significant between women for pbc efficacy. *Figure 5-9* shows women with graduate degrees have similar job and technology pbc efficacy, but the lowest pbc efficacy means compared to women with an undergraduate or some post-secondary education.

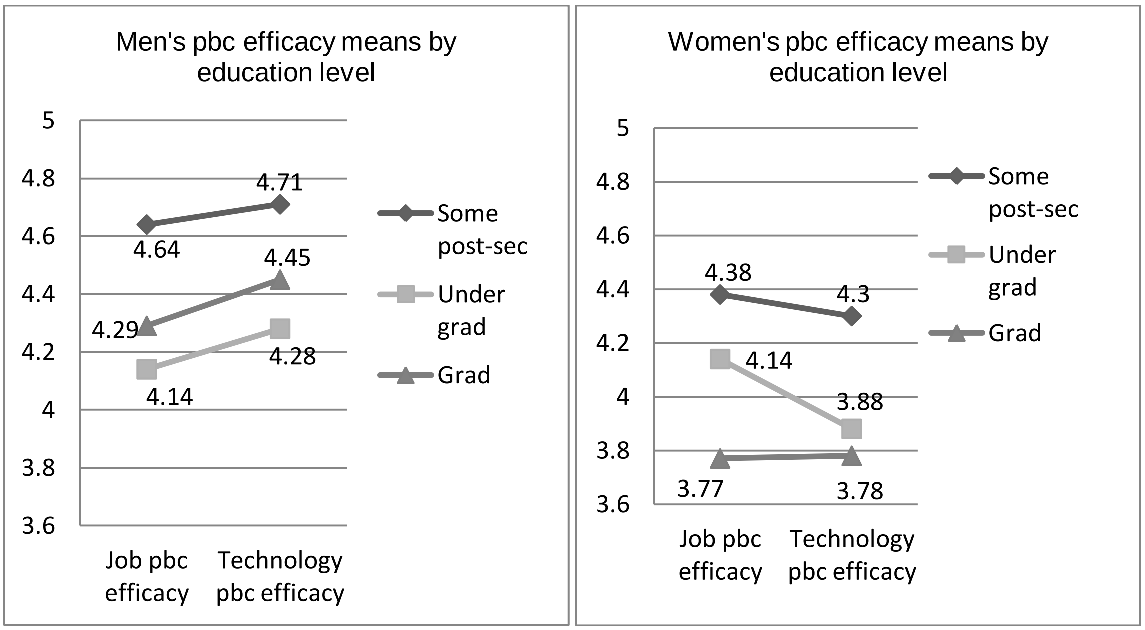

Figure 5-9. Men's and women's pbc efficacy means by education level.

5.5.2 Technology and non-technology education samples.

Table 5-14 shows repeated measures by non-technology and technology education programs. Again, gender effects self-efficacy, except in the technology education sample. This is the only test where self-efficacy and gender is *not* statistically significant.

Table 5-14 *Repeated measures for non-technology and technology education programs*

		Education			
		Non-technology education		Technology education	
		Within	Between	Within	Between
Dependent	Variable	*F*	*F*	*F*	*F*
Self-efficacy	gender	7.02L**	5.19*		
Locus of control	age	4.58*			
Attitude	techjob			4.19*	
	age		4.32*		
sn work	techjob			4.93*	
	edlevel		4.21*		
sn family	techjob			5.61*	
	edlevel	3.98*			5.28L**
pbc efficacy	gender		8.32**	4.08*	
pbc control	gender		7.97**		
pbc control	techjob	5.82*			
	age				5.08**

$^{*}p<.05$, $^{**}p<.01$, $^{***}p<.001$
L= Levene's is statistically significant at $p < .05$

As with the sample split by gender, age is the only variable with an effect on locus of control. *Figure 5-10* shows the over 45 age group has lower technology locus of control compared to job locus of control, but those over 45 with a non-technology education show a large decrease from job to technology domains.

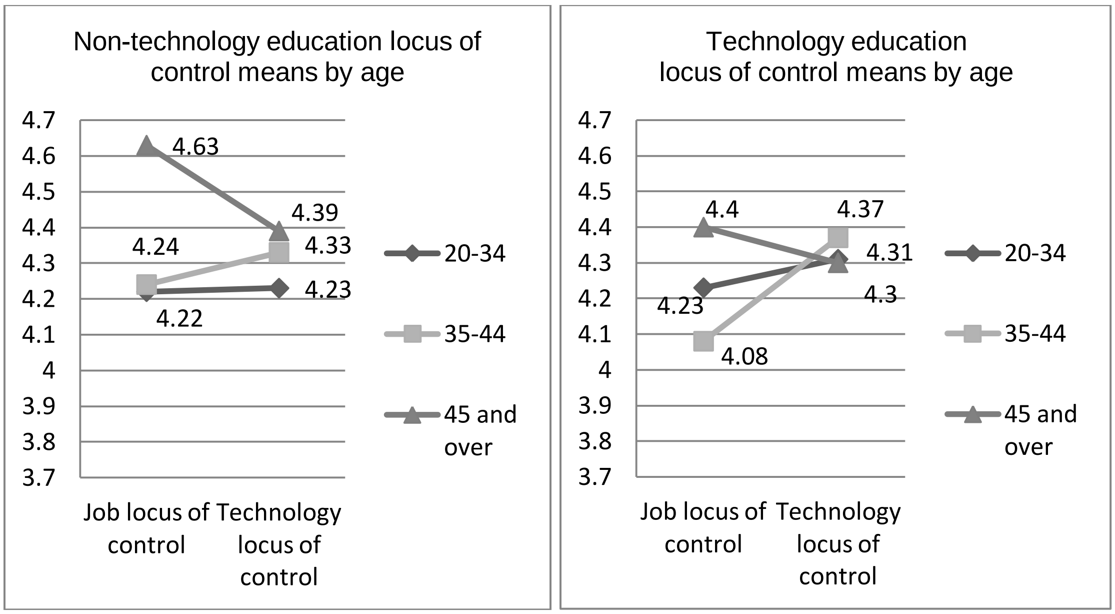

Figure 5-10. Technology and non-technology education locus of control means by age.

5.5.3 Technology and non-technology job samples.

The split sample for job type is similar to the split for education. Table 5-15 shows gender and education effects on self-efficacy. Similar to the gender and education program split samples, only age influences locus of control.

Table 5-15 *Repeated Measures for technology and non-technology job types*

		Job type			
		Non-technology job		Technology job	
		Within	Between	Within	Between
Dependent	Variable	*F*	*F*	*F*	*F*
Self-efficacy	gender	5.14*	5.85*	4.38*	
	teched	4.63*		14.84***	
	age		3.93*		
Locus of control	age	3.67*			
Attitude	teched	7.00*			
sn work	age				3.22*
	edlevel		3.21*		
sn family	edlevel	3.18*			
pbc efficacy	gender	13.99L***	9.59**		
	age				4.79**
pbc control	gender		6.47*		5.22*
	teched	6.59*			

*p<.05, **p<.01, ***p<.001
L= Levene's is statistically significant at p < .05

5.5.3.1 Job type and education program.

The unexpected results in *Figure 5-11* show those in technology jobs have lower technology self-efficacy compared to job self-efficacy. This is similar to the results for the women-only sample.

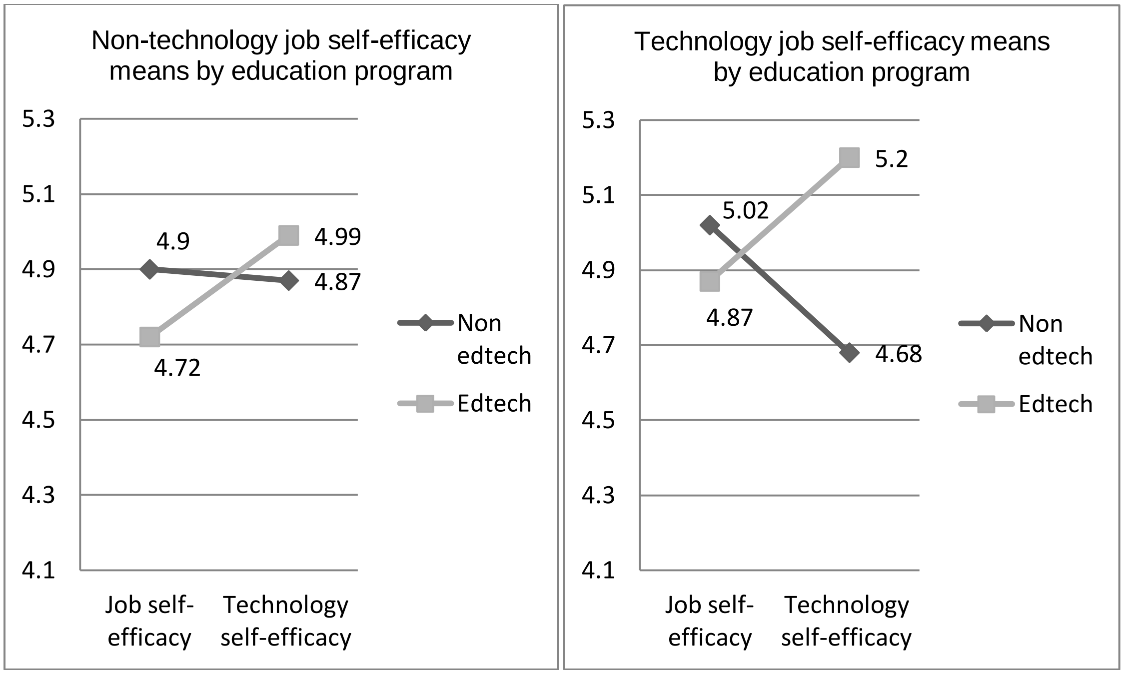

Figure 5-11. Non-technology and technology job self-efficacy means by education program.

5.5.3.2 Job type and age.

Having a non-technology job has a statistically significant effect on self-efficacy by age group. *Figure 5-12* shows the 20 – 34 and 35 – 44 age groups as having higher technology self-efficacy compared to job self-efficacy, which is unexpected. Also unexpected is the large decrease for those over 45 in technology jobs. This may be an effect of time since graduating: the 45 and over group has a mean time since graduation of 14.9 years (*SD* = 11.6), compared to 8.4 years (*SD* = 6.04) for those 35-44, and 4.5 years (*SD* = 2.65) for those 20-34.

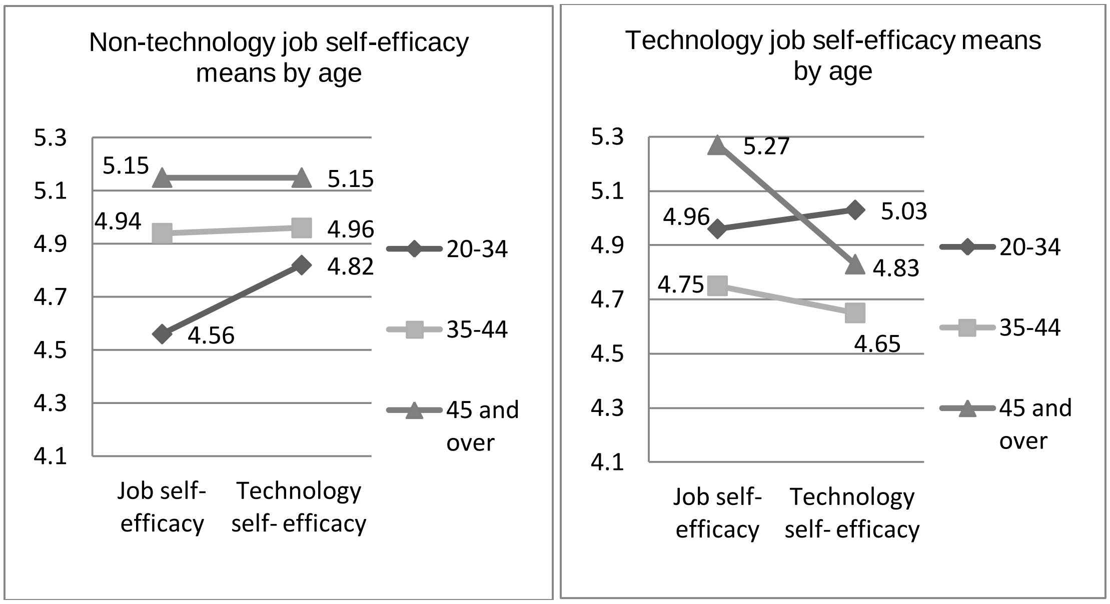

Figure 5-12. Non-technology and technology job self-efficacy means by age.

Having a non-technology job influences locus of control by age. *Figure 5-13* shows those over 45 have lower technology locus of control compared to job locus of control. In contrast to other age results, 20 to 34 year-olds in technology jobs have lower technology locus of control compared to job locus of control.

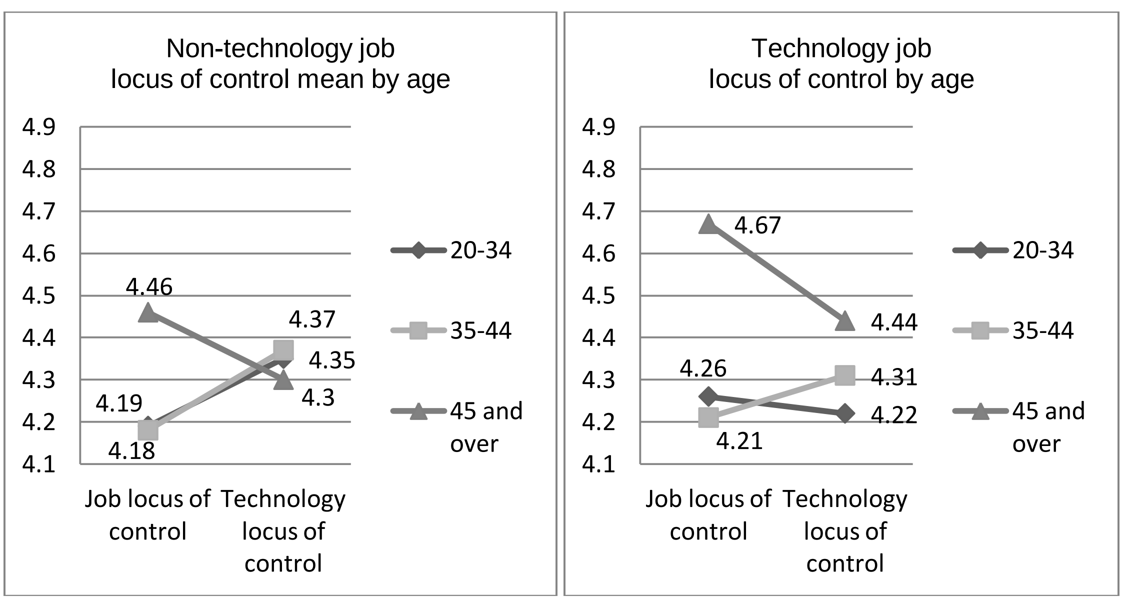

Figure 5-13. Non-technology and technology job locus of control means by age.

5.6 Theory of Planned Behavior

The second approach to the research questions was to use the theory of planned behavior (TPB) to test for technology self-perceptions in a work environment. The hypotheses are the TPB subscales, attitude, subjective norm, and perceived behavioral control will predict skill updating. In addition, the variables used in the first part of the study--gender, education, job type, age, and education level--will influence intentions to update.

The listwise correlations in Table 5-16 show negative correlations between the two perceived behavioral control variables (pbc), pbc efficacy and pbc control, and subjective norm (sn) work.

Table 5-16 *Job domain TPB subscale correlations*

	M	*SD*	1	2	3	4	5	6
1. Attitude	5.13	.582	--	.047	.211***	.272***	.362***	.122
2. sn work	3.30	1.10		--	.411***	-.267***	-.204**	.230**
3. sn family	4.83	1.06			--	-.092	-.109	.409***
4. pbc efficacy	4.11	.926				--	.458**	-.032
5. pbc control	4.44	1.04					--	-.050
6. Intent	4.04	1.14						--

* $p < .05$, ** $p < .01$, *** $p < .001$

$N = 169$

Table 5-17 shows the technology domain list-wise correlations are similar to the job domain, but there are negative correlations between pbc efficacy and both subjective norm variables, sn work and sn family.

Table 5-17 *Technology domain TPB subscale correlations*

	M	*SD*	1	2	3	4	5	6
1. Attitude	4.82	.745	--	.061	.325**	.276***	.443***	.154*
2. sn work	3.07	1.08		--	.434***	-.327***	-.041	.224**
3. sn family	4.37	1.21			--	-.241**	.011	.235**
4. pbc efficacy	4.12	.968				--	.443**	-.155*
5. pbc control	4.29	1.01					--	-.104
6. Intent	3.48	.995						--

* $p < .05$, ** $p < .01$, *** $p < .001$

$N = 170$

Single-step multiple regressions were used to regress intentions to update skills onto the moderating (gender, education program, job type, age, and education level) and TPB variables. Table 5-18 shows the predictors account for less than 18% of the variance in intention to update job skills, and less than 13% of the variance in updating technology skills. Of the TPB subscales, only attitude and subjective norm family are statistically significant. Subjective norm family has a positive influence on intention to update job skills, while attitude has a positive influence on updating technology skills.

The other three statistically significant predictors negatively influence intentions to update. Having a technology education negatively influences intentions to update job and technology skills. Age is also a negative predictor of intention to update technology skills: those in older age groups are less likely to update their technology skills.

Table 5-18 *Theory of planned behavior regressions*

	Job intention to update	Technology intention to update
Variables	β	β
Gender	.052	-.071
Tech ed	-.168*	-.180*
Tech job	-.147	-.136
Age	-.136	-.208**
Ed level	.042	-.076
Attitude	.058	.229**
sn work	.072	.115
sn family	.407***	.096
pbc efficacy	.020	-.105
pbc control	.015	-.111
R^2	.172	.128
F	4.48***	3.48***
df	10,168	10,169

* $p < .05$, ** $p < .01$, *** $p < .001$

5.7 Mastery Experiences

The last approach to the research questions was to test for the influence of mastery experiences, hypothesizing that updating skills and job experience would positively influence self-efficacy and locus of control. The variables representing mastery experiences are updating skills in the previous year, years in the current job, and years since graduation.

Table 5-19 *Job domain - means, standard deviation, correlations*

	M	*SD*	1	2	3	4	5
1. Job updating behavior	4.07	1.38	--	.058	.098	-.108	-.183*
2. Job self-efficacy	4.89	.716		--	.417***	-.007	.173*
3. Job loc	4.28	.646			--	-.103	.195*
4. Years in job	4.83	4.73				--	-.038
5. Years grad	7.81	7.60					--

* $p < .05$, ** $p < .01$, *** $p < .001$

$N = 170$

The listwise Pearson correlations in Table 5-19 show a negative effect of experience as represented by time. Years since graduation is correlated negatively with job self-efficacy. Although not statistically significant, years in a job has a negative relationship with updating job skills, job self-efficacy, and job locus of control. Table 5-20 shows technology locus of control positively correlates with updating technology skills. Similar to the job domain, years since graduation is negatively correlated with updating technology skills, but is correlated positively with self-efficacy and locus of control.

Table 5-20 *Technology domain - means, standard deviation, correlations*

	M	*SD*	1	2	3	4	5
1. Tech updating behavior	3.36	1.20	--	.061	.230**	-.137*	-.206**
2. Tech self-efficacy	4.88	.849		--	.355**	.059	.060
3. Tech locus of control	4.31	.542			--	-.067	.076
4. Years in job	4.88	4.77				--	-.044
5. Years grad	7.75	7.56					--

* $p < .05$, ** $p < .01$, *** $p < .001$

$N = 166$

The influence of mastery experiences was tested using single-step multiple regressions: self-efficacy and locus of control regressed onto updating behavior, moderating (gender, education program, job type, age, and education level), and experience (years in job and years since graduation) variables. Table 5-21 shows the regressions explain little of the variance. Similar to the domain differences reported for the repeated measures, gender is a statistically significant predictor of technology self-efficacy. This means, on average, being female leads to lower technology self-efficacy. Age, on the other hand, is positively related to job self-efficacy. Technology locus of control is positively influenced by having updated technology skills in the previous year. This suggests mastery experiences have a positive effect on technology locus of control, but do not influence self-efficacy.

Table 5-21 *Mastery experience regressions*

	Self-efficacy		Locus of control	
	Job domain	Technology domain	Job domain	Technology domain
Variables	β	β	β	β
Updating behavior	.103	.094	.147	.255**
Gender	-.120	-.239**	-.113	-.140
Tech ed	-.078	.209	-.035	-.031
Tech job	.083	.025	.036	-.050
Age	-.144	-.030	-.182	-.052
Ed level	.229*	.051	.183	.112
Years in job	.058	.096	-.043	-.004
Years grad	-.025	.130	.036	.043
R^2	.056	.088	.060	.049
F	2.25*	3.03**	2.35*	2.06*
df	8, 169	8, 169	10,169	10,169

* $p < .05$, ** $p < .01$, *** $p < .001$

$N = 170$

6: Discussion

The three approaches to the research questions asked in this study had mixed success in measuring the effects of gender, education, and job type on self-efficacy and locus of control in job and technology domains. The first model, using the ANOVAs and repeated measures, shows differences between job and technology self-efficacy and locus of control. As expected, technology self-perceptions are influenced by gender: men report higher levels of self-efficacy and locus of control compared to women, and women have lower technology self-efficacy compared to job self-efficacy. In addition, the women-only tests suggest technology education has a positive influence on technology self-efficacy. The second model, the theory of planned behavior, did not adequately measure skills updating intentions. In addition, the third model shows updating job and technology skills has no effect on self-efficacy or locus of control. The lack of statistically significant repeated regressions and correlations leave some of the hypotheses unanswered, but do provide interesting questions for future research. In particular, the regressions for the theory of planned behavior raise concerns about attitudes toward continuous learning in work environments.

The discussion expands on key findings and situates the results into current knowledge of gender and technology issues. Although many of the hypotheses are supported, and there are statistically significant differences between job and technology self-perceptions. These differences are not predictive and do not explain causation, Therefore, the discussion focuses on plausible alternatives based on previous studies. The chapter concludes with limitations of the study and suggestions for future research.

6.1 Gender Differences

The most notable gender difference is men have higher technology self-efficacy than job self-efficacy, while women have lower technology self-efficacy compared to job self-efficacy. Although prior research shows overconfidence in men does not influence general self-efficacy or locus of control (Hensley, 1977), men will overestimate in specific contexts (Bennett, 1997; Beyer, 1990). The men in this study have higher self-efficacy in the technology domain compared to the job domain. This tendency for higher scores in technology domains is similar to higher self-perceptions in other research measuring “masculine” tasks (Beyer, 2008). Prior research shows expertise in general is perceived as “masculine” (Bailyn, 2003; Clegg, 2008) and technology in particular is seen as a male domain (Johnson, 2009).

Higher self-evaluations are also consistent with prior research finding women give lower self-ratings of performance compared to men’s self-ratings. Beyer found “women tend either to be accurate or to underestimate” (Beyer, 1990, p. 967) when self-evaluating performance on specific tasks. Johnson’s (2009) findings support this tendency for women to downplay their expertise; women tend to be “hesitant about positioning themselves as [technology] experts in the public sphere” (Johnson, 2009, p. 379).

Although it has been suggested women may underestimate to appear modest, this “explanation cannot account for the fact that women's underestimation was a task-specific—rather than generalized—phenomenon, present only in those tasks for which they had initially low confidence (masculine and unfamiliar neutral tasks)” (Beyer, 1990, p. 967). Self-ratings for women in the current study are similar to those of prior research, except for women with a technology education. As shown in *Figure 6-1*, men and women with a technology education have similar self-efficacy means.

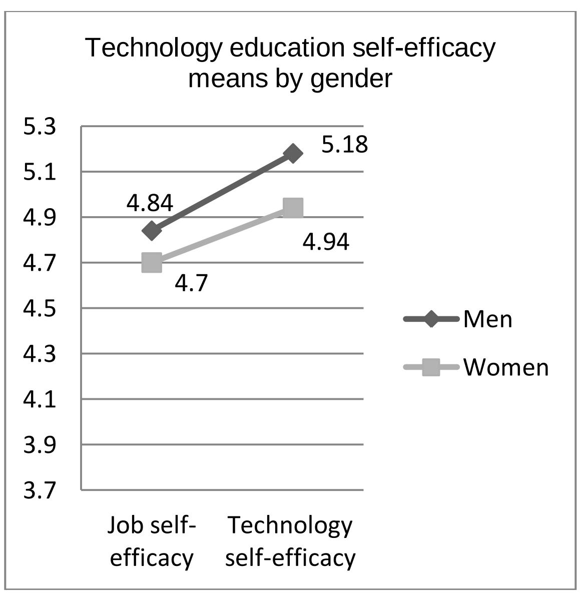

Figure 6-1. Self-efficacy means of men and women with technology education.

Prior studies by Rosenberg et al. (1995) and Ross and Broh (2000) have also reported education as having a positive influence on self-efficacy. Research suggests academic achievement has a positive influence on self-efficacy: “high self-efficacy is likely to be the result, rather than the cause, of academic success” (Stupinsky, 2007, p. 306). Therefore, it is likely technology education also had a positive influence the technology self-efficacy of the female participants in this study.

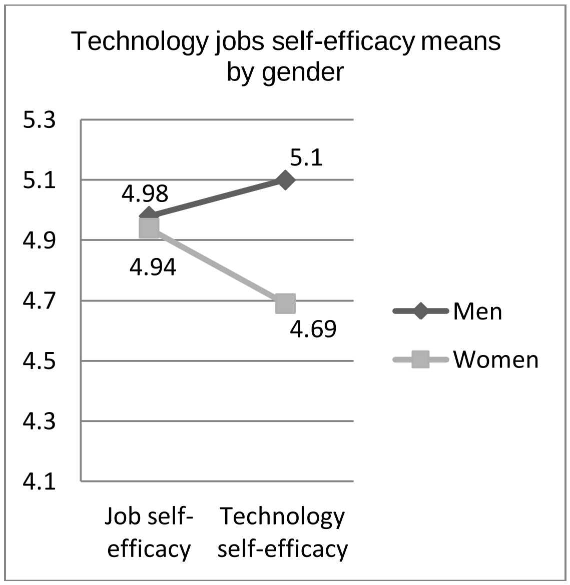

Figure 6-2. Self-efficacy means of men and women with technology jobs.

Figure 6-2 shows an unexpected effect: Women in technology jobs have lower technology self-efficacy compared to women in non-technology jobs. Even though women in technology jobs are as likely to be familiar with technology as their male counterparts, having a technology job is associated with the same gender differences as having a non-technology job or a non-technology education.

If previous studies’ claims that exposure to technology increases self-efficacy (Igbaria & Iivari, 1995; Varma, 2009; van Langen & Dekkers, 2005) are correct, confounding factors may be the reason technology education, but not technology jobs, positively influences women’s self-efficacy. The first possible confound is women from technology education programs may rate themselves higher because they believe they should. Women may provide higher self-ratings because of their beliefs about their education as opposed to their feelings of competency with technology.

The second possibility is aspects of technology jobs negatively influence self-efficacy for women. For example, women in technology jobs may not form the same levels of self-efficacy compared to men even though women have similar skills and perform similar job tasks. Research suggests self-efficacy is not dependent on job performance: "Contrary to the view that perceived self-efficacy simply reflects past performances, the same performance attainment gave rise to widely different levels of perceived self-efficacy" (Bandura & Locke, 2003, p. 90). Instead, research suggests these differences in self-efficacy may be the influence of gender beliefs (Matsui, 1994). For example, the difficulties women face in a male-dominated technology culture may negatively affect how women view their self-efficacy in relation to technology.

A technology job may also negatively influence self-efficacy because of the type of experiences men and women use to form self-efficacy beliefs. Zeldin et al. (2008) found "mastery experience was the primary source of the men's self-efficacy beliefs … [but] for women, social persuasions and vicarious experiences were the primary sources of self-efficacy beliefs" (p. 1036). Specifically, women "used their relationships with family members, teachers, peers, and supervisors as identity forming and enhancing. They believed they were competent in underrepresented domains through the beliefs that others shared with them about their capabilities" (p. 1053). Britner and Pajares (2006) also found mastery experience was less important for girls: "girls' higher levels of success in science did not result in their reporting more mastery experiences (higher in boys) or in the development of stronger science self-efficacy (equal in boys and girls) or science self-concept (higher in boys)" (p. 494).

6.1.1 Women-only.

The women-only comparison of technology and non-technology education shows the same positive influence of technology education as the male-female comparisons.

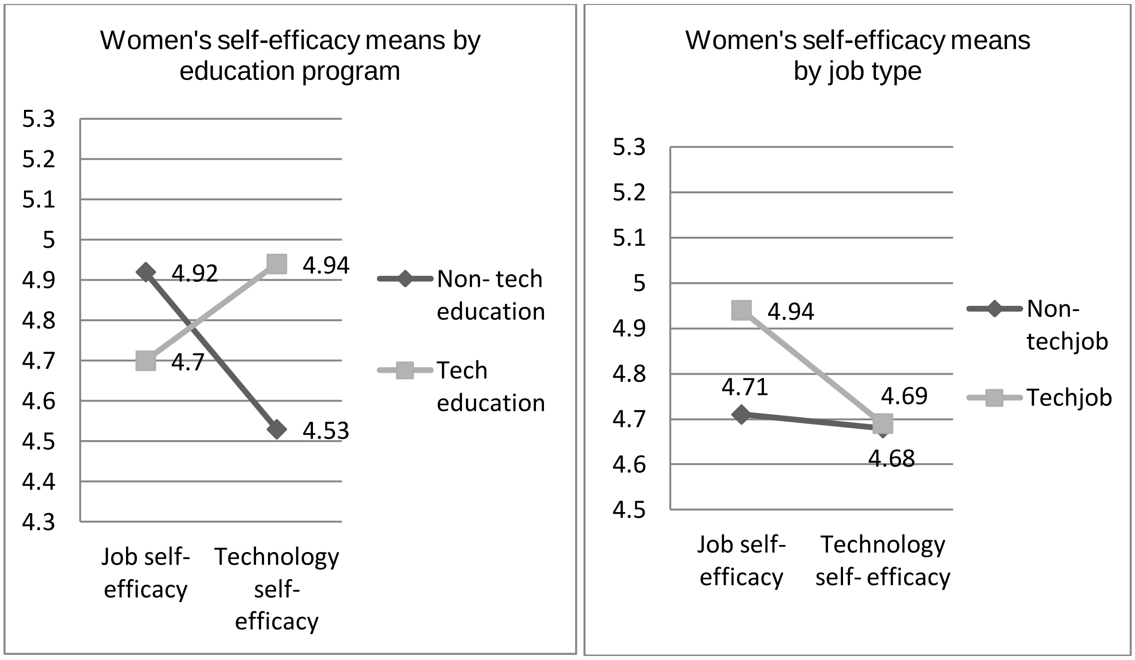

Figure 6-3. Women's self-efficacy means by education program and job type.

Figure 6-3 shows having a technology job does not have a similar positive influence on a woman's self-efficacy as a technology education. As discussed above, prior research suggests exposure to technology has a positive effect on self-efficacy (Igbaria & Iivari, 1995; Varma, 2009; van Langen & Dekkers, 2005). Therefore, lower technology self-efficacy for women in technology jobs is unexpected. Although the mean (M = 4.69, SD = 1.01) is similar to women in non-technology jobs (M = 4.68, SD = .725), women in technology jobs have lower technology self-efficacy than job self-efficacy.

The cause of this discrepancy may be similar to research that finds women are more self-critical of their academic abilities (Luscombe & Riley, 2001). In a job situation, women may feel they are better at other aspects of their job (e.g., managing, coordinating, supervising, etc.) than they are about the technology aspects. Women may also be more sensitive to how they compare to men in similar positions. For example, women may have stronger skill sets in some areas, such as soft-skills (Moore et al., 2008); while men typically assert themselves more with technology. Women in technology jobs may be more critical of their technology skills, and therefore, self-report lower technology self-efficacy.

In addition, the results support prior research that suggest women are not influenced as much by past performance, but may feel a greater influence from industry culture, role models, and other social persuasions. For example, women explaining why they chose a mathematics-related career “recalled vicarious experiences and verbal persuasions to a greater extent than they did performance attainments” (Zeldin & Pajares, 2000, p. 227), but men focused mainly on performance. Researchers suggest, “vicarious experiences and social persuasions might be stronger for women in male-dominated domains than was suggested by previous research” (Zeldin et al., 2008, p. 1039).

As discussed previously, experience does not necessarily produce higher self-efficacy (Bandura & Locke, 2003), and self-evaluations may be “shaped by gender stereotypes” (Wilson, Kickul, & Marlino, 2007, p. 397). Because the work environment is socially constructed, women who choose male-dominated career paths may have lower self-efficacy due to the work environment even if they have comparable performance. One study found women who chose to do an MBA have lower self-efficacy compared to men: “Even at these top-ranked schools, women who qualify for admission still feel less confident than their male counterparts, at least in some domains’ (Wilson et al., 2007, p. 397).

The self-critical tendency of women in assessing their own abilities is seen in the differences by education level. *Figure 6-4* shows women with graduate degrees have the lowest pbc efficacy scores compared to women with undergraduate or some post-secondary education. The pbc efficacy subscale reflects feelings of self-efficacy specifically related to updating skills. Because women have a tendency to be more self-critical of performance (Luscombe & Riley, 2001), lower pbc efficacy suggests women with graduate education have higher expectations.

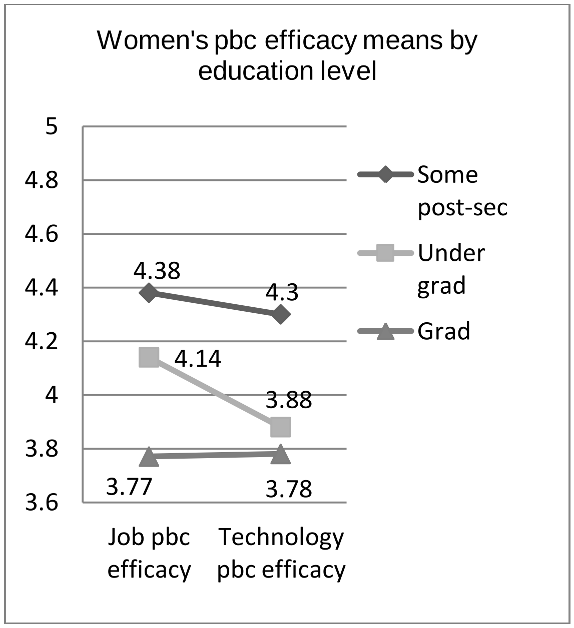

Figure 6-4. Women's pbc efficacy means by education level.

Finally, the positive effects of education may be due to the perceived legitimacy of an externally validated qualification. Graduating from a technology-focused program may be important for women because a specific qualification may lessen the need to be modest about technology skills (Luscombe & Riley, 2001). In other words, women may feel more confident and more willing to acknowledge publicly their own expertise if there is external confirmation of skills as opposed to self-ratings only.

To summarize the women-only sample, lower self-efficacy and locus of control for women is consistent with prior studies. Even though research reports no cognitive ability differences between genders for science, technology, engineering, and math (STEM) subjects (Abele & Spurk, 2009; Else-Quest et al., 2010; Hyde & Kling, 2001; Hyde & Linn, 2006), women possessing lower technology self-efficacy is consistent with women providing lower performance self-ratings in masculine domains (Beyer, 1990). Women do not seem to acknowledge skills publicly or are willing to say they are "experts" (Johnson, 2009). It is also an interesting paradox that women with more experience, such as a graduate education, have the lowest perceived behavioral efficacy scores. It appears cultural factors related to gendered behavior have influenced the women in this study. Only women from technology education programs appear to break from gender expectations.

6.1.2 Men-only.

There are only two scales where men have lower means in the technology domain compared to the job domain: technology subjective norms work and technology perceived behavioral control.

Figure 6-5 shows men's subjective norm (sn) work mean is lower in the technology domain. It was expected that men would be less influenced than women by comparison others (Kemmelmeier & Oyserman, 2001), but it was not expected that subjective norms in the technology domain would be less influential than the job domain.

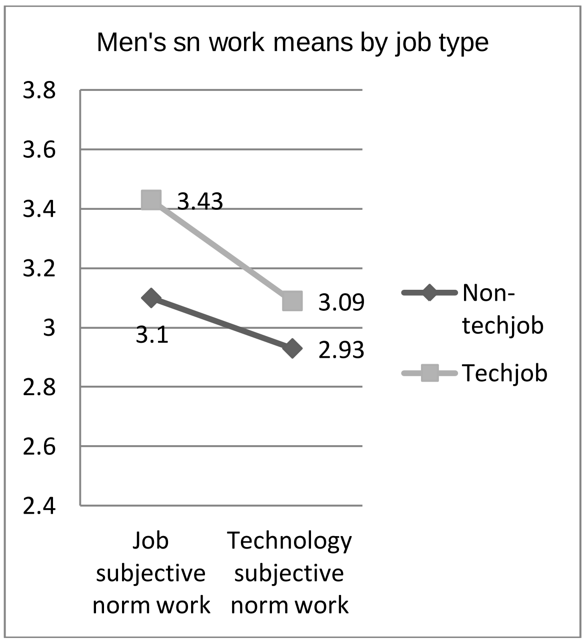

Figure 6-5. Men's subjective norm work means by job type.

Figure 6-6 shows men's perceived control over updating technology skills is lower compared to updating job skills. This perception by men may be an indication of a lack of resources.

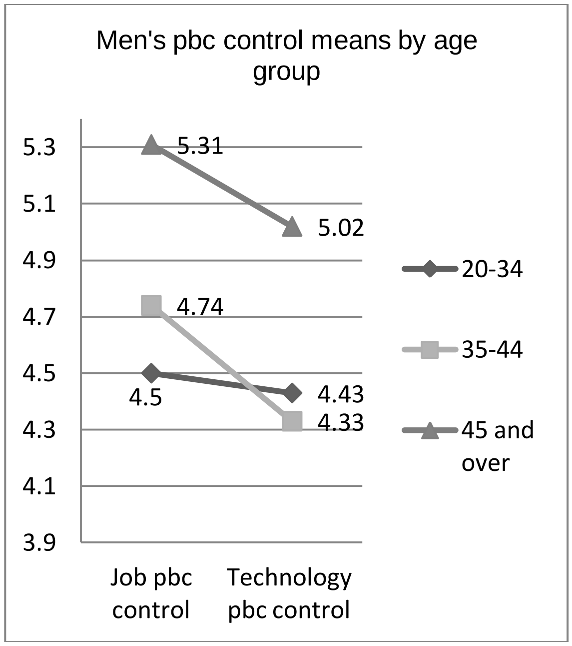

Figure 6-6. Men's pbc control means by age.

The perceived behavioral control (pbc) questions split into two groups: self-efficacy and control. The control factor measured belief in ability to complete a specific behavior (Notani, 1998) that is or is not within the person's control. A technology pbc control mean lower compared to the job pbc control mean suggests men believe updating technology skills is not entirely within their control. This may indicate an underlying desire to update technology skills, but feelings of not having enough funds or organizational support to do so. The desire to update would be consistent with prior research showing men to have greater internal locus of control for achievement (Strickland & Haley, 1980) and the tendency to select higher goals (Levy & Baumgardner, 1991, p. 535). Lower scores may reflect a discrepancy between what men want to accomplish and the resources believed to be available.

6.2 Job Type and Education

The positive influence technology education has on women is the same for those with technology and non-technology jobs.

Figure 6-7 shows people in technology and non-technology jobs have higher self-efficacy after having a technology education. As expected, people without a technology education have lower technology self-efficacy compared to job self-efficacy. Yet, having a technology job does not mitigate the non-technology education effect. In other words, having a technology job does not create the same positive self-perceptions of technology self-efficacy as having a technology education.

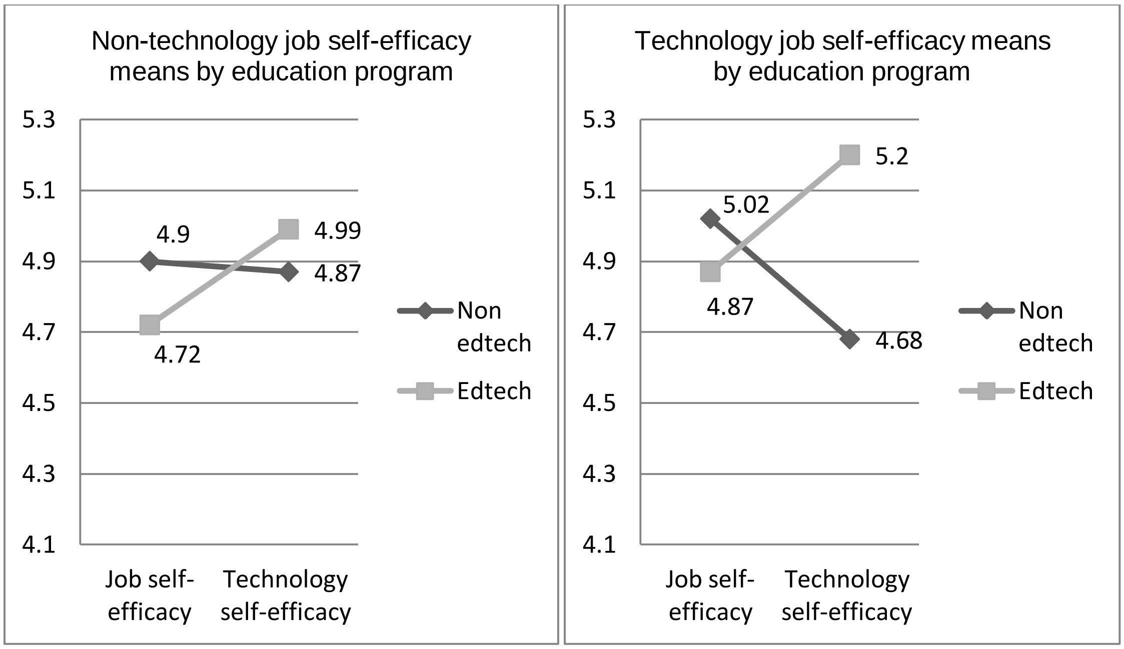

Figure 6-7. Non-technology and technology job self-efficacy means by education program.

Even though those in technology jobs have been in their current positions over eight years on average (M = 8.5, SD = 8.08), it appears this experience does not lead to higher technology self-evaluation. Given experience working with technology does not appear to influence self-efficacy positively, changes to self-perceptions may need direct experience of control (Bandura, 1977). For example, technology adoption rates only increase "through changes in perceived efficacy" (Hill et al., 1987, p. 313). Similarly, the current study shows technology experience, such as having a technology job, does not appear to influence self-efficacy beliefs. Job experience will require completing tasks using technology, but may not require the same level of cognitive understanding required of a technology education. Therefore, technology education may lead to higher self-efficacy because of perceived changes in mastery or control.

6.3 Age

The age effects provide some support for the hypothesis that younger people have higher locus of control with technology (Slowik, 2009) compared to their job locus of control. In contrast to younger groups, *Figure 6-8* shows women have lower locus of control in the technology domain compared to the job domain for the 45 and over age group. In addition, people from non-technology education programs have lower technology locus of control. This means job locus of control is perceived as internal and technology locus of control as external.

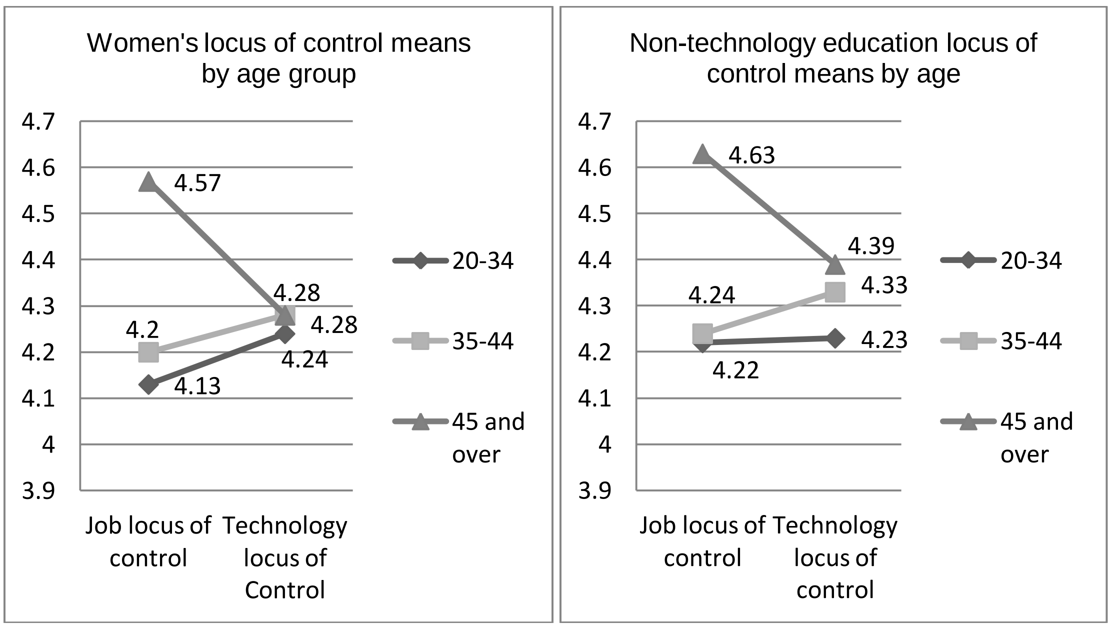

Figure 6-8. Women's and non-technology education locus of control by age.

Age is an anomaly as none of the other variables (gender, education program, job type) influence locus of control. This difference may be because of perceived advantages younger workers have with technology. Research also suggests older workers finding it difficult to prolong careers in IT due to "wider societal norm of early retirement [converging] with the high valuation of youth in information technology" (Brooke, 2009, p. 247). Therefore, older workers may perceive control in a technology context much differently than younger workers.

6.4 Skill Updating in the Workplace

The regressions for the theory of planned behavior measure the intention to update job and technology skills. Compared to published TPB research (Elliott et al., 2007; Ramayah et al., 2009; Taylor & Todd, 1995), the variance of less than 18% is low. The description of updating skills may be too vague to measure adequately the variance in intention and behavior.

The results of the theory of planned behavior explain very little: very few coefficients are statistically significant, and the variance explained is small. Compared to published studies with explained variances over 50%, the results of this study are not strong. Two likely reasons for the low theory of planned behavior results are issues with the scale and the perception of the behavior. Despite collegial input in the construction phase, the questions about upgrading skills may be too general to capture intention. Specifically, the definition of skill updating may be too broad.

The intention to update technology skills variance explained in this study is comparable to the 34% variance in technology use found by Taylor and Todd (1995).The lack of variance explained in this study, and Taylor and Todd's, raises questions about self-perceptions confounding beliefs about behavior with technology. A common issue with TPB scale construction is the need for the participants to have control over the behavior tested. The Taylor and Todd study focused on computing resources used by students. Students likely required computing resources to complete course assignments, and the low variance explained for updating skills may be due to the participants feeling a lack of choice. In this study, there may be a belief that skill development is part of the employment relationship and not the responsibility of the individual. If this is the case, there is a concern regarding perceptions of responsibility and control over continuous learning.

6.5 Influence of Mastery Experiences

As previously discussed, having a technology job does not positively influence technology self-efficacy, and women are not positively influenced by performance experiences. Similarly, the regressions specifically testing for past updating behavior appear to have little influence on current self-efficacy and locus of control. Only updating skills resulted in a positive influence on technology locus of control. This may be due to added resources or job duties as a result of completing technology skills training. An unexpected outcome is the number of years since graduating has a negative correlation with intentions to update skills and with updating behavior. People in these positions may not engage in skill development at the same pace as those early in their careers.

The lack of evidence to support mastery experiences positively influencing technology self-efficacy suggests specific skills and exposure are not as important as the overall effects of education. Similar to the social influences women reported as important to their beliefs about technology competence (Zeldin et al., 2008), continuous education may not influence self-efficacy unless it involves more than mastery experiences.

6.6 Assessment of the self-efficacy and locus of control scales

The validity of the outcomes discussed is dependent on effectively capturing differences between self-efficacy and locus of control scales, and differences between job and technology domains. Although some studies find correlations between self-efficacy and locus of control, suggesting they are higher order global self-perceptions (Judge, 2002), the correlations for self-efficacy and locus of control ($r(175) = .437$, $p < .001$ for job domain and $r(175) = .372$, $p < .001$ for technology domain) are not high, suggesting the scales are measuring different aspects of self-perception. Prior studies explain the difference between the two scales. For example,

> The relationship between self-efficacy and outcome expectations is not always consistent, however. A student reasonably confident in her mathematics capabilities, for example, may choose not to take an advanced statistics course because the teacher's grading curve convinces her that earning a top grade is unlikely. (Usher & Pajares, 2009, p. 89)

Comparing the same scale across job and technology domains, there is a strong correlation between job and technology locus of control scales ($r(175) = .691$, $p < .001$) and a moderate correlation between job and technology self-efficacy scales ($r(175) = .517$, $p < .001$). Previous locus of control scales, such as work locus of control (Spector, 1988) and sales locus of control (Chung & Ding, 2002), were successful in measuring locus of control in specific contexts. In contrast, the high correlation between locus of control scales in this study suggests locus of control is stable across job and technology domains. The self-efficacy scale, however, captured differences across gender and education program, and has a lower correlation between domains, suggesting job and technology domains influence self-efficacy.

6.7 Limitations

The limitations of this study include limited internal validity, constructs, self-reporting, survey instrument, non-response bias, social desirability, sample characteristics and size, and the dichotomous treatment of gender.

6.7.1 Internal validity.

Two main issues with internal validity are the perception of technology and the inability to explain causality of the education effects. The scales had minimal changes between the job and technology versions, but changing the word "job" to "technology" may capture more than perceptions of technology within a job context. For example, all previous experiences and beliefs, including social and cultural biases, may contribute to the differences in gender results.

The repeated measures show differences between the groups, but there is no causal connection for the repeated measure results. Although having a technology education has a positive influence on self-efficacy, the reason for this influence is unclear. Increased self-efficacy could be due to content in the program, or it could be due to the effects of technology culture in the work environment. For example, the qualifications of a technology education may be more valued in certain work environments. In other words, the work culture is the influencing the perceived value of the degree, as opposed the value of the skills learned.

In addition, the modifications to the original scales were necessary to measure the changes between job and technology domain self-perceptions. Only the work locus of control scale (Spector, 1988) remained in the original format. Therefore, the absolute values of the scales are not comparable to studies using the original versions, and validity is difficult to assess.

6.7.2 Constructs.

The TPB section of the survey was unable to capture intentions to update skills. Updating may not be within the control of the individual, but considered under the control of the organization. Because the theory of planned behavior is more predictive when looking at behaviors internal to the individual, such as dieting and drinking alcohol (Notani, 1998), a behavior that is partly outside of individual control might not be measured successfully.

In addition to issues with the definition of behavior, this study did not assess performance or abilities. It may be this sample of women has lower performance compared to men and lower technology self-efficacy is a warranted conclusion. This is unlikely, however, given research shows women to have comparable abilities in STEM subjects (e.g., Else-Quest et al., 2010; Hyde, 2006; Hyde & Linn, 2006). It is more likely the results reflect lower self-evaluations by women, which is similar to past research (Beyer, 2008).

6.7.3 Self-reporting.

A limitation of self-reporting is over-estimates due to feelings of inferiority. For example:

> Underlying this concern is the suspicion that many people who score high on measures of trait self-esteem, and even people who seem to think highly of themselves in their interactions with others, may inwardly harbor serious doubts about their self-worth. These individuals, it has been suggested, are defending against their inner feelings of worthlessness and are not genuinely high in self-esteem. (Crocker & Wolfe, 2001, p. 296)

If this type of over-estimation exists, women’s lower scores, as compared to men’s, may be reflective of a willingness to express doubts: “feminine subject positions may allow girls and women to express their insecurities more easily than boys and men” (Phipps, 2007, p. 775). This explanation, however, only applies in general to lower scores on self-perception scales, and does not account for higher technology self-efficacy for women with technology education.

6.7.4 Survey instrument.

Possible biases caused by the structure of the survey include learning effects, inconsistency, non-response biases, order effects, and covariation.

There is a possibility of a learning effect because the questions for job and technology were almost identical. The learning effect is also a limit to within-subject designs. There are carryover effects, especially “when repeated stimuli are identical or highly similar” (Keren & Raaijmakers, 1988, p. 237). In the case of this study, an item on corresponding job and technology scales were as similar as possible. Therefore, subjects were able to make a choice to answer similarly or purposely change their response.

Because of the learning effect, there could also be a consistency motif: when respondents to “try to maintain consistency in their responses to similar questions or to organize information in consistent ways” (Podsakoff et al., 2003, p. 881). The diverging scores for job and technology are evidence this is not the case for this study. Respondents were aware of the similarity of the scales and were able to make conscious decisions to maintain consistency or not.

Scale formats and anchors are similar throughout the survey. This consistency allowed comparisons between scales without having to adjust the results, but may have created covariation due to “consistency in the scale properties rather than the content of the items” (Podsakoff et al., 2003, p. 884). The outcomes of the repeated measures suggest any covariation was minimal. In addition, the survey included negatively coded items that required “respondents to engage in more controlled, as opposed to automatic, cognitive processing” (Podsakoff et al., 2003, p. 884).

6.7.5 Non-response bias.

There are several possible non-response biases to consider given the structure of the survey and characteristics of the sample. Fatigue, due to the length of the survey, might cause some dropout. In addition, people who saw the similarities of the job and technology versions may have chosen to quit the survey thinking the second set of responses were the first set repeated.

Active non-respondents, “those who overtly choose not to respond to a survey” (Rogelberg & Stanton, 2007, p. 444), are a concern for this sample. Non-respondents with negative feelings might be less likely to complete the survey, and they would perceive education differently. For example, students with negative feelings about their education programs may feel the opposite of social desirability.

6.7.6 Social desirability and self-selection.

Sampling from those who have chosen to take a technology education could cause issues with social desirability and self-selection.

Social desirability, “the tendency on the part of individuals to present themselves in a favorable light, regardless of their true feelings about an issue or topic” (Podsakoff et al., 2003, p. 881), is an issue in any research collecting self-reported data. Social desirability may influence relationships by moderating or suppressing variables (Ganster, Hennessey, & Luthans, 1983). In this study, questions for job and technology domains are identified clearly and respondents made aware two sets of questions would be compared. Given the nature of the study was clear, respondents may enlarge effects to demonstrate their concerns. For example, women in technology jobs may have a desire to express concerns about the culture they work in, thereby strengthening the effects seen between gender and technology self-efficacy.

The School of Interactive Arts and Technology (SIAT) respondents may have a social desirability response bias because the researcher was identified as belonging to their school. These students were in a program designed not only to develop technology skills, but to also have them challenge ideas about technology use and influence on society. These students may adjust their responses in an effort to provide answers they believe would be desirable to people from their education program.

Secondly, a self-selection bias may exist in the sample due to the women’s self-selecting into technology education programs. Women in a technology education may choose this type if education specifically because they have positive technology self-perceptions.

6.7.7 Samples.

Sample size and uneven distribution across variables is a weakness of the study. The sample used for this research violates assumptions of normality and equality of means due to size differences of categories, and is not large enough to assess how job type and technology education interact. This is also the case for assessing effects of age and education levels.

Secondly, the SIAT respondents have similar characteristics, but the participants recruited by the SIAT respondents may not. Although it is likely the SIAT group recruited participants from amongst their friends and colleagues, it is a limitation to know little about the characteristics of this group.

Another unknown about the sample is the survey only asked for the most recent degree obtained. It is possible some of the participants have non-technology master's degrees (e.g. MBA or MA), but instead hold undergrad degrees from computer science or engineering, or vice versa. A complete education history would clarify the characteristics of the sample and improve the understanding of the influence of education.

6.7.8 Gender dichotomies.

The dichotomous gender variable may over-emphasize differences: "We argue that this style of statistical analysis forces gender into polarised masculine and feminine categories therefore emphasising differences between the two" (Adam et al., 2004, p. 229). Gender identities "require negotiation and construction," and there is a "much more complex picture of gender subjectivities within science than is obtained from the straightforward mapping of masculinity and femininity onto science/non-science or physical science/biological science binaries" (Hughes, 2001, p. 287). This current study mapped gender onto technology/non-technology educations, and technology/non-technology jobs. Therefore, the limits of quantitative gender research apply: the categories are essentialist and fixed (Crump et al., 2007) and based on culturally constructed binaries (Johnson, 2009). The gender results compared men to women, and because the male scores were higher, male scores were deemed more desirable.

6.7.9 Age and locus of control.

The results for age and locus of control may be confounded by the types of jobs older employees have. Older worker may be in more supervisory position and, therefore, feel they have more control in their work. Also, many older employees are in supervisory positions requiring a different perspective of technology. For example, managers would have to assess the technology needs of their department.

6.8 Future Research

Future research needs to address the limitations outlined above and investigate the influence of education on self-efficacy. This study contributes to knowledge of gender differences in self-efficacy. This study was not able to isolate outcomes of education by pre- and post-testing.

6.8.1 Additional samples.

There is a need to test multiple samples. Expanding the results to include samples from other education programs and industries will increase generalizability (Rogelberg & Stanton, 2007, p. 333) and clarify the effects of education. Future studies with a large enough sample of women with technology education and technology jobs will permit statistical testing without violations. For example, a larger sample will help determine organizational or industry-moderating variables, such as organizational culture in technology industries having negative effects on women. Self-efficacy results for women in technology jobs may be the effect of the negative environment and not related to education. Controlling for organizational culture will address this issue. In addition, controlling for gender differences in job tasks may isolate influences of performance on technology self-efficacy and any self-reporting bias by women.

A second sample to consider is mixed-skill technology jobs. Mixed-skill jobs have a skill set separate from technology, but have a high degree of technology integration (Roan & Whitehouse, 2007). These types of jobs may have more equal gender representation due to increasing numbers of women enrolling in their corresponding education programs. As discussed in chapter 2, the percentage of women graduating from educational technology and media arts programs has increased compared to computer science (U.S. Department of Education, 2007).

Finally, samples from other cultures will provide different social and cultural perspectives of technology. For example, “American women designated IT as a masculine field, South Asian women did not consider IT careers to be masculine” (Adya, 2008, p. 614).

6.8.2 Instrument and methods.

The modification to Rosenberg’s self-esteem scale measured self-efficacy effectively; however, the data is limited because it is self-reported. Future studies should focus on domain specific self-efficacy supplemented by task specific measurements to address the limitation of perceived versus actual ability. For example, performance data or a supervisory ranking to compare to self-evaluations would confirm if subjects are under or over estimating self-efficacy.

Future research should also investigate the relationship between self-efficacy and expectations. Self-efficacy may not be the result of education or industry, but preconceived ideas individuals already possess. A study designed to measure pre- and post-education efficacy would be necessary to confirm hypotheses about the effectiveness of educational programs to influence beliefs. In addition, samples for educational programs that specifically incorporate technology, but are outside of traditional STEM, will add to the understanding of women's interests in technology.

6.8.3 Qualitative follow-up study.

The survey instrument does not explain why men and women have different self-efficacy scores, nor if there are social desirability limitations. In-depth interviews or focus groups would provide more understanding of differences between genders, and differences between women from different education programs.

One aspect current research has not assessed is the cultural expectation for men to be more competent with technology compared to women. Approaching research from a reverse perspective may provide insights into gender differences. Women may have a more realistic view; and it is men, influenced by socio-cultural expectations, who over-inflate their expectations with technology. Using a male deficit model would reframe research questions to investigate over-estimation by men. For example, researchers could ask men if they are inflating in an effort to maintain expectations of being good with technology. Men may expect to do well with technology and, in general, have attitudes that they "should" have higher self-efficacy and locus of control.

Qualitative research, such as interviews or focus groups, may also uncover why men and younger age groups have lower perceived control scores compared to women and older age groups. The pbc control scale represents having beliefs in one's ability and the resources to act. It may be this is an effect of perception: it may appear there are not enough resources or access to training if someone wanted to learn new skills.

6.8.4 Theoretical approach to gender differences.

Adding qualitative questions will address some of the gender issues raised by the results. Although gender is "one of the fundamental ways of organising and classifying our social experience" (Adam et al., 2004, p. 223), there is a need to address dichotomous issues by increasing sample size to allow for within-gender comparisons of culture, family, or education influence.

Gendered aspects of technology and job environments also need to be tested. Researchers such as Cohoon & Aspray (2006) have questioned "whether the computing culture causes overrepresentation of males or whether the presence of a disproportionate number of males in computing give it a masculine culture" (Werner & Denning, 2009, p. 29). Researching jobs in gender-balanced environments may produce higher self-efficacy for women with technology jobs. In addition, multiple industries may contribute to understanding gender differences in mastery and social experiences.

6.8.5 Continuous learning and control.

There is no evidence from this study to suggest further use of the theory of planned behavior or locus of control scales. The results do suggest, however, participants lack perceived behavioral control beliefs about updating their skills. Investigating attitudes about continuous learning may uncover discrepancies in employee and employer expectations for professional development. In addition, given evidence suggesting higher self-perceptions on core traits generally leads to higher scores in performance, and that core skills are "a very good basis for predicting typical levels of job performance" (Judge, 2009, p. 59), organizations could benefit from understanding self-efficacy in relation to changing technology skill needs.

7: Conclusions and Implications

The research questions at the beginning of this study asked if technology experience mitigated social and cultural expectations, and specifically if experience in a technology education program or a technology job positively influenced self-efficacy or locus of control. The outcomes of this study support prior gender research suggesting women are likely to under-sell their capabilities compared to men, but only partially supports prior research claims of technology exposure having a positive effect on self-efficacy. This sample of women with technology jobs has lower self-efficacy compared to men and compared to women who have a technology education. It is not clear if being in a technology job causes women's lower technology self-efficacy, or if having a technology education causes higher self-efficacy and mitigates negative technology industry culture. The research also does not explain if men have higher technology self-efficacy due to actual beliefs in technology skills or if there is a social desirability bias.

Although causation was not established, quantitative differences between male and female self-perceptions in a technology domain is new to the literature. In addition, samples in this study are from a working population, which moves the implications beyond educational settings typically used in self-efficacy research.

7.1 Implications for Organizations

Women's lower self-efficacy in technology jobs compared to men's is an issue for organizations because the long-term effects of lower self-efficacy are most likely lower performance (Gist, Schwoerer, & Rosen, 1989). Beyer (1990) argues "a woman's misperceptions regarding her competence may lead to low expectancies for future performances and dissuade her from pursuing a career in certain masculine-gender-typed domains" (p. 368). For example, "when women do not pursue the potentially lucrative mathematics-related careers for which they are capable, they also decrease their chances for a financially stable career future and cannot take advantage of the personal challenge" (Zeldin & Pajares, 2000, p. 241). Therefore, it is important to address the reasons why women in technology jobs have lower self-efficacy and what impact this may have on earnings or remaining employable in technology industries.

A second issue for organizations is the low variance explained for the theory of planned behavior regressions. The lack of intention to update skills raises several questions about attitudes toward updating skills. The theory of planned behavior results suggest lack of perceived control over continuous learning related to job and technology skills. Future research needs to assess expectations for training in order to understand employees' attitudes. Clarifying expectations should help organizations maintain well-trained workforces.

7.2 Implications for Education Programs

One of the main contributions of this study is finding mastery experiences alone do not appear to increase women's self-efficacy. Instead, social and persuasive experiences related to educational programs appear more likely to influence women's technology self-efficacy. This is important because of the crossover from non-STEM education programs to technology jobs: almost half of the technology education graduates moved into non-technology jobs and vice-versa. Therefore, non-technology programs also need to assess curriculum with technology experience in mind.

Initial recommendations by governments and educational institutions for increasing the number of women in science, technology, engineering, and math (STEM) professions stemmed from a deficit model. The recommendations suggested increasing access to education as the main solution, but once in the programs, women would learn the same way men do. Unfortunately, increasing the number of women in traditional technology programs did not address the underlying issues women experience in STEM education or IT professions (Adam et al., 2004; Woodfield, 2002).

Focusing on changes to pedagogy and curriculum, as opposed to enrollment, is more likely to change how women perceive technology education:

> [Curriculum] and pedagogy are two of the most important frameworks … through which students understand themselves and what they are to become. While purporting to liberate girls and women from gender stereotypes and promoting their equality in SET, initiatives which mobilise 'Women in SET' discourse may actually be engaged in processes of regulation which reinforce those stereotypes

> and construct girls/women and SET in such a way as to make it difficult for girls and women to understand themselves as being capable SET students and future professionals. (Phipps, 2007, p. 783)

An approach focusing on pedagogy suggests addressing “more subtle forms of gender differentiation” (Arnot, 2000, p. 295) and trying to increase girls’ interest in STEM subjects by including “participation, creativity, and collaboration” (Sandow, Marks, & Borg, 2009, p. 13) in STEM curriculum. Critics of this approach argue these changes are only effective at the surface level: “At the very least it can be (and has been) said that such approaches do not engage critically enough with the discipline of SET, being focused on altering its presentation on a superficial level rather than examining its epistemologies and practices” (Phipps, 2007, p. 783). Even if there are changes to some of the delivery methods or to earlier positive technology mastery experiences, most interventions have maintained traditional STEM curriculum and environments.

Changes to curriculum address increasing interest: an education integrating technology into broader creative, social, and design curriculum is more appealing to women (AAUW Educational Foundation, 2000; Rudasill & Callahan, 2010; Varma, 2009). Increasing the type of subjects available may create more interest for girls and women, thereby increasing appeal for female faculty. Attracting female faculty is equally important because women choosing STEM careers are more likely to have had a female role model in STEM (Beyer, 2008). Technology education programs with a broader range of topics will also address the social experiences women tend to emphasize (Zeldin & Pajares, 2000).

Even with the above changes, increasing women’s interest in technology is more likely by going beyond STEM and integrating technology into non-traditional STEM subjects. One example is in marketing education where a heavy reliance on technology-based information sources (Miller & Mangold, 1996) has created a need to move beyond technology added as a complement in existing classes to “discipline-specific marketing technology courses” (Hannaford, Erffmeyer, & Tomkovick, 2002, p. 47) and programs (Hannaford et al., 2002). Some marketing area educators suggest a Marketing Information Systems (MKIS) management stream as a specific marketing domain separate from Management Information Systems (MIS) (Gandhi & Bodkin, 1996).

Given lower enrollment rates for women entering traditional STEM subjects, focus should now be on programs with increasing enrollment of women, such as marketing, interactive media, and educational technology (U.S. Department of Education, 2007). Programs integrating technology into broader subjects show promise for attracting women, and based on the sample from this study, have positive, long-term self-efficacy effects.

7.3 Gender and Technology in Society

Similar to accumulative disadvantage for wages and advancement opportunities (Valian, 1999), technology disadvantages will have an increasing effect on women. Ideas to change the perception of technology as a male domain include out of school learning environments and societal influences, such as "developing of popular science television programmes, magazines and instructive science and technical centres and organizing summer camps and competitions" (van Langen & Dekkers, 2005, p. 338). Integrating technology into non-technology education or job contexts, as a means of creating social and persuasive experiences, is more likely to have a positive influence on women's technology careers choices. Unfortunately, these interventions usually occur past the initial exposure to technology stereotypes, such as in the home or early education (Varma, 2009).

Having positive reinforcement at an early age contributes to choosing STEM courses and careers: "One of the major keys to finding a pathway to STEM careers cited in the study was an early positive interaction with a male adult such as a father, grandfather, or a technology education teacher" (McCarthy, 2009, p. 17). Male influence may be important because of perceived male "technical confidence" (Moore et al., 2008, p. 530). Unfortunately, many men do not realize their part in maintaining traditional gender roles and inequities:

> [Male] participants perceive their own realities as men as being very different from the realities of women. They position women as those that are 'affected' by the 'problem' of gender issues, and thereby remove themselves from engaging in debates around it. In this manner participants not only negate the importance of gender equity in SET but also avoid claiming any responsibility for changing their practice in order to achieve greater gender equity. (Lynch & Nowosenetz, 2009, p. 573)

To achieve greater gender equity, it is necessary to overcome stereotypes of girls “as lacking in confidence and imagination, as well as being at the mercy of their parents, teachers, peers, society, and their biology” (Phipps, 2007, p. 775). It is especially important to challenge “constructions of female passivity and insecurity [as they] appear to undermine the broader political message about women being as capable as men in science, engineering, and technology” (Phipps, 2007, p. 775).

Changing cultural perspectives requires “acknowledgement that science and technology are culturally embedded, symbolically meaningful, and shaped by specific social forces and cultural imperatives” (Campbell, 2009, p. 2). Women need to examine the socially constructed expectations about their capabilities with technology and seek opportunities to participate in technology education. By doing so, more women will become active and equal participants in technological development.

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9: Appendices

9.1 Appendix 1 Undergraduate Degrees by Gender

Table 9-1 *Undergraduate degrees for computer science, and math and statistics engineering by gender 1990-2009*

	computer and information sciences					mathematics and statistics				
	total	male	% m	female	% f	total	male	% m	female	% f
1990-91	25,159	17,771	71%	7,388	29%	14,393	7,580	53%	6,813	47%
1991-92	24,821	17,685	71%	7,136	29%	14,468	7,668	53%	6,800	47%
1992-93	24,519	17,606	72%	6,913	28%	14,384	7,566	53%	6,818	47%
1993-94	24,527	17,528	71%	6,999	29%	14,171	7,594	54%	6,577	46%
1994-95	24,737	17,684	71%	7,053	29%	13,494	7,154	53%	6,340	47%
1995-96	24,506	17,757	72%	6,749	28%	12,713	6,847	54%	5,866	46%
1996-97	25,422	18,527	73%	6,895	27%	12,401	6,649	54%	5,752	46%
1997-98	27,829	20,372	73%	7,457	27%	11,795	6,247	53%	5,548	47%
1998-99	30,574	22,298	73%	8,276	27%	11,966	6,181	52%	5,785	48%
1999-00	37,788	27,185	72%	10,603	28%	11,418	5,955	52%	5,463	48%
2000-01	44,142	31,923	72%	12,219	28%	11,171	5,791	52%	5,380	48%
2001-02	50,365	36,462	72%	13,903	28%	11,950	6,333	53%	5,617	47%
2002-03	57,433	41,950	73%	15,483	27%	12,505	6,784	54%	5,721	46%
2003-04	59,488	44,585	75%	14,903	25%	13,327	7,203	54%	6,124	46%
2004-05	54,111	42,125	78%	11,986	22%	14,351	7,937	55%	6,414	45%
2005-06	47,480	37,705	79%	9,775	21%	14,770	8,115	55%	6,655	45%

2006-07	42,170	34,342	81%	7,828	19%	14,954	8,360	56%	6,594	44%
2007-08	38,476	31,694	82%	6,782	18%	15,192	8,490	56%	6,702	44%
2008-09	37,994	31,215	82%	6,779	18%	15,496	8,793	57%	6,703	43%

Source: U.S. Department of Education 2010

Table 9-2 *Undergraduate degrees for engineering by gender 1990-2009*

	engineering and engineering technologies				
	Total	male	% m	female	% f
1990-91	79,751	68,482	86%	11,269	14%
1991-92	78,058	67,104	86%	10,954	14%
1992-93	78,662	67,248	85%	11,414	15%
1993-94	78,662	66,920	85%	11,742	15%
1994-95	78,569	66,223	84%	12,346	16%
1995-96	78,086	65,430	84%	12,656	16%
1996-97	75,757	63,066	83%	12,691	17%
1997-98	74,649	61,955	83%	12,694	17%
1998-99	72,665	59,703	82%	12,962	18%
1999-00	73,419	59,741	81%	13,678	19%
2000-01	72,975	59,564	82%	13,411	18%
2001-02	74,679	60,474	81%	14,205	19%
2002-03	77,319	62,884	81%	14,435	19%
2003-04	78,227	63,502	81%	14,725	19%
2004-05	79,743	65,164	82%	14,579	18%
2005-06	81,610	67,013	82%	14,597	18%
2006-07	82,072	68,230	83%	13,842	17%
2007-08	83,853	69,724	83%	14,129	17%
2008-09	84,636	70,675	84%	13,961	16%

Source: U.S. Department of Education 2010

Table 9-3 *Undergraduate degrees for sciences by gender 1990-2009*

	biological and biomedical sciences					physical sciences and science technologies				
	total	male	% male	female	% female	total	male	% male	female	% female
1990-91	39,377	19,358	49%	20,019	51%	16,334	11,170	68%	5,164	46%
1991-92	42,781	20,748	48%	22,033	52%	16,948	11,425	67%	5,523	48%
1992-93	46,868	22,795	49%	24,073	51%	17,534	11,819	67%	5,715	48%
1993-94	51,157	25,002	49%	26,155	51%	18,392	12,218	66%	6,174	51%
1994-95	55,790	26,628	48%	29,162	52%	19,161	12,490	65%	6,671	53%
1995-96	60,750	28,782	47%	31,968	53%	19,627	12,566	64%	7,061	56%
1996-97	63,679	29,432	46%	34,247	54%	19,496	12,213	63%	7,283	60%
1997-98	65,583	29,511	45%	36,072	55%	19,362	11,924	62%	7,438	62%
1998-99	64,608	28,175	44%	36,433	56%	18,285	11,003	60%	7,282	66%
1999-00	63,005	26,310	42%	36,695	58%	18,331	10,946	60%	7,385	67%
2000-01	59,865	24,293	41%	35,572	59%	17,919	10,553	59%	7,366	70%
2001-02	59,415	23,346	39%	36,069	61%	17,799	10,292	58%	7,507	73%
2002-03	60,104	22,918	38%	37,186	62%	17,950	10,562	59%	7,388	70%
2003-04	61,509	23,248	38%	38,261	62%	17,983	10,476	58%	7,507	72%
2004-05	64,611	24,617	38%	39,994	62%	18,905	10,934	58%	7,971	73%
2005-06	69,178	26,651	39%	42,527	61%	20,318	11,831	58%	8,487	72%
2006-07	75,151	29,951	40%	45,200	60%	21,073	12,455	59%	8,618	69%
2007-08	77,854	31,637	41%	46,217	59%	21,934	12,959	59%	8,975	69%
2008-09	80,756	32,925	41%	47,831	59%	22,466	13,299	59%	9,167	69%

Source: U.S. Department of Education 2010

Table 9-4 *Undergraduate degrees for business and communications by gender 1990-2009*

	business					communications				
	total	male	% male	female	% female	total	male	% male	female	% female
1990-91	249,165	131,557	53%	117,608	47%	53,047	20,806	39%	32,241	61%
1991-92	256,298	135,263	53%	121,035	47%	55,144	21,601	39%	33,543	61%
1992-93	256,473	135,368	53%	121,105	47%	54,907	22,154	40%	32,753	60%
1993-94	246,265	128,946	52%	117,319	48%	52,033	21,484	41%	30,549	59%
1994-95	233,895	121,663	52%	112,232	48%	48,969	20,501	42%	28,468	58%
1995-96	226,623	116,545	51%	110,078	49%	48,173	19,868	41%	28,305	59%
1996-97	225,934	116,023	51%	109,911	49%	47,894	19,771	41%	28,123	59%
1997-98	232,079	119,379	51%	112,700	49%	50,263	20,103	40%	30,160	60%
1998-99	240,947	122,250	51%	118,697	49%	52,460	20,950	40%	31,510	60%
1999-00	256,070	128,521	50%	127,549	50%	57,058	22,152	39%	34,906	61%
2000-01	263,515	132,275	50%	131,240	50%	59,191	22,542	38%	36,649	62%
2001-02	278,217	138,343	50%	139,874	50%	64,036	23,692	37%	40,344	63%
2002-03	293,391	145,075	49%	148,316	51%	69,828	25,338	36%	44,490	64%
2003-04	307,149	152,513	50%	154,636	50%	73,002	25,813	35%	47,189	65%
2004-05	311,574	155,940	50%	155,634	50%	75,238	26,926	36%	48,312	64%
2005-06	318,042	159,683	50%	158,359	50%	76,936	28,142	37%	48,794	63%
2006-07	327,531	166,350	51%	161,181	49%	78,420	29,009	37%	49,411	63%
2007-08	335,254	170,978	51%	164,276	49%	81,048	30,384	37%	50,664	63%
2008-09	347,985	177,862	51%	170,123	49%	83,109	31,218	38%	51,891	62%

Source: U.S. Department of Education 2010

9.2 Appendix 2 Hypotheses Summary

9.2.1.1 Hypotheses General format.

Hypothesis (a): There are differences between self-efficacy and locus of control means by variable.

Hypothesis (b): There are differences between job and technology self-efficacy and locus of control means by variable.

9.2.1.2 Gender hypotheses.

Hypothesis 1a. Men have higher self-efficacy and locus of control compared to women.

Hypothesis 1b. Men have higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but women have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

9.2.1.3 Education hypotheses.

Hypothesis 2a. Individuals with a technology education have higher self-efficacy and locus of control compared to those with a non-technology education.

Hypothesis 2b. Individuals with a technology education have higher technology self-efficacy and locus of control, but those with a non-technology education have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

9.2.1.4 Job type hypotheses.

Hypothesis 3a. Individuals with a technology job have higher technology self-efficacy and locus of control compared to those with a non-technology job.

Hypothesis 3b. Individuals with a technology job have higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control; and those with a non-technology job have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

9.2.1.5 Gender interactions hypotheses.

4a. Individuals with technology education and jobs have higher self-efficacy and locus of control compared to those without technology education or jobs.

4b. Women with a technology education or job have higher technology self-efficacy and locus of control compared to women with a non-technology education or job.

4c. Women with a technology job have higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but women with a non-technology job have lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

9.2.1.6 Age hypotheses.

5a. The oldest age group has higher self-efficacy and locus of control compared to lower age groups.

5b. The youngest age group has higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but the oldest age group has lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

9.2.1.7 Education level hypotheses.

6a. The highest level of education group has higher self-efficacy and locus of control compared to lower level of education groups.

6b. The highest level of education group has higher technology self-efficacy and locus of control compared to job self-efficacy and locus of control, but the lower level of education group has lower technology self-efficacy and locus of control compared to job self-efficacy and locus of control.

9.2.1.8 Theory of planned behavior hypotheses.

7a Job attitude, subjective norm, and perceived behavioral control predict job skill updating intention

7b Technology attitude, subjective norm, and perceived behavioral control, predict technology skill updating intention

7c Gender, education program, job type, age and education level influence intention to update job and technology skills.

9.2.1.9 Theory of planned behavior subscales hypotheses.

8a. Men have higher attitudes, subjective norms, and perceived behavioral control compared to women

8b. Men have higher technology attitudes, subjective norms, and perceived behavioral control compared to job attitudes, subjective norms, and perceived behavioral control, but women have lower technology attitudes, subjective norms, and perceived behavioral control compared to job attitudes, subjective norms, and perceived behavioral control.

8c. Individuals with technology education have higher attitudes, subjective norms, and perceived behavioral control compared to those without technology education.

8d. Individuals with technology education have higher technology attitudes, subjective norms, perceived behavioral control compared to job attitudes, subjective norms, perceived behavioral control, but Individuals without technology education have lower technology attitudes, subjective norms, and perceived behavioral control compared to job attitudes, subjective norms, and perceived behavioral control.

8e. Individuals with technology jobs have higher attitudes, subjective norms, and perceived behavioral control compared to Individuals without technology jobs.

8f. Individuals with technology jobs have higher technology attitudes, subjective norms, perceived behavioral control compared to job attitudes, subjective norms, and perceived behavioral control, but individuals without technology jobs have lower technology attitudes, subjective norms, and perceived behavioral control compared to job attitudes, subjective norms, and perceived behavioral control.

9.2.1.10 Mastery experiences hypotheses.

Hypotheses 9: Updating skills and experience in a job positively influences self-efficacy and locus of control

9.3 Appendix 3 Examples of Technology Usage Models

Below are the questions and models used by Taylor and Todd, 1995
The Usage and Behavioral Intention measures were the same for all three models.

1. Usage
Usage statistics were gathered from a university Computing Resource Centre (CRC) including: number of visits, number of assignments, software used

2. Behavioral Intention
I intend to use the CRC this term.
I intend to use the CRC to print projects, papers or assignments this term
I intend to use the CRC frequently this term

9.3.1 Technology Acceptance Model Questions.

Perceived Usefulness
The CRC will be of no benefit to me
A service that is of no benefit to me is: (bad/good)

Using the CRC will improve my grades
A service that will improve my grades is: (bad/good)

The advantages of the CRC will outweigh the disadvantages
A service with more advantages than disadvantages is: (bad/good)

Overall using the CRC will be advantageous
A service that is advantageous is: (bad/good)

Ease of Use
Instructions for using equipment in the CRC will be hard to follow
Instructions that are hard to follow are: (bad/good)

It will be difficult to learn how to use the CRC
A service that is difficult to learn is: (bad/good)

It will be easy to operate the equipment in the CRC
A service with equipment that is easy to operate is: (bad/good)

9.3.2 Theory of planned behavior questions.

Attitude
Using the CRC is a (bad/good) idea
Using the CRC is a (foolish/wise) idea
I (dislike/like) the idea of using the CRC
Using the CRC would be (unpleasant/pleasant)

Subjective norm
People who influence my behavior would think that I should use the CRC.
People who are important to me would think that I should use the CRC

Perceived Behavioral Control
I would be able to use the CRC
Using the CRC is entirely within my control
I have the resources and the knowledge and the ability to make use of the CRC

9.3.3 Decomposed theory of planned behavior.

1. Attitudinal Structure

Perceived Usefulness
The CRC will be of no benefit to me
A service that is of no benefit to me is: (bad/good)

Using the CRC will improve my grades
A service that will improve my grades is: (bad/good)

The advantages of the CRC will outweigh the disadvantages
A service with more advantages than disadvantages is: (bad/good)

Overall using the CRC will be advantageous
A service that is advantageous is: (bad/good)

Compatibility
Using the CRC will fit well with the way I work.
A service that fits well with the way I work is: (bad/good)

Using the CRC will fit into my workstyle
A service that fits into my workstyle is: (bad/good)

The setup of the CRC will be compatible with the way I work
A service that is compatible with the way I work is: (bad/good)

Ease of Use
Instructions for using equipment in the CRC will be hard to follow
Instructions that are hard to follow are: (bad/good)

It will be difficult to learn how to use the CRC
A service that is difficult to learn is: (bad/good)

It will be easy to operate the equipment in the CRC
A service with equipment that is easy to operate is: (bad/good)

2. Normative Structure

Peer Influences:

My friends would think that I should use the CRC.
Generally speaking, I want to do what my friends think I should do.

My Classmate would think that I should use the CRC
Generally speaking, I want to do what my classmates think I should do

Superior Influences:
My professors would think that I should use the CRC.
Generally speaking, I want to do what my professors think I should do.

I will have to use the CRC because my professors think I should do
Generally speaking, I want to do what my professors think I should do

3. Control Structure

Efficacy
I would feel comfortable using the CRC on my own.
For me, feeling comfortable using a service on my own is: (unimportant/important)

If I wanted to, I could easily operate any of the equipment in the CRC on my own
For me, being able to easily operate equipment on my own is: (unimportant/important)

I would be able to use the equipment in the CRC even if there is no one around to show me how to use it
For me, being able to use the equipment even if there is no one around to show me how to use it is (unimportant/important)

Facilitating Conditions – Technology
The equipment (printers, computers, etc) in the CRC are not compatible with the other computers I use
For me, a service having equipment that is compatible with the other equipment I use is: (unimportant/important)

The software in the CRC is not compatible with the software I use
For me, a service having software that is compatible with the software I use is: (unimportant/important)

I will have trouble reading my disks in the CRC
For me, whether or not I have trouble reading my disks is: (unimportant/important)

Facilitating Conditions –Resources
There will not be enough computers for everyone to use in the CRC
For me, having enough computers for everyone to use is: (unimportant/important)

Printing in the CRC will be too expensive
For me, being able to print for a low price is: (unimportant/important)

I won’t be able to use a computer in the CRC when I need it
For me, being able to use a computer when I need it is: (unimportant/important)

9.4 Appendix 4 Theory of Planned Behavior Questions

9.4.1 Theory of planned behavior – Job skills updating.

Job Attitude
1. There are more advantages than disadvantages to updating my job skills
2. It is easy to update my job skills
3. I enjoy learning new job skills
4. *Updating my job skills will be unpleasant
5. It is a good idea to update my job skills
6. *It won't help my career to update my job skills

Subjective Norms
1. My friends think that I should update my job skills
2. The people in life whose opinions I value would approve of my updating my job skills.
3. My supervisor thinks that I should update my job skills
4. Top management thinks that I should update my job skills
5. My family would approve of my updating my job skills
6. I should update my job skills because my peers think I should.
7. Specialists in my organization think I should update my job skills.

Perceived Behavioral Control
Self-efficacy
1.* It is difficult to keep my job skills current
2. *When thinking about changes related to my work, I am concerned about my ability to keep up in the future
3. It is easy to learn new job skills
4. Overall, I am confident in my ability to keep pace with changes related to my work
5. *It would be impossible for me to keep up with the changes in my job
Control
6. It is mostly up to me if I update my skills to keep up with changes in my job.
7. I have the resources I need to update my job skills
8. The materials to update my job skills are available to me
9. *It is difficult to find resources to help me update my job skills

Intention and Behavior
Intention
1. I intend to update my job skills within the next year and will add my new skills to my C.V.
2. *Within the next year, I will probably only do informal updating such as asking a colleague or referring to an on online resource.
Behavior
3. * Last year, I learned new job skills informally but nothing I would add to my C.V.
4. Last year I updated my job skills and will add my new skills to my C.V.

9.4.2 Theory of planned behavior – Technology skills updating.

Job Attitude

1. There are more advantages than disadvantages to updating my job technology skills
2. It is easy to update my job technology skills
3. I enjoy learning new job technology skills
4. *Updating my job technology skills will be unpleasant
5. It is a good idea to update my job technology skills
6. *It won't help my career to update my job technology skills

Subjective Norms

1. My friends think that I should update my job technology skills
2. The people in life whose opinions I value would approve of my updating my job technology skills.
3. My supervisor thinks that I should update my job technology skills
4. Top management thinks that I should update my job technology skills
5. My family would approve of my updating my job technology skills
6. I should update my job technology skills my peers think I should.
7. Technology specialists in my organization think I should update my job skills.

Perceived Behavioral Control

Self-efficacy

1. It is difficult to keep my job technology skills current
2. When thinking about technology changes related to my work, I am concerned about my ability to keep up in the future
3. It is easy to learn new technology skills for work
4. Overall, I am confident in my ability to keep pace with technology changes related to my work
5. It would be impossible for me to keep up with the technology changes in my job

Control

6. It is mostly up to me if I update my technology skills to keep up with changes in my job.
7. I have the resources I need to update my job technology skills
8. The materials to update my job technology skills are available to me
9. It is difficult to find resources to help me update my job technology skills

Intention and Behavior

Intention

1. I intend to update my technology skills within the next year and will add my new skills to my C.V.
2. *Within the next year, I will probably only do informal updating of my technology skills such as asking a colleague or referring to an on online resource.

Behavior

3. * Last year, I learned new technology skills informally but nothing I would add to my C.V.
4. Last year I updated my technology skills and will add my new skills to my C.V.

9.5 Appendix 5 Self-Esteem and Locus of Control Scales

9.5.1.1 Self-Esteem.

Original Scale: Rosenberg Self-Esteem Scale (Rosenberg, 1965)

1. On the whole, I am satisfied with myself.
2.* At times, I think I am no good at all.
3. I feel that I have a number of good qualities.
4. I am able to do things as well as most other people.
5* I feel I do not have much to be proud of.
6* I certainly feel useless at times.
7 I feel that I'm a person of worth, at least on an equal plane with others
8* I wish I could have more respect for myself
9* All in all, I am inclined to feel that I am a failure.
10 I take a positive attitude toward myself

Adapted Job version (Changes from the original are in bold)
1. On the whole, I am satisfied with **my ability to do my job.**
2. *At times, I think I am no good **at my job** at all.
3. I feel that I have a number of good **job skills**.
4. I am able to do **my job** as well as most other people.
5 ***When thinking about my job**, I feel I do not have much to be proud of.
6* **When doing my job,** I certainly feel useless at times.
7 **When thinking about my job,** I feel that I'm a person of worth, at least on an equal plane with others.
8* I wish I could have more respect for **my abilities to do my job**.
9* **In regard to my job**, I am inclined to feel that I am a failure.
10 I take a positive attitude toward **my job**.

Adapted Technology Version (Changes from the job version are in bold)
1. On the whole, I am satisfied with my ability to use **technology**.
2. *At times, I think I am no good at **using technology** at all.
3. I feel that I have a number of good **technical skills**.
4. I am able to **use technology** as well as most other people.
5 *When thinking about **technology**, I feel I do not have much to be proud of.
6* * When **using technology**, I certainly feel useless at times.
7 When thinking about **technology**, I feel that I'm a person of worth, at least on an equal plane with others.
8* I wish I could have more respect for my abilities **to use technology**
9* In regard to **technology**, I am inclined to feel that I am a failure.
10 I take a positive attitude toward **technology**

9.5.1.2 Job Locus of Control Scale.

Original Scale (Spector et al., 2002) Original 6 point Likert
1*A job is what you make of it.

2*On most jobs, people can pretty much accomplish whatever they set out to accomplish.
3* If you know what you want out of a job, you can find a job that gives it to you.
4* If employees are unhappy with a decision made by their boss, they should do something about it.
5 Getting the job you want is mostly a matter of luck.
6 Making money is primarily a matter of good fortune.
7* Most people are capable of doing their jobs well if they make the effort.
8 In order to get a really good job you need to have family members of friends in high places.
9 Promotions are usually a matter of good fortune
10 When it come to landing a really good job, who you know is more important than what you know
11* Promotions are given to employees who perform well on the job
12 To make a lost of money you have to know the right people
13 It takes a lot of luck to be an outstanding employee on most jobs
14* People who perform their jobs well generally get rewarded for it
15* Most employees have more influence on their supervisors than they think they do.
16 The main difference between people who make a lot of money and people who make a little money is luck

Adapted Technology Version (Changes from the job version are in bold)

1***Technology** is what you make of it.
2***When using technology**, people can pretty much accomplish whatever they set out to accomplish.
3*If you know what you want out of a **software program**, you can find a **program** that gives it to you.
4*If employees are unhappy with a **technology related** decision made by their boss, they should do something about it.
5 Getting the **IT resources** you want is mostly a matter of luck
6 Making money **from technology** is primarily a matter of good fortune.
7*Most people are capable of **using technology** well if they make the effort.
8 In order to get **the best technology** you need to have family members of friends in high places.
9 Promotions **in technology jobs** are usually a matter of good fortune
10 When it come to getting the **best IT resources**, who you know is more important than what you know
11*Promotions are given to employees who perform well **with technology**
12 To make a lot of money you have to know **how to use technology**
13 It takes a lot of luck to be an outstanding employee on most **technology related** jobs
14*People who perform **well with technology** generally get rewarded for it
15*Most employees have more influence on their **IT department** than they think they do.
16 The main difference between people who **do well with technology** and people who don't **do well** is luck

9.6 Appendix 6 Bloom's Taxonomy

Shortened to 5 levels

1. Comprehension – classify, compare, explain, summarize
Use general software for common tasks: Word Processing, Data Entry

2. Application – apply, calculate, produce
Create artistic works, design using software, database queries, using statistics software

3. Analysis – compare, differentiate, order, transform –
Programming,

4. Synthesis – construct, develop, improve –
Design or develop new technology

5. Evaluation – test, validate, critique, judge:
Evaluate technologies; make high level strategic decisions involving technology

9.7 Appendix 7 Copyright Permissions

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Self Esteem Scale:
The family has given permission for all academic use. They ask that the following reference be used and that they be informed: Rosenberg, Morris. 1989. *Society and the Adolescent Self-Image*. Revised edition. Middletown, CT: Wesleyan University Press.

9.8 Appendix 8 Updating Activities Input

Job titles of 10 colleagues:

Emerging Technologies Support Liaison
Media Resource Coordinator
IT Network Manager
Network Television Media Archive Librarian
Online Professional Development Coordinator
Instructional Designer
Media Artist
University Program Coordinator
Assistant Professor: Digital Arts
Lecturer: Business Administration

List of ideas:

Participating in a professional organization (speakers, lectures, workshops)
Vendor training
Certifications (MCP, ITIL, IEEE, etc)
Joining and participating in an online community of practice
Joining and participating in a professional organization
Internal courses or training provided to employees (either assigned or requested)
Technical sites
Reading a professional organization's membership journal/newsletter
Internal courses or training provided to employees (either assigned or requested)
Employer pays for training taken on company time.
Peer support group
Networking events
Social Network
Tweet ups
Third Tuesday
Job shadowing a colleague
Online searching
Calling colleagues or calling people until I find someone who can help me/tell me what I need to know.

9.9 Appendix 9 Survey

This study, Attitude and Belief Influences on Technology Updating Behaviors, is conducted by Haizley Trevor-Smith as part of a dissertation in partial fulfillment of the requirements for the degree of Doctor in Philosophy.

Purpose and goals of this study:
The study is designed to investigate attitudes about job skills and technology skills. Three sets of questions based on the Theory of Planned Behavior, Self-esteem, and Work Locus of Control are asked for both job and technology. There are also demographic and job description questions.

Simon Fraser University
This study is being conducted as part of the researcher's PhD program requirements under the supervision of Professor J. E. Bowes at the School of Interactive Art and Technology, Simon Fraser University.

The University and those conducting this research study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort, and safety of participants. This research is being conducted under permission of the Simon Fraser Research Ethics Board. The chief concern of the Board is for the health, safety and psychological well-being of research participants.

Should you wish to obtain information about your rights as a participant in research, or about the responsibilities of researchers, or if you have any questions, concerns or complaints about the manner in which you were treated in this study, please contact the Director, Office of Research Ethics by email at hal_weinberg@sfu.ca or phone at 778-782-6593.

Statement of confidentiality:
Any information that is obtained during this study will be kept confidential to the full extent permitted by the law of British Columbia and Canada. Responses gathered in the online survey will remain confidential through the use of an encrypted, secure website. No published information describing the results of this study will include information that makes it possible to identify any individual participant. Electronic survey data will be gathered on a secure server at Simon Fraser University and then downloaded and stored on a USB drive. The data will be destroyed after 7 years.

What the participants will be required to do:
Participants will complete online questionnaires about their attitudes toward their job and technology, and demographic information. Participation in this study is voluntary. You may skip any question or withdraw at any time. We hope that you will answer all the questions honestly, providing the most reliable and accurate information.

The data obtained in this study may be used in future works that may be similar. You will be asked is you would like to be contacted for future. Future participation is voluntary.

The benefits and risks to participants of this study:
There are no risks associated with participation in the study.

There are no benefits to participants except to contribute to the understanding of the research questions.

Withdrawing from the study:
You may withdraw your participation at any time by closing your browser. No information is saved until you press the submit button at the end of the survey.

Concerns:
You may register any concern or complaint with the Director of the Office of Research Ethics:

Dr. Hal Weinberg
Director, Office of Research Ethics
8888 University Drive
Simon Fraser University
Burnaby, British Columbia Canada
V5A 1S6
+1 778-782-6593
email: hal_weinberg@sfu.ca
Application Number: 2010s0243

Research Results and Future Contact:
You may obtain results of this study by contacting Haizley Trevor-Smith (Principal Investigator), School of Interactive Arts and Technology, by sending an e-mail to hbtrevor@sfu.ca

You will be asked if you want to participate in follow up questions concerning this study. If you choose to provide your email, you may be contacted by the researcher at a later date.

Consent:
By continuing with this survey, you are agreeing that you have been informed that the research will be confidential, you understand the risks and contributions of your participation in this study, and you agree to participate. By continuing to participate, you are confirming that you are either a student of Simon Fraser University or are 19 years of age or older.

Please press **"Next"** to continue, or if you wish not to participate, close your browser.

Job Context

1. What industry do you work in?
2. What is your current job? Please provide the title and describe in a few words.
3. How many years have you been in your current job?

Job Skills and Updating Activities

The following questions are focused on job skills. Job skills include any skill used in the normal activities of your job.

For the purposes of this survey, updating job skills refers to professional activities to update job skills. Updating job activities includes any activity that would lead to a skill or knowledge you would state on your C.V. Examples include:

- Taking university, college or professional institute courses related to your job (online or Face-to-face)
- Attending work related conferences and seminars
- Learning a new skill from a book
- Learning a new skill from online resources
- Participating in a professional organization (speakers, lectures, workshops)
- Vendor training
- Certifications (MCP, ITIL, IEEE, etc)
- Joining and participating in an online community of practice
- Joining and participating in a professional organization
- Internal courses or training provided to employees (either assigned or requested)

Theory of Planned Behavior – Job Skills Updating

Use 6 point Likert Scale

Job Attitude

1. There are more advantages than disadvantages to updating my job skills
2. It is easy to update my job skills
3. I enjoy learning new job skills
4. *Updating my job skills will be unpleasant
5. It is a good idea to update my job skills
6. *It won't help my career to update my job skills

Subjective Norms

1. My friends think that I should update my job skills
2. The people in life whose opinions I value would approve of me updating my job skills.
3. My supervisor thinks that I should update my job skills
4. Top management thinks that I should update my job skills
5. My family would approve of me updating my job skills
6. I should update my job skills because my peers think I should.
7. Specialists in my organization think I should update my job skills.

Perceived Behavioral Control

Self-efficacy

1.* It is difficult to keep my job skills current

2. *When thinking about changes related to my work, I am concerned about my ability to keep up in the future
3. It is easy to learn new job skills
4. Overall, I am confident in my ability to keep pace with changes related to my work
5. *It would be impossible for me to keep up with the changes in my job

Control

6. It is mostly up to me if I update my skills to keep up with changes in my job
7. I have the resources I need to update my job skills
8. The materials to update my job skills are available to me
9. *It is difficult to find resources to help me update my job skills

Intention and Behavior

Intention

1. I intend to update my job skills within the next year and will add my new skills to my C.V.
2. *Within the next year, I will probably only do informal updating such as asking a colleague or referring to an on online resource.

Behavior

3. * Last year, I learned new job skills informally but nothing I would add to my C.V.
4. Last year I updated my job skills and will add my new skills to my C.V.

Job Self-Efficacy

Original Scoring is: Strongly Agree – Agree – Disagree - Strongly Disagree
Use 6 point Likert Scale

1. On the whole, I am satisfied with my ability to do my job.
2. *At times, I think I am no good at my job at all.
3. I feel that I have a number of good job skills.
4. I am able to do my job as well as most other people.
5 *When thinking about my job, I feel I do not have much to be proud of.
6* When doing my job, I certainly feel useless at times.
7 When thinking about my job, I feel that I'm a person of worth, at least on an equal plane with others.
8* I wish I could have more respect for my abilities to do my job.
9* In regard to my job, I am inclined to feel that I am a failure.
10 I take a positive attitude toward my job.

Work Locus of Control

Original Scoring – 6 point Likert – Disagree very much – Agree very much

1* A job is what you make of it.
2* On most jobs, people can pretty much accomplish whatever they set out to accomplish.
3* If you know what you want out of a job, you can find a job that gives it to you.
4* If employees are unhappy with a decision made by their boss, they should do something about it.
5 Getting the job you want is mostly a matter of luck.
6. Making money is primarily a matter of good fortune.
7* Most people are capable of doing their jobs well if they make the effort.
8 In order to get a really good job you need to have family members or friends in high places.
9 Promotions are usually a matter of good fortune.
10 When it comes to landing a really good job, who you know is more important than what you know.
11* Promotions are given to employees who perform well on the job.
12 To make a lot of money you have to know the right people.
13 It takes a lot of luck to be an outstanding employee on most jobs.
14* People who perform their jobs well generally get rewarded for it.
15* Most employees have more influence on their supervisors than they think they do.
16 The main difference between people who make a lot of money and people who make a little money is luck.

IT Use

Please respond to the following questions based on your tasks at work:

	Never	Rarely	Sometimes	Frequently	Always
I use general software for common tasks: Word Processing, Data Entry, Using the Internet					
I do database queries or use statistics software					
I create artistic works using technology as a tool					
I use code to produce my work (HTML, Flash, etc.)					
I customize software that is then used by other users (e.g. Creating database, Excel conditionals or macros)					
I program or script					
Other people rely on my technical skills or technical support					
I create technology tools (software programs, hardware) that other artists use to create their works					
I design or develop new technology					
Other people use the technology I create					
My decisions involving technology at work have consequences for other users					
I evaluate technologies and make high level strategic decisions involving technology					

Percentage of time spent using technology in a typical week:
0-20%
21-40%
41-60%
61-80%
81-100%

Theory of Planned Behavior – Technology Skills Updating

Job Attitude
1. There are more advantages than disadvantages to updating my job technology skills
2. It is easy to update my job technology skills
3. I enjoy learning new job technology skills
4. *Updating my job technology skills will be unpleasant
5. It is a good idea to update my job technology skills
6. *It won't help my career to update my job technology skills

Subjective Norms
1. My friends think that I should update my job technology skills
2. The people in life whose opinions I value would approve of me updating my job technology skills.
3. My supervisor thinks that I should update my job technology skills
4. Top management thinks that I should update my job technology skills
5. My family would approve of me updating my job technology skills
6. I should update my job technology skills my peers think I should.
7. Technology specialists in my organization think I should update my job skills.

Perceived Behavioral Control
Self-efficacy
1. *It is difficult to keep my job technology skills current
2. *When thinking about technology changes related to my work, I am concerned about my ability to keep up in the future
3. It is easy to learn new technology skills for work
4. Overall, I am confident in my ability to keep pace with technology changes related to my work
5. *It would be impossible for me to keep up with the technology changes in my job
Control
6. It is mostly up to me if I update my technology skills to keep up with changes in my job
7. I have the resources I need to update my job technology skills
8. The materials to update my job technology skills are available to me
9. *It is difficult to find resources to help me update my job technology skills

Intention and Behavior
Intention
1. I intend to update my technology skills within the next year and will add my new skills to my C.V.
2. *Within the next year, I will probably only do informal updating of my technology skills such as asking a colleague or referring to an on online resource.

Behavior
3. * Last year, I learned new technology skills informally but nothing I would add to my C.V.
4. Last year I updated my technology skills and will add my new skills to my C.V.

Technology Self-Efficacy

1. On the whole, I am satisfied with my ability to use technology
2. *At times, I think I am no good at using technology at all
3. I feel that I have a number of good technical skills
4. I am able to use technology as well as most other people
5 *When thinking about technology, I feel I do not have much to be proud of
6* When using technology, I certainly feel useless at times
7 When thinking about technology, I feel that I'm a person of worth, at least on an equal plane with others
8* I wish I could have more respect for my abilities to use technology
9* In regard to technology, I am inclined to feel that I am a failure
10 I take a positive attitude toward technology

Technology Locus of Control

1* Technology is what you make of it
2* When using technology, people can pretty much accomplish whatever they set out to accomplish
3* If you know what you want out of a software program, you can find a program that gives it to you
4* If employees are unhappy with technology related decisions by their boss, they should do something about it
5 Getting the IT resources you want is mostly a matter of luck
6 Making money from technology is primarily a matter of good fortune
7* Most people are capable of using technology well if they make the effort
8 In order to get the best technology you need to have family members or friends in high places
9 Promotions in technology jobs are usually a matter of good fortune
10 When it come to getting the best IT resources, who you know is more important than what you know
11* Promotions are given to employees who perform well with technology
12 To make a lot of money you have to know how to use technology
13 It takes a lot of luck to be an outstanding employee on most technology related jobs
14* People who perform well with technology generally get rewarded for it
15* Most employees have more influence on the IT department than they think they do
16 The main difference between people who do well with technology and people who don't do well is luck

Demographic

Age
Ranges: Under 24, 25-4, 35-44, 45-54, 55 and over

Gender
Male
Female

Education

No post-secondary education
Professional Diploma (3-12 month program)
College Diploma (1-2 year program)
Undergraduate Degree
Undergraduate degree and Professional designation
Post graduate Degree (Master's or PhD)

If you have completed post-secondary education, please indicate the type of program:

Applied Science
Arts
Business
Communications
Computer Science
Education
Fine Arts
Health Sciences
Interactive Arts and Technology, or Media Lab
Law
Science
Other

Did you graduate from TechBC or School of Interactive Arts and Technology at SFU?
Yes/No

What year did you graduate?

Are you willing to participate in follow-up research in the future?
We are conducting a follow up study in the future. If you are willing to participate please enter your email. Your personal information will keep separately from your survey results.

Email:

9.10 Appendix 10 Cronbach's Alpha Matrices

The TPB scales shown have items identified by factor analysis. The final model for the TPB contains 5 scales. Attitude is the initial survey version as any items removed lowered the job attitude alpha below .6. Subjective norm and perceived behavioral form two components each.

9.10.1 Subjective norm alphas.

The matrices in Table 9-5 five items grouping onto component 1. These items ask about influence of friends, supervisor, top management, peers, and organizational specialists. This group is professionally oriented and renamed subjective norms work (snwork). Component 2, renamed subjective norms family (snfam) includes items asking about people whose opinion is valued and family.

Table 9-5 *Subjective Norms Factor Analysis*

Rotated Component Matrix[a]

	Component	
	1 jsnwork	2 jsnfam
jsn1	.679	
jsn2		.905
jsn3	.851	
jsn4	.895	
jsn5		.852
jsn6	.576	
jsn7	.823	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Rotated Component Matrix[a]

	Component	
	1 tsnwork	2 jsnfam
tsn1	.760	
tsn2		.870
tsn3	.863	
tsn4	.879	
tsn5		.912
tsn6	.632	
tsn7	.794	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

9.10.2 Perceived behavioral control alphas.

Factor analysis for Perceived Behavioral Control shows two distinct factors for job and technology. As previously discussed, previous research has shown perceived behavioral control to form factors for efficacy and control (Armitage & Conner, 1999a; Meng-Hsiang Hsu & Chao-Min Chiu, 2004; Taylor & Todd, 1995).

The results for this sample also indicate two factors. Component 1 contains items related to efficacy: beliefs about ability and difficulty. Component 2 relates to control and access to resources and materials.

Table 9-6 *Perceived Behavioral Control Factor Analysis (all items)*

Rotated Component Matrix[a]

	Component	
	1 jpbceff	2 jpbccon
jpbceff1	.785	
jpbceff2	.827	
jpbceff3	.621	
jpbceff4	.687	.382
jpbceff5	.528	
jpbcc1		.592
jpbcc2	.311	.789
jpbcc3		.809
jpbcc4		.701

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Rotated Component Matrix[a]

	Component	
	1 tpbceff	2 tpbccon
tpbceff1	.827	
tpbceff2	.806	
tpbceff3	.573	.431
tpbceff4	.672	.474
tpbceff5	-.648	
tpbcc1		.665
tpbcc2		.876
tpbcc3		.875
tpbcc4	.322	.616

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

A separate analysis of the self-efficacy (pbceff) items shows pbceff2 is not loading on both components and pbceff5 is negative for the technology version. These two items were removed from the scale. Item 3 is not leading the same for both the technology and job version, however, as Table 9-7 shows, it is statistically significant.

Table 9-7 *PBC Efficacy Factor Analysis*

Rotated Component Matrix[a]

	Component	
	1	2
jpbceff1	.771	
jpbceff2	.668	.441
jpbceff3	.793	
jpbceff4	.509	.652
jpbceff5		.931

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Rotated Component Matrix[a]

	Component	
	1	2
tpbceff1	.719	.380
tpbceff2	.801	
tpbceff3		.932
tpbceff4	.404	.779
tpbceff5	-.760	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

The control items 2, 3 and 4 clearly load onto a single component. Item 1 was removed.

Table 9-8 *PBC Control Factor Analysis*

Rotated Component Matrix[a]

	Component	
	1	2
jpbcc1		.988
jpbcc2	.890	
jpbcc3	.919	
jpbcc4	.750	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Rotated Component Matrix[a]

	Component	
	1	2
tpbcc1		.946
tpbcc2	.740	.517
tpbcc3	.819	.400
tpbcc4	.887	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

The revised versions of the two create a total score for perceived behavioral control total (pbctot2).

Table 9-9 *KMO and Bartlett Reliability*

Scale	Removed	KMO	Bartlett sig	Scale	Removed	KMO	Bartlett sig
jatt	none	.672	.000	tatt	none	.675	.000
jsn	tsn2 tsn5	.788	.000	tsn	tsn2 tsn5	.781	.000
jpbceff	jpbceff5	.730	.000	tpbceff	tpbceff5 neg (*tpbceff3)	.732	.000
jpbccon	jpbcc1	.678	.000	tpbccon	tpbcc1	.716	.000
jpbctot	jpbcef5, jpbcc1	.773	.000	tpbctot	tpbceff5, tpbcc1	.788	.000

Factor Analysis for each subscale tested for unidimensionality and the Kaiser-Meyer-Olkin measure tested sampling adequacy for factor analysis reliability.

9.11 Appendix 11 Note on Rosenberg's Self-Esteem

Some studies suggest multidimensionality of Rosenberg self-esteem scale (RSE) (Bachman & O'Malley, 1986; W. E. Hensley & Roberts, 1976; Kaplan & Pokorny, 1969; C. G. Richardson, Ratner, & Zumbo, 2009). Results show two dimensions related to overall self-concept have been found: self-competence and self-liking (C. G. Richardson et al., 2009). Some researchers suggest the multidimensionality is due to interpretation of negatively worded items (Marsh, 1996; Schmitt & Allik, 2005; Wang, Siegal, Falck, & Carlson, 2001). Other explanations relate to the age of the samples (e.g. Dobson, Goudy, Keith, & Powers, 1979). Comparison of positively worded version of the scale and the original five positive and five negative items version resulted in a one-factor model for the positive and two-factor for the original (Greenberger et al., 2003).

The RSE scale is widely used even with the issues of wording and multiple dimensions, but it is recommended to test for two factors (Richardson et al., 2009). Multidimensionality may be useful for this study if the technology context version of the scale shows two factors and the job context only one. In other words, there are some stable (global) questions that remain the same across the job and technology contexts. It is assumed the self-competence factor would be lower for the technology context and self-liking factor would remain the same for both job and technology versions.

The Kaiser-Meyer-Olkin (KMO) measure and Bartlett reliability, shown in Table 9-10, for the two scales are acceptable.

Table 9-10 *Self-esteem Scales KMO and Bartlett Reliability*

Scale	KMO	Bartlett sig
Job self-esteem	.860	.000
Technology self-esteem	.916	.000

Table 9-11 shows items 5 and 8 clearly loading on factor 2 for both job and technology scales.

Table 9-11 *Self-esteem Scales Component Matrices*

Rotated Component Matrix[a]

	Component	
	1	2
jse1	.684	
jse2	.569	.333
jse3	.798	
jse4	.716	
jse5		.710
jse6	.416	.567
jse7	.740	
jse8		.659
jse9	.507	.508
jse10		.737

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Rotated Component Matrix[a]

	Component	
	1	2
tse1	.816	
tse2	.685	.450
tse3	.826	
tse4	.861	
tse5	.426	.628
tse6	.568	.660
tse7	.836	
tse8		.830
tse9	.659	.427
tse10	.696	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

9.12 Appendix 12 Complete Results Tables

Table 9-12 *One-way ANOVAs*

Job		*df*	*F*	η^2	*p*	Technology		*df*	*F*	η^2	*p*
jse	gender	1	.748	.387	.388	tse	**gender**	**1**	**13.421**	**8.846**	**.000**
	teched	1	3.009	1.536	.085		**teched**	**1**	**6.580**	**4.499**	**.011**
	techjob	1	2.259	1.158	.135		techjob	1	.129	.091	.720
	age	**2**	**5.220**	**2.573**	**.066**		age	2	.619	.439	.540
	edlevel	3	1.048	.541	.353		edlevel	3	.590	.418	.556
		df	*F*	η^2	*p*			*df*	*F*	η^2	*p*
jloc	gender	1	.681	.291	.410	tloc	gender	1	1.639	.509	.202
	teched	1	1.460	.620	.229		teched	1	.007	.002	.935
	techjob	1	.608	.259	.437		techjob	1	.447	.140	.505
	age	**2**	**4.445**	**1.823**	**.013**		age	2	.390	.122	.678
	edlevel	3	2.279	.957	.105		edlevel	3	.236	.074	.790
		df	*F*	η^2	*p*			*df*	*F*	η^2	*p*
jatt	gender	1	.017	.006	.896	tatt	gender	1	.369	.202	.545
	teched	1	.011	.004	.915		teched	1	1.813	.984	.180
	techjob	1	1.708	.557	.193		techjob	1	.057	.031	.811
	age	2	2.853	.915	.060		age	2	2.091	1.126	.127
	edlevel	3	.160	.053	.853		edlevel	3	1.113	.606	.331
		df	*F*	η^2	*p*			*df*	*F*	η^2	*p*
jsn	gender	1	.182	.217	.671	tsn	gender	1	.499	.581	.481
work	teched	1	1.179	1.403	.279	work	**teched**	**1**	**5.497**	**6.219**	**.020**
	techjob	1	2.469	2.916	.118		techjob	1	.069	.081	.793
	age	**2**	**3.101**	**3.605**	**.048**		**age**	**2**	**3.359**	**3.796**	**.037**
	edlevel	**3**	**3.751**	**4.328**	**.025**		**edlevel**	**3**	**3.772**	**4.242**	**.025**
		df	*F*	η^2	*p*			*df*	*F*	η^2	*p*
jsnfam	gender	1	.023	.026	.879	tsnfam	gender	1	.143	.205	.706
	teched	1	.995	1.097	.320		teched	1	2.645	3.738	.106
	techjob	1	3.095	3.371	.080		techjob	1	.115	.165	.735
	age	2	.044	.049	.957		age	2	.304	.437	.738
	edlevel	**3**	**4.226**	**4.493**	**.016**		**edlevel**	**3**	**5.019**	**6.846**	**.008**
		df	*F*	η^2	*p*			*df*	*F*	η^2	*p*
jpbcef	gender	1	2.462	2.082	.118	tpbcef	**gender**	**1**	**10.983**	**9.910**	**.001**
	teched	1	2.596	2.194	.109		teched	1	.249	.238	.618
	techjob	1	.690	.589	.407		techjob	1	.942	.899	.333
	age	2	2.670	2.234	.072		age	2	1.581	1.497	.209
	edlevel	3	2.043	1.721	.133		edlevel	3	1.108	1.055	.332
		df	*F*	η^2	*p*			*df*	*F*	η^2	*p*
jpbc	**gender**	**1**	**12.936**	**12.769**	**.000**	tpbc	**gender**	**1**	**6.298**	**6.368**	**.013**
con	teched	1	.738	.779	.391	con	**teched**	**1**	**3.998**	**4.094**	**.047**
	techjob	1	.644	.680	.424		techjob	1	.047	.049	.828
	age	**2**	**2.964**	**3.056**	**.054**		age	2	2.488	2.548	.086
	edlevel	3	1.006	1.061	.368		edlevel	3	.326	.343	.722

Table 9-13 *Repeated Measures*

Repeat	Control	*Within*				*Between*			
		df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
self-efficacy		1	.240	.062	.652				
	gender	**1**	**9.587**	**2.767**	**.002**	**1**	**7.285**	**6.466**	**.008**
	teched	**1**	**20.732**	**5.646**	**.000**	1	.421	.388	.517
	techjob	1	3.177B	.958	.076	1	.325	.300	.569
	age	**2**	**3.380**	**.996**	**.036**	2	2.224	2.016	.111
	edlevel	3	2.632	.782	.075	3	.190	.177	.827
		df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
loc		1	.467	.055	.495				
	gender	1	.204BL	.024	.652	1	1.177	.729	.280
	teched	1	2.985	.346	.086	1	.439	.274	.508
	techjob	1	3.03BL	.351	.084	1	.066	.004	.936
	age	**2**	**4.707**	**.529**	**.010**	2	1.757	1.081	.176
	edlevel	3	1.677	.195	.190	3	.887	.551	.414
		df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
attitude		1	43.016	8.559	.000				
	gender	1	.692	.137	.406	1	.103	.070	.748
	teched	1	2.831	.555	.094	1	.641L	.433	.425
	techjob	1	.817	.162	.367	1	.631	.427	.428
	age	2	.042	.008	.959	**2**	**3.083**	**2.033**	**.048**
	edlevel	3	.796	.158	.453	3	.740	.501	.479
		df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
subjective norm work		1	11.281	3.792	.001				
	gender	1	.377	.127	.540	1	.523	1.057	.471
	teched	1	2.522B	.838	.114	1	3.363	6.681	.068
	techjob	1	**4.883B**	**1.600**	**.028**	1	.652	1.315	.421
	age	2	.130B	.044	.878	**2**	**3.819**	**7.445**	**.024**
	edlevel	3	.005	.002	.995	3	**4.435**	**8.586**	**.013**
		df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
subjective norm family		1	48.975	19.689	.000				
	gender	1	.044	.017	.835	1	.154	.329	.695
	teched	1	.567	.227	.452	1	2.285	4.825	.132
	techjob	1	**6.031**	**2.344**	**.015**	1	.373	.796	.542
	age	2	.195	.079	.823	2	.202	.435	.817
	edlevel	2	**3.416**	**1.329**	**.035**	2	**5.134**	**10.428**	**.007**
		df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
pbc efficacy		1	.151	.040	.698				
	gender	**1**	**6.374**	**1.630**	**.012**	**1**	**6.575**	**9.753**	**.011**
	teched	1	2.714L	.708	.101	1	1.423	2.173	.235
	techjob	1	.000	.000	.991	1	1.084	1.658	.299
	age	2	.046	.012	.955	2	2.202	3.324	.114
	edlevel	3	.700	.185	.498	3	1.880	2.848	.156
		df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
pbc control		1	4.482	1.300	.036				
	gender	1	1.585	.456	.210	**1**	**11.899**	**20.045**	**.001**
	teched	1	1.797	.516	.182	1	2.008	3.572	.158
	techjob	1	1.135	.327	.288	1	.261	.469	.610
	age	2	.778	.225	.461	2	3.009	5.265	.052
	edlevel	3	.979	.284	.404	3	.559	1.013	.643

B – Box is statistically significant $p<.005$, L-Levene's is statistically significant $p<.05$

Table 9-14 *Scale Means*

	Gender		Education program		Job type		Age			Education level		
	Male N=90	Female N=89	Non-Teched N=96	Tech ed N=83	Non-techjob N=87	Tech job N=92	20-34 N=91	35-44 N=51	45 and over N=37	Some post-secondary N=23	Under grad N=83	Graduate N=73
Job self-efficacy	4.93	4.83	4.97	4.78	4.80	4.96	4.77	4.84	5.21	5.08	4.87	4.83
Technology self-efficacy	5.13	4.68	4.76	5.08	4.93	4.89	4.93	4.80	4.99	4.77	4.97	4.88
Job locus of control	4.33	4.25	4.34	4.22	4.25	4.32	4.23	4.19	4.57	4.53	4.30	4.20
Technology locus of control	4.37	4.26	4.31	4.32	4.34	4.29	4.28	4.34	4.37	4.35	4.34	4.28
Job attitude	5.13	5.14	5.14	5.13	5.08	5.19	5.09	5.08	5.34	5.20	5.13	5.13
Technology attitude	4.86	4.79	4.76	4.91	4.81	4.84	4.76	4.78	5.05	5.04	4.78	4.81
Job sn work	3.26	3.33	3.21	3.39	3.16	3.42	3.47	3.25	2.94	2.95	3.53	3.14
Technology sn work	3.01	3.12	2.89	3.27	3.09	3.04	3.26	2.96	2.74	2.75	3.30	2.90
Job sn family	4.87	4.85	4.79	4.94	4.72	4.99	4.88	4.83	4.84	4.83	5.09	4.61
Technology sn family	4.43	4.36	4.26	4.56	4.43	4.37	4.46	4.29	4.41	3.91	4.68	4.24
Job pbc efficacy	4.24	4.02	4.23	4.01	4.07	4.18	4.09	3.99	4.43	4.46	4.14	4.01
Technology pbc efficacy	4.38	3.91	4.18	4.10	4.07	4.21	4.12	4.01	4.38	4.42	4.11	4.09
Job pbc control	4.73	4.19	4.40	4.53	4.52	4.40	4.30	4.51	4.77	4.33	4.38	4.59
Technology pbc control	4.52	4.14	4.19	4.49	4.34	4.31	4.23	4.25	4.66	4.29	4.27	4.40

9.12.1 Regressions.

Table 9-15 *Job Intention Regression Model*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.470[a]	.221	.172	1.039

a. Predictors: (Constant), jpbccon, teched, edlevel, jsnfam, Gender, techjob, age, jattot, jsnwork, jpbceff

Table 9-16 *Job Intention Regression Coefficients*

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.440	.853		1.688	.093
gender	.118	.169	.052	.698	.486
teched	-.384	.178	-.168	-2.156	.033
techjob	-.334	.171	-.147	-1.956	.052
age	-.195	.113	-.136	-1.722	.087
edlevel	.069	.128	.042	.542	.589
jattot	.113	.158	.058	.716	.475
jsnwork	.075	.085	.072	.880	.380
jsnfam	.440	.088	.407	5.026	.000
jpbceff	.025	.104	.020	.236	.814
jpbccon	.016	.097	.015	.163	.871

a. Dependent Variable: jintot

Table 9-17 *Technology Intent Regression Model*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.424[a]	.180	.128	.930

a. Predictors: (Constant), tpbccon, tsnfam, techjob, age, Gender, edlevel, teched, tsnwork, tattot, tpbceff

Table 9-18 *Technology Intention Regression Coefficients*

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.221	.651		4.950	.000
genderGender	-.140	.149	-.071	-.938	.350
teched	**-.359**	**.161**	**-.180**	**-2.226**	**.027**
techjob	-.270	.150	-.136	-1.801	.074
age	**-.263**	**.102**	**-.208**	**-2.591**	**.010**
edlevel	-.111	.112	-.076	-.992	.323
tattot	**.305**	**.119**	**.229**	**2.564**	**.011**
tsnwork	.106	.078	.115	1.363	.175
tsnfam	.079	.072	.096	1.089	.278
tpbceff	-.108	.093	-.105	-1.163	.246
tpbccon	-.109	.088	-.111	-1.247	.214

a. Dependent Variable: tinttot

Table 9-19 *Job Behavior Regression*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.466[a]	.217	.190	1.246

a. Predictors: (Constant), jintot, techjob, age, Gender, edlevel, teched

Table 9-20 *Job Behavior Regression Coefficients*

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.323	.520		2.545	.012
gender	.080	.190	.029	.424	.672
teched	.070	.204	.025	.344	.731
techjob	.178	.196	.064	.905	.367
age	-.012	.129	-.007	-.091	.927
edlevel	**.315**	**.146**	**.155**	**2.165**	**.032**
jintot	**.538**	**.083**	**.446**	**6.491**	**.000**

a. Dependent Variable: jinttot

Table 9-21 *Technology Behavior Regression*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.505	.255	.229	1.046

a. Predictors: (Constant), tintot, techjob, age, Gender, edlevel, teched

Table 9-22 *Technology Behavior Regression Coefficients*

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.322	.449		2.944	.004
gender	.032	.159	.014	.203	.839
teched	.291	.171	.122	1.701	.091
techjob	.133	.166	.056	.800	.425
age	-.110	.109	-.073	-1.011	.313
edlevel	.099	.123	.057	.807	.421
tintot	**.545**	**.077**	**.487**	**7.074**	**.000**

a. Dependent Variable: tinttot

9.13 Gender

Table 9-23 *Gender ANOVAs (between subjects effects)*

Job Depend	Male				Female			
	df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
jse	Male=89				Female=88			
teched	1	1.840	.892	.178	1	1.771	.957	.187
techjob	1	.428	.211	.515	1	2.301	1.236	.133
age	2	2.374	1.127	.099	2	2.910	1.520	.060
edlevel	2	1.470	.711	.236	2	.425	.235	.655
jloc	Male=90				Female=89			
teched	1	.299	.127	.586	1	1.923	.821	.169
techjob	1	.028	.012	.868	1	.989	.427	.323
age	2	1.729	.718	.183	2	**3.330**	1.365	**.040**
edlevel	2	.928	.392	.399	2	2.207	.927	.116
jatt	Male=90				Female=89			
teched	1	.797	.263	.374	1	1.096	.360	.298
techjob	1	.764	.252	.385	1	.917	..02	.341
age	2	3.044	.959	.053	2	.864	.285	.425
edlevel	2	1.314	.430	.274	2	.136	.046	.873
jsnwork	Male=85				Female=85			
teched	1	2.205	2.824	.141	1	.009	.010	.924
techjob	1	1.909	2.453	.171	1	.603	.662	.440
age	2	1.092	1.415	.340	2	2.261	2.401	.111
edlevel	2	1.348	1.737	.265	2	**3.110**	3.239	**.050**
jfam	Male=89				Female=88			
teched	1	**4.622**	**6.193**	**.034**	1	1.452	1.182	.231
techjob	1	1.393	1.934	.241	1	1.838	1.489	.179
age	2	.344	.487	.710	2	.714	.588	.493
edlevel	2	2.495	3.367	.088	2	1.926	1.543	.152
jpbceff	Male=89				Female=89			
teched	1	**5.164**	**4.597**	**.026**	1	.125	.096	.725
techjob	1	.006	.006	.939	1	1.691	1.273	.197
age	2	**3.975**	**3.472**	**.022**	2	.836	.637	.437
edlevel	2	.942	.880	.394	2	**3.447**	**2.478**	**.036**

Tech Depend	Male				Female			
	df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
tse								
teched	1	.434	.234	.512	1	**4.713**	**3.549**	**.033**
techjob	1	.155	.084	.695	1	.007	.006	.933
age	2	.409	.222	.665	2	.460	.365	.633
edlevel	2	1.042	.557	.357	2	.380	.303	.685
tloc								
teched	1	.230	.085	.633	1	.166	.043	.685
techjob	1	.005	.002	.943	1	.662	.169	.418
age	2	.423	.158	.657	2	.068	.018	.935
edlevel	2	.242	.090	.786	2	.609	.156	.546
tatt								
teched	1	2.134	1.148	.148	1	.098	.054	.755
techjob	1	.060	.033	.808	1	.019	.010	.892
age	2	.567	.312	.569	2	1.690	.914	.191
edlevel	2	.492	.271	.613	2	1.917	1.032	.153
tsnwork								
teched	1	**4.784**	**5.546**	**.031**	1	1.691	1.875	.197
techjob	1	.470	.572	.495	1	1.384	1.541	.243
age	2	1.428	1.712	.246	2	2.359	2.556	.101
edlevel	2	2.422	2.838	.095	2	**3.246**	**3.447**	**.044**
tsnfam								
teched	1	**5.194**	**8.577**	**.025**	1	.078	.089	.781
techjob	1	.053	.093	.818	1	.628	.717	.430
age	2	.312	.549	.733	2	1.219	1.378	.301
edlevel	2	**4.838**	**7.695**	**.010**	2	1.063	1.206	.350
tpbceff								
teched	1	2.171	2.171	.144	1	.010	.008	.922
techjob	1	.680	.696	.412	1	**7.787**	**5.672**	**.006**
age	2	2.133	2.121	.125	2	.618	.489	.541
edlevel	2	.706	.725	.497	2	2.048	1.570	.135

	df	*F*	η^2	*p*	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	*df*
jpb control		Male=89				Female=88			tpbcon								
teched	1	.107	.117	.745	1	.680	.608	.412	teched	1	.614	.729	.435	1	2.526	2.087	.116
techjob	1	.435	.473	.511	1	.029	.029	.865	techjob	1	.021	.025	.886	1	.000	.000	.997
age	2	**4.067**	**4.115**	**.021**	2	.490	.442	.614	age	2	2.393	2.741	.097	2	.858	.724	.428
edlevel	2	.821	.892	.444	2	.741	.664	.480	edlevel	2	.042	.051	.959	2	1.001	.841	.372

Table 9-24 *Gender Repeated Measures*

	Male								Female								
	Within				Between					Within				Between			
self-efficacy																	
N=90	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	N=89	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
teched	1	**3.932**	1.02	**.051**	1	.139	.106	.710	teched	1	**15.408L**	**4.096**	**.000**	1	.399	.410	.529
techjob	1	1.04	.280	.310	1	.019	.014	.891	techjob	1	1.751L	.537	.189	1	.688	.705	.409
age	2	1.68L	.445	.192	2	1.201	.904	.306	age	2	1.663	.507	.196	2	1.362	1.379	.262
edlevel	2	**3.54**	.898	**.033**	2	.484	.370	.618	edlevel	2	1.525	.466	.223	2	.069	.072	.934
locus of control																	
N=87	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	N=88	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
teched	1	.042	.004	.838	1	.316	.224	.576	teched	1	**3.908**	**.572**	**.051**	1	.399	.216	.529
techjob	1	.113	.010	.738	1	.002	.001	.966	techjob	1	3.576	.526	.062	1	.038	.021	.846
age	2	2.417L	.196	.095	2	.585	.415	.559	age	2	**3.966**	**.562**	**.023**	2	1.474	.784	.235
edlevel	2	1.011	.084	.368	2	.407	.290	.667	edlevel	2	1.096	.166	.339	2	1.698	.899	.189
attitude																	
N=87	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	N=88	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
teched	1	.949	.156	.333	1	1.784	1.256	.185	teched	1	1.50	.347	.224	1	.103	.068	.748
techjob	1	.311	.052	.578	1	.326	.234	.569	techjob	1	.428	.100	.515	1	.326	.212	.570
age	2	.905	.149	.408	2	1.601	1.122	.208	age	2	.792	.185	.456	2	1.592	1.014	.210
edlevel	2	.288	.048	.750	2	.918	.653	.403	edlevel	2	2.534	.570	.085	2	.783	.508	.460
subjective norm work																	
N=88	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	N=88	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
teched	1	.844	.227	.361	1	3.751	8.142	.056	teched	1	2.108B	.844	.150	1	.606	1.092	.439
techjob	1	1.222	.328	.272	1	1.207	2.698	.275	techjob	1	**4.025B**	**1.575**	**.048**	1	.008	.014	.930
age	2	.036	.010	.965	2	1.405	3.118	.251	age	2	.155	.064	.856	2	2.817	4.843	.066
edlevel	2	.891	.240	.414	2	1.979	4.334	.145	edlevel	2	.319	.132	.728	2	**4.116**	**6.870**	**.020**
subjective norm family																	
N= 87	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	N=88	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
teched	1	.087	.029	.768	1	**6.020**	**15.768**	**.016**	teched	1	.499B	.238	.482	1	.715	1.076	.400
techjob	1	1.22	.403	.272	1	.408	1.138	.525	techjob	**1**	**5.161**	**2.332**	**.026**	1	.036	.055	.849
age	2	.121	.041	.886	2	.366	1.029	.695	age	2	.151	.073	.860	2	1.284	1.912	.282
edlevel	2	1.564	.511	.215	2	**4.306**	**11.087**	**.017**	edlevel	2	2.819BL	1.281	.065	2	.964	1.446	.386
pbc efficacy																	
	df	*F*	η^2	*p*	*df*	*F*	η^2	*p*	N=89	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
teched	1	1.622	.388	.206	1	**4.353**	**7.110**	**.040**	teched	1	.289	.079	.592	1	.019	.025	.890
techjob	1	2.748	.649	.101	1	.112	.192	.738	techjob	1	2.967	.785	.089	1	**5.063L**	**6.160**	**.027**
age	2	.277	.068	.759	2	2.934	4.765	.059	age	2	.058L	.016	.944	2	.869	1.110	.423
edlevel	2	.177	.043	.838	2	.900	1.529	.411	edlevel	2	1.262	.340	.288	2	3.049L	3.708	.053

pbc control N=87	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	N=88	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
teched	1	1.777	.530	.186	1	.022	.004	.964	teched	1	.789	.217	.377	1	1.689	2.459	.197
techjob	1	1.408	.422	.239	1	.122	.235	.727	techjob	1	.040	.011	.842	1	.010	.015	.919
age	2	1.358	.406	.263	2	**3.390**	**6.113**	**.038**	age	2	.177	.049	.838	2	.750	1.107	.475
edlevel	2	1.169	.351	.316	2	.216	.419	.806	edlevel	2	.170	.047	.844	2	.987	1.449	.377

Table 9-25 *Scale Means for Men*

	Education program		Job type		Age			Education level		
	Non-Teched	Teched	Non-techjob	Techjob	20-34	35-44	45 and over	Some post-secondary	Under grad	Graduate
Job self-efficacy	5.04 N=41	4.84 N=49	4.88 N=46	4.98 N=44	4.83 N=46	4.88 N=27	5.25 N=17	5.36 N=7	4.88 N=49	4.91 N=34
Technology self-efficacy	5.07 N=41	5.18 N=49	5.16 N=46	5.10 N=44	5.16 N=46	5.03 N=27	5.21 N=17	5.01 N=7	5.23 N=49	5.01 N=34
Job locus of control	4.37 N=41	4.29 N=46	4.32 N=46	4.34 N=41	4.32 N=46	4.19 N=27	4.56 N=17	4.47 N=7	4.39 N=49	4.21 N=34
Technology locus of control	4.40 N=41	4.34 N=46	4.37 N=46	4.36 N=41	4.32 N=46	4.40 N=27	4.47 N=17	4.24 N=6	4.40 N=48	4.34 N=33
Job attitude	5.07 N=41	5.18 N=49	5.08 N=44	5.19 N=42	5.10 N=43	5.00 N=26	5.42 N=17	5.45 N=6	5.13 N=48	5.07 N=33
Technology attitude	4.74 N=41	4.96 N=49	4.84 N=44	4.88 N=42	4.81 N=43	4.84 N=26	5.03 N=17	5.05 N=6	4.89 N=48	4.77 N=33
Job sn work	3.06 N=39	3.43 N=47	3.10 N=44	3.43 N=42	3.39 N=43	3.28 N=26	2.91 N=17	3.06 N=7	3.45 N=46	3.04 N=33
Technology sn work	2.73 N=39	3.24 N=47	2.93 N=44	3.09 N=42	3.15 N=43	3.02 N=26	2.62 N=17	3.09 N=7	3.23 N=46	2.68 N=33
Job sn family	4.59 N=41	5.11 N=48	4.73 N=46	5.02 N=43	4.88 N=43	4.98 N=26	4.68 N=17	4.57 N=7	5.13 N=48	4.57 N=34
Technology sn family	4.10 N=41	4.72 N=48	4.40 N=46	4.47 N=43	4.50 N=43	4.46 N=26	4.21 N=17	3.64 N=7	4.81 N=48	4.07 N=34
Job pbc efficacy	4.49 N=41	4.03 N=48	4.23 N=45	4.24 N=43	4.08 N=46	4.13 N=26	4.81 N=17	4.64 N=7	4.14 N=48	4.29 N=33

Technology pbc efficacy	4.55 N=41	4.23 N=48	4.47 N=45	4.29 N=43	4.29 N=46	4.25 N=27	4.84 N=16	4.71 N=7	4.28 N=48	4.45 N=33
Job pbc control	4.77 N=41	4.69 N=48	4.80 N=46	4.65 N=43	4.50 N=46	4.74 N=25	5.31 N=17	4.81 N=7	4.60 N=48	4.89 N=34
Technology pbc control	4.42 N=41	4.60 N=48	4.53 N=45	4.50 N=44	4.43 N=46	4.33 N=25	5.02 N=17	4.57 N=7	4.49 N=48	4.55 N=34

Table 9-26 *Scale Means for Women*

	Education program		Job type		Age			Education level		
	Non-TechEd	Teched	Non-techjob	Techjob	20-34	35-44	45 and over	Some post-secondary	Under grad	Graduate
Job self-efficacy	4.92 N=55	4.70 N=34	4.71 N=41	4.94 N=45	4.70 N=45	4.80 N=24	5.17 N=20	4.96 N=16	4.86 N=34	4.76 N=39
Technology self-efficacy	4.53 N=55	4.94 N=34	4.68 N=48	4.69 N=45	4.70 N=45	4.55 N=24	4.81 N=20	4.66 N=16	4.59 N=34	4.77 N=39
Job locus of control	4.32 N=55	4.13 N=34	4.17 N=40	4.31 N=48	4.13 N=45	4.20 N=24	4.57 N=20	4.55 N=16	4.17 N=34	4.19 N=39
Technology locus of control	4.24 N=55	4.29 N=34	4.31 N=40	4.22 N=48	4.24 N=45	4.28 N=24	4.28 N=20	4.39 N=16	4.24 N=34	4.23 N=38
Job attitude	5.19 N=55	5.06 N=34	5.08 N=38	5.20 N=46	5.07 N=44	5.18 N=22	5.26 N=18	5.09 N=16	5.13 N=34	5.18 N=39
Technology attitude	4.77 N=55	4.82 N=34	4.78 N=38	4.80 N=46	4.71 N=44	4.72 N=22	5.06 N=18	5.03 N=16	4.62 N=34	4.85 N=39
Job sn work	3.32 N=52	3.35 N=33	3.24 N=39	3.41 N=46	3.55 N=44	3.22 N=22	2.97 N=18	2.90 N=16	3.64 N=33	3.24 N=36
Technology sn work	3.00 N=52	3.31 N=33	3.27 N=39	3.00 N=46	3.36 N=44	2.89 N=22	2.84 N=18	2.60 N=16	3.39 N=33	3.10 N=36
Job sn family	4.94 N=55	4.70 N=33	4.71 N=41	4.97 N=47	4.89 N=44	4.67 N=22	4.98 N=18	4.94 N=16	5.05 N=33	4.64 N=39
Technology sn family	4.39 N=55	4.32 N=33	4.46 N=41	4.28 N=47	4.41 N=44	4.09 N=22	4.58 N=18	4.03 N=16	4.50 N=33	4.38 N=39
Job pbc efficacy	4.05 N=55	3.98 N=33	3.89 N=41	4.13 N=48	4.09 N=45	3.82 N=24	4.10 N=20	4.38 N=16	4.14 N=34	3.77 N=39

Technology pbc efficacy	3.90 N=55	3.92 N=33	3.63 N=41	4.14 N=48	3.95 N=45	3.74 N=24	4.01 N=20	4.30 N=16	3.88 N=34	3.78 N=39
Job pbc control	4.12 N=55	4.29 N=33	4.21 N=40	4.17 N=48	4.09 N=44	4.26 N=24	4.32 N=20	4.13 N=16	4.06 N=33	4.32 N=39
Technology pbc control	4.02 N=55	4.33 N=33	4.14 N=41	4.14 N=48	4.03 N=44	4.17 N=24	4.35 N=20	4.17 N=16	3.97 N=34	4.27 N=39

9.13.1 Gender regressions.

Table 9-27 *Gender Regression Model Summary for Job Intent*

Gender	R	R Square	Adjusted R Square	Std. Error of the Estimate
Male	.477[a]	.227	.134	1.085
Female	.555[b]	.308	.224	.986

a. Predictors: (Constant), jpbccon, teched, techjob, edlevel, jsnfam, jattot, jsnwork, age, jpbceff

b. Predictors: (Constant), jpbccon, techjob, jsnwork, age, edlevel, jattot, jsnfam, jpbceff, teched

Table 9-28 *Gender Regression Coefficients for Job Intent*

		Unstandardized Coefficients		Standardized Coefficients		
Gender		B	Std. Error	Beta	t	Sig.
Male	(Constant)	1.459	1.283		1.138	.259
	teched	-.125	.263	-.054	-.476	.635
	techjob	-.482	.247	-.208	-1.950	.055
	age	-.340	.179	-.230	-1.904	.061
	edlevel	-.045	.214	-.024	-.212	.833
	jattot	.199	.240	.099	.831	.409
	jsnwork	.071	.124	.070	.577	.566
	jsnfam	.372	.120	.378	3.101	.003
	jpbceff	.180	.164	.148	1.095	.277
	jpbccon	-.079	.147	-.072	-.542	.590
Female	(Constant)	1.381	1.154		1.196	.236
	teched	-.627	.266	-.275	-2.359	.021
	techjob	-.342	.253	-.153	-1.354	.180
	age	-.074	.151	-.054	-.492	.624
	edlevel	.218	.163	.147	1.337	.185
	jattot	-.087	.213	-.046	-.409	.683
	jsnwork	.106	.118	.100	.904	.369
	jsnfam	.573	.137	.471	4.183	.000
	jpbceff	-.050	.143	-.040	-.352	.726
	jpbccon	.127	.132	.110	.962	.339

Table 9-29 *Gender Regression Model Summary for Technology Intent*

Gender	R	R Square	Adjusted R Square	Std. Error of the Estimate
Male	.431[a]	.186	.087	.922
Female	.514[b]	.264	.177	.935

a. Predictors: (Constant), tpbccon, tsnfam, techjob, age, edlevel, teched, tsnwork, tpbceff, tattot

b. Predictors: (Constant), tpbccon, tsnwork, edlevel, age, techjob, tattot, teched, tsnfam, tpbceff

Table 9-30 *Gender Regression Coefficients for Technology Intent*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Male	(Constant)	4.553	.940		4.843	.000
	teched	-.068	.223	-.035	-.306	.760
	techjob	-.305	.208	-.159	-1.466	.147
	age	-.187	.148	-.151	-1.263	.211
	edlevel	-.171	.182	-.110	-.943	.349
	tattot	.215	.173	.165	1.243	.218
	tsnwork	.089	.108	.101	.819	.415
	tsnfam	-.006	.095	-.009	-.067	.947
	tpbceff	-.172	.128	-.178	-1.346	.182
	tpbccon	-.194	.113	-.218	-1.708	.092
Female	(Constant)	1.980	.877		2.258	.027
	teched	-.696	.253	-.332	-2.748	.007
	techjob	-.395	.242	-.191	-1.631	.107
	age	-.342	.143	-.266	-2.383	.020
	edlevel	-.090	.146	-.065	-.612	.542
	tattot	.377	.166	.275	2.265	.026
	tsnwork	.113	.117	.116	.963	.338
	tsnfam	.141	.116	.148	1.216	.228
	tpbceff	-.076	.145	-.067	-.525	.601
	tpbccon	.049	.140	.043	.347	.730

a. Dependent Variable: tinttot

Table 9-31 *Gender Regression Model Summary for Job Behavior*

Gender	R	R Square	Adjusted R Square	Std. Error of the Estimate
Male	.521[a]	.272	.229	1.175
Female	.440[b]	.194	.145	1.322

a. Predictors: (Constant), jintot, teched, techjob, edlevel, age

b. Predictors: (Constant), jintot, age, techjob, edlevel, teched

Table 9-32 *Gender Regression Coefficients for Job Behavior*

Gender		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Male	(Constant)	1.492	.689		2.165	.033
	teched	-.034	.261	-.013	-.128	.898
	techjob	.302	.257	.114	1.177	.242
	age	-.174	.180	-.101	-.966	.337
	edlevel	.258	.222	.117	1.161	.249
	jintot	.582	.110	.506	5.279	.000
Female	(Constant)	1.442	.805		1.791	.077
	teched	.051	.349	.017	.146	.884
	techjob	-.003	.320	-.001	-.011	.991
	age	.160	.189	.091	.848	.399
	edlevel	.373	.202	.195	1.841	.069
	jintot	.466	.131	.366	3.553	.001

a. Dependent Variable: jbehtot

Table 9-33 *Gender Regression for Technology Behavior*

Gender	R	R Square	Adjusted R Square	Std. Error of the Estimate
Male	.601[a]	.361	.323	.899
Female	.449[b]	.201	.153	1.185

a. Predictors: (Constant), tinttot, teched, techjob, edlevel, age

b. Predictors: (Constant), tinttot, edlevel, age, techjob, teched

Table 9-34 *Gender Regression Coefficients for Technology Behavior*

		Unstandardized Coefficients		Standardized Coefficients		
Gender		B	Std. Error	Beta	t	Sig.
Male	(Constant)	.906	.513		1.767	.081
	teched	.181	.200	.083	.904	.369
	techjob	.198	.198	.091	1.004	.318
	age	.048	.137	.034	.350	.728
	edlevel	.067	.171	.037	.392	.696
	jintot	.609	.091	.601	6.672	.000
Female	(Constant)	1.765	.759		2.325	.023
	teched	.374	.310	.142	1.206	.231
	techjob	.164	.289	.064	.566	.573
	age	-.246	.174	-.155	-1.418	.160
	edlevel	.088	.181	.051	.486	.629
	jintot	.484	.131	.382	3.685	.000

a. Dependent Variable: jbehtot

9.14 Education Results

Table 9-35 *Education ANOVAs (between subjects effects)*

Job Depend	Non-technology education				Technology education			
	df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
jse	nonteched= 96				teched=83			
gender	1	.603	.340	.439	1	.792	.359	.376
techjob	1	.644	.363	.424	1	1.009	.457	.318
age	2	2.930	1.579	.058	2	1.213	.546	.303
edlevel	2	.121	.069	.886	2	1.422	.637	.247
jloc	nonteched= 96				teched=83			
gender	1	.123	.050	.726	1	1.268	.569	.264
techjob	1	.571	.231	.452	1	.009	.004	.923
age	**2**	**4.034**	**1.528**	**.021**	2	.692	.314	.504
edlevel	2	.600	.244	.551	2	2.095	.919	.130
jatt	nonteched= 96				teched=83			
gender	1	.934	.340	.336	1	.988	.285	.323
techjob	1	.077	.028	.782	**1**	**5.944**	**1.618**	**.017**
age	2	**4.184**	**1.429**	**.018**	2	.038	.011	.963
edlevel	2	.631	.232	.534	2	.404	.118	.669
jsnwork	nonteched= 91				teched=80			
gender	1	1.187	1.524	.279	1	.114	.124	.737
techjob	1	1.368	1.754	.245	1	1.875	2.001	.175
age	2	3.003	3.701	.055	2	1.274	1.365	.286
edlevel	2	**3.925**	**4.745**	**.023**	2	.261	.287	.771
jsnfam	nonteched= 94				teched=83			
gender	1	2.616	2.894	.109	1	3.262	3.411	.075
techjob	1	2.778	3.066	.099	1	1.129	1.212	.291
age	2	.439	.500	.646	2	.560	.609	.573
edlevel	2	.806	.911	.450	2	4.207	4.187	.018
jpbceff	nonteched= 94				teched=83			
gender	1	**4.837**	**4.525**	**.030**	1	.079	.056	.779
techjob	1	.545	.533	.462	1	.002	.001	.963
age	2	1.913	1.827	.154	2	.953	.665	.390

Tech Depend	Non-technology education				Technology education			
	df	*F*	η^2	*p*	*df*	*F*	η^2	*p*
tse	nonteched= 96				teched=83			
gender	1	**9.412**	**7.000**	**.003**	1	2.130	1.130	.148
techjob	1	.971	.786	.327	1	1.767	.941	.188
age	2	1.281	1.031	.283	2	.206	.113	.814
edlevel	2	1.085	.877	.342	2	2.511	1.302	.088
tloc	nonteched= 96				teched=83			
gender	1	1.917	.587	.169	1	.148	.048	.701
techjob	1	.010	.003	.919	1	.750	.240	.389
age	2	.650	.203	.524	2	.071	.023	.932
edlevel	2	.160	.050	.853	2	.094	.031	.910
tatt	nonteched= 96				teched=83			
gender	1	.047	.032	.830	1	1.106	.388	.317
techjob	1	.162	.111	.688	1	.040	.016	.841
age	2	2.907	1.904	.060	2	.961	.368	.387
edlevel	2	.866	.592	.424	2	.715	.275	.492
tsnwork	nonteched= 96				teched=81			
gender	1	1.335	1.693	.251	1	.092	.090	.763
techjob	1	.028	.036	.867	1	.000	.000	.988
age	2	1.10	1.397	.338	2	1.277	1.232	.285
edlevel	2	**3.071**	**3.737**	**.051**	2	.308	.305	.736
tsnfam	nonteched= 95				teched=81			
gender	1	1.274	1.978	.262	1	2.587	3.155	.112
techjob	1	.142	.223	.707	1	.348	.436	.557
age	2	.719	1.127	.490	2	1.113	1.380	.334
edlevel	2	1.806	2.766	.170	**2**	**4.361**	**5.004**	**.016**
tpbceff	nonteched= 96				teched=83			
gender	1	**10.118**	**9.887**	**.002**	1	2.443	1.978	.122
techjob	1	.511	.550	.476	1	.307	.255	.581
age	2	1.101	1.177	.337	2	.418	.349	.660

edlevel	2	**3.206**	**2.982**	**.045**	2	.815	.571	.446	edlevel	2	.521	.563	.596	2	1.161	.952	.319
jpbcontrol		nonteched= 94				teched=83			tpbcon		nonteched= 96				teched=83		
gender	1	**9.121**	**9.507**	**.003**	1	3.413	3.208	.068	gender	1	3.218	3.677	.076	1	1.661	1.413	.201
techjob	1	.785	.892	.378	1	.000	.000	.985	techjob	1	.391	.460	.533	1	.395	.342	.531
age	2	1.018	1.153	.365	2	**6.695**	**5.688**	**.002**	age	2	2.425	2.752	.094	2	2.507	2.073	.088
edlevel	2	.379	.436	.685	2	1.812	1.719	.170	edlevel	2	.054	.064	.948	2	.838	.722	.436

Table 9-36 *Education Repeated Measures*

	Non-technology education									**Technology education**							
	Within				Between					Within				Between			
self-efficacy																	
N=96	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	***N*=83**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
gender	**1**	**7.021L**	**2.128**	**.009**	**1**	**5.192**	**5.211**	**.025**	**gender**	1	.498	.107	.482	1	1.798	1.382	.184
techjob	1	3.530	1.108	.063	1	.038	.041	.845	techjob	1	.200	.043	.656	1	1.762	1.355	.188
age	2	.306	.100	.737	2	2.469	2.510	.090	age	2	2.358	.489	.101	2	.215	.170	.807
edlevel	2	2.294	.720	.107	2	.213	.227	.809	edlevel	2	1.024	.219	.364	2	2.286	1.720	.108
locus of control																	
***N*=96**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	***N*=83**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
gender	1	1.493	.147	.225	1	.798	.490	.374	gender	1	.784	.107	.379	1	.636	.405	.428
techjob	1	1.468	.145	.229	1	.145	.090	.704	techjob	1	.788	.108	.377	1	.207	.133	.650
age	**2**	**4.584**	**.422**	**.013**	2	2.187	1.308	.118	**age**	2	.976	.133	.382	2	.035	.023	.965
edlevel	2	.904	.090	.408	2	.328	.204	.721	edlevel	2	1.041	.142	.358	2	.608	.389	.547
attitude																	
***N*=96**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	***N*=83**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
gender	1	.362	.082	.549	1	.352	.291	.555	gender	1	.024	.004	.877	1	1.323	.669	.253
techjob	1	.559	.126	.456	1	.016	.014	.898	techjob	1	**4.19**	**.658**	**.044**	1	1.944	.976	.167
age	2	.074	.017	.928	2	**4.319**	**3.316**	**.016**	age	2	.832	.136	.439	2	.472	.243	.625
edlevel	2	.182	.041	.834	2	.951	.782	.390	edlevel	2	2.278	.360	.109	2	.064	.033	.938
snwork																	
***N*=90**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	***N*=80**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
gender	1	.042	.021	.838	1	1.746	3.603	.190	gender	1	2.121	.340	.149	1	.004	.007	.951
techjob	1	1.069	.516	.304	1	.653	1.365	.421	techjob	1	**4.926**	**.762**	**.029**	1	.673	1.271	.414
age	2	.531	.259	.590	2	2.511	5.056	.087	age	2	.970	.158	.384	2	1.397	2.60	.254
edlevel	2	.108	.053	.897	2	**4.207**	**8.168**	**.018**	edlevel	2	.116	.019	.891	2	.359	.686	.699
snfamily																	
***N*=95**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	***N*=80**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
gender	1	.075	.040	.784	1	2.236	4.790	.138	gender	1	.067	.017	.796	1	3.833	7.558	.054
techjob	1	1.671	.869	.199	1	1.181	2.559	.280	techjob	1	**5.608**	**1.349**	**.020**	1	.009	.019	.924
age	2	.515	.272	.599	2	.612	1.338	.545	age	2	.598	.154	.553	2	.952	1.947	.390
edlevel	2	**3.981L**	**1.961**	**.022**	2	.809	1.762	.449	edlevel	2	.050	.013	.951	2	**5.283L**	**9.736**	**.007**

pbcefficacy																		
***N*=94**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	***N*=83**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
gender	1	1.664	.471	.200	1	**8.325**	**13.651**	**.005**	**gender**	1	**4.083**	**.917**	**.047**	1	.851	1.063	.359
techjob	1	.002	.001	.963	1	.571	1.015	.452	techjob	1	.156	.037	.694	1	.216	.272	.643
age	2	.167	.048	.847	2	1.770	3.079	.176	age	2	.131	.031	.878	2	.386	.489	.681
edlevel	2	2.065	.576	.133	2	1.692	2.947	.190	edlevel	2	.332	.079	.718	2	1.052	1.310	.354
pbccontrol																		
***N*=94**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*	***N*=83**	*df*	*F*	η^2	*p*	*df*	*F*	η^2	*p*
gender	1	1.570	.506	.213	1	**7.966**	**14.497**	**.006**	**gender**	1	.736	.181	.394	1	2.876	4.439	.094
techjob	**1**	**5.825**	**1.794**	**.018**	1	.009	.018	.924	**techjob**	1	.648	.160	.423	1	.114	.182	.737
age	2	.486	.159	.617	2	1.739	3.350	.182	**age**	2	1.928	.463	.152	2	**5.081**	**7.297**	**.008**
edlevel	2	.726	.237	.486	2	.111	.222	.895	edlevel	2	.563	.140	.572	2	1.474	2.301	.235

B – Box is statistically significant p<.005, L-Levene’s is statistically significant p<.05

Table 9-37 *Non-technology Education Means*

	Job type		Age			Education level		
	Non-techjob	Techjob	20-34	35-44	45 and over	Some post-secondary	Undergrad	Graduate
Job self-efficacy	4.90 N=40	5.02 N=56	4.81 N=33	4.90 N=36	5.25 N=27	5.04 N=17	4.98 N=37	4.93 N=42
Technology self-efficacy	4.87 N=40	4.68 N=56	4.69 N=33	4.65 N=31	4.99 N=25	4.52 N=17	4.72 N=33	4.89 N=42
Job locus of control	4.28 N=40	4.38 N=56	4.22 N=33	4.24 N=36	4.63 N=27	4.49 N=17	4.33 N=33	4.29 N=42
Technology locus of control	4.32 N=40	4.31 N=56	4.23 N=33	4.33 N=36	4.39 N=27	4.33 N=17	4.34 N=33	4.28 N=42
Job attitude	5.16 N=40	5.13 N=56	5.02 N=33	5.05 N=36	5.42 N=27	5.28 N=17	5.08 N=37	5.14 N=42
Technology attitude	4.72 N=40	4.79 N=56	4.61 N=33	4.65 N=36	5.07 N=27	4.98 N=17	4.66 N=37	4.75 N=42
Job sn work	3.04 N=37	3.33 N=54	3.42 N=32	3.36 N=33	2.76 N=26	2.86 N=17	3.61 N=36	2.99 N=38
Technology sn work	2.86 N=37	2.90 N=54	3.04 N=32	2.95 N=33	2.61 N=26	2.61 N=17	3.24 N=36	2.67 N=38
Job sn family	4.58 N=40	4.94 N=56	4.65 N=33	4.89 N=36	4.81 N=27	4.88 N=17	4.92 N=37	4.63 N=42
Technology sn family	4.21 N=40	4.30 N=56	4.08 N=33	4.29 N=36	4.46 N=27	3.76 N=17	4.45 N=37	4.30 N=42
Job pbc efficacy	4.14 N=40	4.30 N=55	4.31 N=33	3.99 N=35	4.45 N=27	4.51 N=17	4.42 N=36	3.95 N=42
Technology pbc efficacy	4.09 N=40	4.24 N=55	4.20 N=33	4.00 N=35	4.39 N=27	4.35 N=17	4.22 N=36	4.07 N=42

Job pbc control	4.51 N=40	4.32 N=54	4.32 N=32	4.28 N=35	4.64 N=27	4.20 N=17	4.42 N=35	4.46 N=42
Technology pbc control	4.10 N=40	4.24 N=54	4.04 N=32	4.03 N=35	4.57 N=27	4.22 N=17	4.14 N=35	4.21 N=42

Table 9-38 *Technology Education*

	Job type		Age			Education level		
	Non-techjob	Techjob	20-34	35-44	45 and over	Some post-secondary	Undergrad	Graduate
Job self-efficacy	4.72 N=47	4.87 N=36	4.75 N=53	4.71 N=14	5.09 N=8	5.20 N=6	4.78 N=46	4.70 N=31
Technology self-efficacy	4.99 N=47	5.20 N=36	5.07 N=53	5.18 N=14	5.00 N=8	5.45 N=6	5.17 N=46	4.87 N=31
Job locus of control	4.22 N=47	4.23 N=36	4.23 N=58	4.08 N=15	4.40 N=10	4.64 N=5	4.27 N=42	4.07 N=28
Technology locus of control	4.37 N=47	4.25 N=36	4.31 N=58	4.37 N=15	4.30 N=10	4.39 N=5	4.33 N=42	4.29 N=28
Job attitude	5.01 N=47	5.29 N=36	5.13 N=58	5.17 N=15	5.12 N=10	4.97 N=5	5.17 N=42	5.11 N=28
Technology attitude	4.89 N=47	4.92 N=36	4.85 N=58	5.09 N=15	4.97 N=10	5.19 N=5	4.87 N=42	4.90 N=28
Job sn work	3.26 N=46	3.58 N=34	3.49 N=55	3.01 N=15	3.40 N=10	3.20 N=6	3.47 N=43	3.33 N=31
Technology sn work	3.27 N=46	3.27 N=34	3.38 N=55	2.97 N=15	3.06 N=10	3.13 N=6	3.35 N=43	3.18 N=31
Job sn family	4.84 N=47	5.09 N=34	5.02 N=56	4.70 N=15	4.90 N=10	4.67 N=6	5.24 N=44	4.58 N=31
Technology sn family	4.62 N=47	4.47 N=34	4.68 N=56	4.30 N=15	4.25 N=10	4.33 N=6	4.88 N=44	4.15 N=31
Job pbc efficacy	4.01 N=47	4.01 N=36	3.96 N=58	3.98 N=15	4.35 N=10	4.29 N=6	3.91 N=46	4.10 N=31
Technology pbc efficacy	4.05 N=47	4.17 N=36	4.08 N=55	4.03 N=15	4.36 N=10	4.63 N=6	4.03 N=46	4.12 N=31

Job pbc control	4.53 N=47	4.53 N=36	4.29 N=58	5.07 N=15	5.13 N=10	4.72 N=6	4.35 N=46	4.76 N=31
Technology pbc control	4.55 N=47	4.42 N=36	4.34 N=58	4.78 N=15	4.90 N=10	4.50 N=6	4.38 N=46	4.66 N=31

9.14.1 Education regressions.

The regression models accounts for only 15.8% of the intention to upgrade job skills for the non-technology education group, but increases to 29.2% for those with a technology education. The only statistically significant coefficient is subjective norms for family.

Table 9-39 *Education Regression for Job Intention*

education	R	R Square	Adjusted R Square	Std. Error of the Estimate
Non-teched	.494[a]	.244	.158	1.110
teched	.611[b]	.373	.292	.895

a. Predictors: (Constant), jpbccon, edlevel, techjob, age, jsnfam, Gender, jsnwork, jattot, jpbceff

b. Predictors: (Constant), jpbccon, techjob, jsnfam, Gender, jpbceff, age, jsnwork, jattot, edlevel

Table 9-40 *Education Regression Coefficients for Job Intention*

		Unstandardized Coefficients		Standardized Coefficients		
Education		B	Std. Error	Beta	t	Sig.
Non-teched	(Constant)	.852	1.224		.696	.488
	Gender	.475	.277	.195	1.717	.090
	techjob	-.326	.261	-.133	-1.251	.215
	age	-.213	.160	-.141	-1.331	.187
	edlevel	.059	.174	.037	.342	.733
	jattot	.167	.240	.085	.694	.489
	jsnwork	-.039	.126	-.037	-.309	.758
	jsnfam	.435	.133	.391	3.267	**.002**
	jpbceff	-.108	.159	-.089	-.678	.500
	jpbccon	.267	.148	.240	1.804	.075
teched	(Constant)	2.984	1.143		2.612	.011
	Gender	-.300	.223	-.140	-1.347	.182
	techjob	-.384	.252	-.179	-1.525	.132
	age	-.211	.166	-.140	-1.268	.209
	edlevel	.119	.210	.068	.568	.572
	jattot	-.200	.215	-.102	-.930	.355
	jsnwork	.204	.112	.199	1.822	.073
	jsnfam	.405	.113	.388	3.592	**.001**
	jpbceff	.190	.137	.150	1.388	.170
	jpbccon	-.227	.126	-.213	-1.801	.076

Table 9-41 *Education Regression for Technology Intention*

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Non-teched	.484[a]	.234	.148	.938
teched	.474[b]	.224	.125	.913

a. Predictors: (Constant), tpbccon, tsnwork, edlevel, techjob, age, Gender, tattot, tpbceff, tsnfam

b. Predictors: (Constant), tpbccon, techjob, tsnwork, tsnfam, age, Gender, tpbceff, tattot, edlevel

The percent explained by the model falls for the technology version for both the non-technology and technology education groups: 14.8% and 12.5% respectively. In this model, attitude has a positive effect and having a technology job has a negative effect for the non-technology education group. For the technology education group, age has a negative effect and subjective norm family has a positive effect.

Table 9-42 *Education Regression Coefficients for Technology Intention*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Non-teched	(Constant)	2.751	.840		3.277	.002
	Gender	.089	.227	.043	.393	.696
	age	-.211	.133	-.166	-1.592	.115
	edlevel	-.113	.141	-.083	-.803	.425
	techjob	-.427	.217	-.206	-1.973	**.052**
	tattot	.463	.149	.386	3.113	**.003**
	tsnwork	.159	.117	.177	1.365	.176
	tsnfam	-.040	.111	-.050	-.363	.717
	tpbceff	-.085	.135	-.086	-.633	.529
	tpbccon	-.147	.121	-.154	-1.216	.228
teched	(Constant)	2.944	1.156		2.546	.013
	Gender	-.277	.226	-.141	-1.224	.225
	age	-.331	.169	-.234	-1.963	**.054**
	edlevel	.169	.213	.104	.793	.430
	techjob	-.016	.249	-.008	-.065	.948
	tattot	-.044	.206	-.027	-.214	.831
	tsnwork	.122	.110	.124	1.107	.272
	tsnfam	.252	.112	.286	2.255	**.027**
	tpbceff	-.111	.131	-.103	-.841	.403
	tpbccon	-.001	.134	-.001	-.008	.994

Table 9-43 *Education Regression for Job Behavior*

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Non-teched	.548[a]	.300	.262	1.229
teched	.396[b]	.157	.102	1.266

a. Predictors: (Constant), jintot, edlevel, techjob, age, Gender,

b. Predictors: (Constant), jintot, edlevel, techjob, age, Gender,

Table 9-44 *Education Regression Coefficients for Job Behavior*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Non-teched	(Constant)	.882	.628		1.404	.164
	Gender	.003	.273	.001	.011	.991
	techjob	.160	.267	.055	.599	.551
	age	.092	.161	.051	.575	.567
	edlevel	.204	.173	.106	1.175	.243
	jintot	.644	.109	.542	5.908	.000
teched	(Constant)	1.951	.806		2.419	.018
	Gender	-.010	.297	-.004	-.033	.974
	techjob	.301	.329	.112	.916	.362
	age	-.270	.224	-.141	-1.203	.233
	edlevel	.649	.284	.291	2.282	.025
	jintot	.376	.134	.302	2.805	.006

Table 9-45 *Education Regression for Technology Behavior*

education	R	R Square	Adjusted R Square	Std. Error of the Estimate
Non-teched	.532[a]	.283	.243	1.093
teched	.451[b]	.204	.152	1.006

a. Predictors: (Constant), tintot, Gender, age, edlevel, techjob

b. Predictors: (Constant), tintot, techjob, Gender, age, edlevel

Table 9-46 *Education Regression Coefficients for Technology Behavior*

Education		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
Non-teched	(Constant)	1.207	.596		2.024	.046
	gender	-.151	.237	-.060	-.637	.526
	techjob	.171	.241	.067	.708	.481
	age	-.106	.144	-.067	-.737	.463
	edlevel	.052	.156	.031	.332	.740
	tintot	.617	.108	.535	5.701	.000
teched	(Constant)	1.605	.626		2.563	.012
	gender	.192	.239	.087	.805	.423
	techjob	.268	.260	.122	1.029	.307
	age	-.114	.179	-.073	-.636	.527
	edlevel	.216	.226	.119	.955	.342
	tintot	.469	.116	.429	4.061	.000

9.15 Job Type Results Tables

Table 9-47 *Job Type ANOVAs*

Job Depend	Non-technology job				Technology job				Tech Depend	Non-technology job				Technology job			
	df	F	η^2	*p*	*df*	F	η^2	*p*		*df*	F	η^2	*p*	*df*	F	η^2	*p*
jse	Nontech =87				tech=92				tse	Nontech =87				tech=92			
gender	1	1.322	.650	.254	1	.048	.026	.827	**gender**	1	**9.957**	**5.059**	**.002**	.1	**4.642**	**3.785**	**.034**
teched	1	1.394	.685	.241	1	.965	.513	.328	**teched**	1	.530	.299	.469	1	**7.363**	**5.836**	**.008**
age	**2**	**6.120**	**2.698**	**.003**	2	2.822	1.441	.065	age	2	1.332	.741	.270	2	1.514	1.270	.226
edlevel	2	.850	.241	.431	1	.316	.170	.730	edlevel	1	.014	.008	.986	1	.757	.646	.472
jloc	Nontech =87				tech=92				tloc	Nontech =87				tech=92			
gender	1	.836	.452	.363	1	.057	.018	.812	gender	1	.275	.088	.602	.1	1.482	.452	.227
teched	1	.174	.095	.677	1	1.572	.502	.213	teched	1	.145	.047	.704	1	.189	.059	.665
age	2	1.048	.565	.355	2	**4.658**	**1.384**	**.012**	age	2	.081	.027	.922	2	1.098	.336	.338
edlevel	1	.618	.336	.541	1	1.751	.553	.180	edlevel	1	.691	.222	.504	1	.007	.002	.993
jatt	Nontech =87				tech=92				tatt	Nontech =87				tech=92			
gender	1	.000	.000	1.00	1	.011	.003	.918	gender	1	.132	.078	.717	.1	.261	.135	.610
teched	1	1.233	.498	.270	1	2.40	.596	.125	teched	1	1.157	.677	.285	1	.784	.403	.378
age	2	2.506	.979	.088	2	2.072	.510	.132	age	2	1.207	.704	.304	2	1.413	.718	.249
edlevel	1	1.059	.428	.351	1	.921	.232	.402	edlevel	1	.747	.440	.477	1	.591	.306	.556
jsnwork	Nontech =87				tech=92				tsnwork	Nontech =87				tech=92			
gender	1	.298	.408	.586	1	.009	.009	.926	gender	1	1.963	2.447	.165	.1	.153	.167	.697
teched	1	.685	.933	.410	1	1.293	1.310	.259	teched	1	2.668	3.298	.106	1	2.710	2.877	.103
age	2	.518	.711	.598	2	**3.395**	**3.271**	**.038**	age	2	1.769	2.189	.177	2	1.829	1.942	.167
edlevel	1	2.928	3.791	.059	1	2.304	2.273	.106	**edlevel**	1	**3.130**	**3.750**	**.049**	1	2.055	2.173	.134
jfam	Nontech =87				tech=92				tsnfam	Nontech =87				tech=92			
gender	1	.006	.010	.937	1	.096	.068	.757	gender	.1	.049	.083	.825	.1	.628	.767	.430
teched	1	1.024	1.522	.314	1	.679	.481	.412	teched	1	2.205	3.625	.141	1	.496	.607	.483
age	2	.462	.696	.632	2	1.377	.962	.258	age	2	.290	.491	.749	2	.389	.480	.679
edlevel	1	1.686	2.467	.192	1	2.492	1.700	.089	edlevel	1	2.757	4.413	.069	1	2.387	2.816	.098
jpbceff	Nontech =87				tech=92				tpbceff	Nontech =87				tech=92			
gender	1	2.90	2.477	.092	1	.350	.295	.556	**gender**	1	**18.04**	**14.86**	**.000**	.1	.552	.511	.459
teched	1	.471	.414	.494	1	2.089	1.725	.152	teched	1	.023	.024	.879	1	.131	.121	.719
age	2	1.590	1.369	.210	2	**5.766**	**4.358**	**.004**	age	2	.305	.307	.738	2	2.427	2.166	.094
edlevel	1	.073	.065	.930	1	3.653	2.883	.030	edlevel	1	.096	.097	.908	1	.863	.797	.425

jpbcontrol	Nontech =87				tech=92				tpbcon	Nontech =87				tech=92			
gender	1	**7.893**	**7.417**	**.006**	1	**4.933**	**5.173**	**.029**	gender	1	3.218	3.349	.076	.1	2.976	2.994	.088
teched	1	.008	.008	.931	1	.898	.984	.346	**teched**	1	**4.068**	**4.193**	**.047**	1	.633	.653	.428
age	2	**3.084**	**2.986**	**.051**	2	.729	.802	.485	age	2	1.687	1.773	.191	2	1.835	1.851	.166
edlevel	1	.672	.688	.514	1	.368	.408	.693	edlevel	1	.770	.826	.466	1	.037	.039	.964

Table 9-48 *Job Type Repeated Measures*

	Non-technology job									Technology job							
	Within				Between					Within				Between			
self-efficacy																	
N=87	*df*	F	η^2	*p*	*df*	F	η^2	*p*	*N*=92	*df*	F	η^2	*p*	*df*	F	η^2	*p*
gender	1	**5.143**	**1.041**	**.026**	1	**5.855**	**4.667**	**.018**	gender	1	**4.377**	**1.593**	**.040**	1	2.252	2.218	.137
teched	1	**4.635**	**.944**	**.034**	1	.046	.039	.830	teched	1	**14.840**	**4.904**	**.000**	1	1.454	1.444	.231
age	2	1.620	.339	.204	2	**3.933**	**3.101**	**.023**	age	2	2.277	.843	.109	2	1.908	1.868	.154
edlevel	2	.809	.173	.449	2	.299	.256	.742	edlevel	2	1.161	.441	.318	2	.371	.375	.691
locus of control																	
N=86	*df*	F	η^2	*p*	*df*	F	η^2	*p*	*N*=89	*df*	F	η^2	*p*	*df*	F	η^2	*p*
gender	1	.481	.056	.490	1	.577	.433	.449	gender	1	1.328	.152	.252	1	.619	.315	.434
teched	1	1.022	.119	.315	1	.002	.002	.964	teched	1	1.116	.128	.294	1	.969	.491	.328
age	2	**3.674**	**.403**	**.030**	2	.222	.169	.801	age	2	1.717	.194	.186	2	2.360	1.159	.100
edlevel	2	.610	.072	.546	2	.625	.471	.538	edlevel	2	1.303	.149	.277	2	.366	.188	.695
attitude																	
N=87	*df*	F	η^2	*p*	*df*	F	η^2	*p*	*N*=92	*df*	F	η^2	*p*	*df*	F	η^2	*p*
gender	1	.217	.039	.642	1	.048	.039	.828	gender	1	.404	.088	.527	1	.090	.050	.765
teched	1	**6.997**	**1.167**	**.010**	1	.008	.007	.927	teched	1	.043	.009	.836	1	1.822	.989	.180
age	2	.062	.011	.940	2	2.112	1.179	.127	age	2	.223	.049	.801	2	2.209	1.179	.116
edlevel	2	.264	.048	.769	2	1.011	.820	.368	edlevel	2	1.134	.245	.326	2	.530	.293	.591
snwork																	
N=82	*df*	F	η^2	*p*	*df*	F	η^2	*p*	*N*=88	*df*	F	η^2	*p*	*df*	F	η^2	*p*
gender	1	2.486	.429	.119	1	.987	2.426	.324	gender	1	.002	.001	.964	1	.017	.027	.897
teched	1	2.025	.351	.159	1	1.600	3.903	.210	teched	1	.349B	.165	.556	1	2.593	4.098	.111
age	2	1.132	.198	.327	2	1.119	2.742	.332	age	2	.455	.216	.636	2	**3.226**	**4.940**	**.045**
edlevel	2	.338	060	.714	2	**3.211**	**7.485**	**.046**	edlevel	2	.079	.038	.924	2	2.749	4.253	.070
snfamily																	
N=85	*df*	F	η^2	*p*	*df*	F	η^2	*p*	*N*=90	*df*	F	η^2	*p*	*df*	F	η^2	*p*
gender	1	.500	.177	.482	1	.000	.000	.994	gender	1	.547L*	.233	.462	1	.479	.726	.491
teched	1	.287	.102	.594	1	2.036	5.636	.157	teched	1	.000	.000	.994	1	.642	.971	.425
age	2	1.384L	.482	.256	2	.223	.637	.800	age	2	.245	.105	.784	2	.880	1.329	.418
edlevel	2	**3.178**	**1.062**	**.047**	2	2.368	6.424	.100	edlevel	2	.549	.235	.579	2	2.879	4.161	.062
pbc efficacy																	
N=86	*df*	F	η^2	*p*	*df*	F	η^2	*p*	*N*=91	*df*	F	η^2	*p*	*df*	F	η^2	*p*
gender	1	**13.99L**	**3.057**	**.000**	1	**9.587**	**13.725**	**.003**	gender	1	.024	.007	.877	1	.484	.723	.489

teched	1	.937	.236	.336	1	.311	.494	.579	teched	1	1.853	.510	.177	1	.879	1.308	.351
age	2	.962	.242	.386	2	.734	1.164	.483	age	2	.600	.168	.551	2	**4.792**	**6.565**	**.011**
edlevel	2	.267	.068	.767	2	.027	.043	.974	edlevel	2	1.810	.493	.170	2	2.219	3.210	.115
pbc control																	
N=85	*df*	F	η^2	*p*	*df*	F	η^2	*p*	*N*=91	*df*	F	η^2	*p*	*df*	F	η^2	*p*
gender	1	1.570	.523	.214	1	**6.469 L**	**10.706**	**.013**	gender	1	.156	.039	.694	1	**5.221**	**9.121**	**.025**
teched	1	**6.587**	**2.071**	**.012**	1	1.144	2.012	.288	teched	1	.288	.071	.593	1	.703	1.291	.404
age	2	.434	.147	.650	2	2.805	4.742	.066	age	2	.440	.109	.646	2	1.145	2.087	.323
edlevel	2	.087	.030	.917	2	.791	1.401	.457	edlevel	2	1.319	.320	.273	2	.066	.123	.936

B – Box is statistically significant p<.005, L-Levene's is statistically significant for technology version p<.05 (except * statistically significant for job version)

Table 9-49 *Non-technology Job Means*

	Age			Education level		
	20-34	35-44	45 and over	Some post-secondary	Undergrad	Graduate
Job self-efficacy	4.56 N=43	4.94 N=25	5.15 N=19	5.18 N=5	4.76 N=37	4.76 N=45
Technology self-efficacy	4.82 N=43	4.96 N=25	5.15 N=19	4.98 N=5	4.94 N=37	4.92 N=45
Job locus of control	4.19 N=43	4.18 N=25	4.46 N=19	4.59 N=5	4.26 N=37	4.20 N=45
Technology locus of control	4.35 N=42	4.37 N=25	4.30 N=19	4.50 N=5	4.40 N=37	4.28 N=44
Job attitude	4.94 N=43	5.13 N=25	5.32 N=19	5.30 N=5	4.97 N=37	5.14 N=45
Technology attitude	4.70 N=43	4.85 N=25	5.02 N=19	5.17 N=5	4.73 N=37	4.84 N=45
Job sn work	3.26 N=41	3.18 N=24	2.92 N=18	2.08 N=5	3.38 N=35	3.11 N=43
Technology sn work	3.27 N=41	3.07 N=24	2.67 N=17	2.12 N=5	3.35 N=35	2.98 N=43
Job sn family	4.69 N=43	4.90 N=25	4.55 N=19	4.90 N=5	5.03 N=33	4.46 N=40
Technology sn family	4.54 N=42	4.35 N=24	4.29 N=19	3.70 N=5	4.78 N=36	4.23 N=44
Job pbc efficacy	3.89 N=43	4.24 N=25	4.25 N=19	4.00 N=5	4.03 N=37	4.11 N=45
Technology pbc efficacy	3.99 N=43	4.10 N=25	4.21 N=18	4.25 N=5	4.04 N=37	4.07 N=44
Job pbc control	4.26 N=42	4.69 N=25	4.88 N=18	4.13 N=5	4.45 N=36	4.62 N=45
Technology pbc control	4.16 N=43	4.44 N=24	4.64 N=19	4.00 N=5	4.24 N=36	4.47 N=45

Table 9-50 *Technology Job Means*

	Age			Education level		
	20-34	35-44	45 and over	Some post-secondary	Undergrad	Graduate
Job self-efficacy	4.96 N=48	4.75 N=26	5.27 N=18	5.05 N=18	4.97 N=46	4.88 N=28
Technology self-efficacy	5.03 N=48	4.65 N=26	4.83 N=18	4.71 N=18	5.00 N=46	4.82 N=28
Job locus of control	4.26 N=48	4.21 N=26	4.67 N=18	4.51 N=18	4.33 N=46	4.20 N=28
Technology locus of control	4.22 N=47	4.31 N=25	4.44 N=17	4.30 N=17	4.28 N=45	4.28 N=27
Job attitude	5.21 N=48	5.04 N=26	5.35 N=18	5.17 N=18	5.26 N=46	5.10 N=28
Technology attitude	4.82 N=48	4.71 N=26	5.07 N=18	5.00 N=18	4.82 N=46	4.77 N=28
Job sn work	3.65 N=46	3.33 N=24	2.96 N=18	3.19 N=18	3.65 N=44	3.20 N=26
Technology sn work	3.24 N=47	2.85 N=25	2.80 N=18	2.92 N=18	3.26 N=45	2.77 N=27
Job sn family	5.07 N=46	4.77 N=26	5.14 N=18	4.76 N=17	5.26 N=42	4.84 N=25
Technology sn family	4.38 N=47	4.23 N=26	4.53 N=18	3.97 N=17	4.60 N=42	4.25 N=25
Job pbc efficacy	4.26 N=48	3.73 N=25	4.61 N=18	4.58 N=18	4.22 N=45	3.87 N=28
Technology pbc efficacy	4.24 N=48	3.92 N=25	4.56 N=18	4.47 N=18	4.17 N=46	4.11 N=28
Job pbc control	4.33 N=48	4.33 N=25	4.67 N=18	4.39 N=18	4.32 N=45	4.54 N=28
Technology pbc control	4.31 N=48	4.08 N=26	4.67 N=18	4.37 N=18	4.30 N=46	4.30 N=28

9.15.1 Job type regressions.

Table 9-51 *Regression Model for Job Intent by Job Type*

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Nontechjob	.437[a]	.191	.090	1.075
techjob	.538[b]	.289	.206	1.032

a. Predictors: (Constant), jpbccon, teched, jsnfam, edlevel, Gender, jsnwork, age, jpbceff, jattot

b. Predictors: (Constant), jpbccon, edlevel, jsnfam, age, Gender, jattot, jpbceff, jsnwork, teched

Table 9-52 *Regression Coefficients for Job Intent by Job Type*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Nontechjob	(Constant)	1.772	1.113		1.593	.116
	gender	.017	.260	.007	.064	.949
	teched	-.248	.266	-.110	-.931	.355
	age	-.062	.168	-.044	-.368	.714
	edlevel	.047	.218	.025	.215	.830
	jattot	.234	.237	.134	.986	.327
	jsnwork	.044	.116	.046	.377	.707
	jsnfam	.339	.113	.370	3.005	.004
	jpbceff	-.017	.154	-.014	-.110	.912
	jpbccon	-.079	.161	-.072	-.489	.626
techjob	(Constant)	.721	1.392		.518	.606
	gender	.186	.257	.081	.724	.471
	teched	-.517	.298	-.219	-1.736	.087
	age	-.359	.165	-.248	-2.178	.032
	edlevel	.035	.179	.022	.197	.844
	jattot	.034	.239	.015	.142	.888
	jsnwork	.022	.139	.019	.156	.877
	jsnfam	.656	.160	.481	4.087	.000
	jpbceff	-.005	.158	-.004	-.030	.976
	jpbccon	.096	.127	.087	.754	.453

a. Dependent Variable: jintot

Table 9-53 *Regression Model Technology Intent by Job Type*

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Nontechjob	.441[a]	.195	.091	1.019
techjob	.435[b]	.189	.098	.876

a. Predictors: (Constant), tpbccon, tsnwork, edlevel, Gender, tsnfam, age, teched, tattot, tpbceff

b. Predictors: (Constant), tpbccon, edlevel, tsnfam, age, Gender, tattot, tpbceff, teched, tsnwork

Table 9-54 *Regression Coefficients for Technology Intent by Job Type*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Nontechjob	(Constant)	3.974	1.073		3.705	.000
	gender	-.122	.260	-.057	-.469	.641
	teched	-.423	.263	-.197	-1.608	.112
	age	-.311	.163	-.229	-1.902	.061
	edlevel	-.215	.201	-.124	-1.072	.287
	tattot	.203	.198	.147	1.024	.309
	tsnwork	.055	.118	.058	.467	.642
	tsnfam	.100	.111	.123	.899	.372
	tpbceff	-.082	.155	-.076	-.526	.601
	tpbccon	-.118	.149	-.114	-.793	.430
techjob	(Constant)	2.042	.837		2.439	.017
	gender	-.061	.207	-.033	-.295	.769
	teched	-.194	.232	-.103	-.835	.406
	age	-.184	.135	-.158	-1.363	.177
	edlevel	.003	.139	.002	.022	.982
	tattot	.399	.154	.311	2.601	.011
	tsnwork	.181	.114	.205	1.594	.115
	tsnfam	.029	.108	.034	.264	.792
	tpbceff	-.137	.122	-.140	-1.121	.266
	tpbccon	-.062	.111	-.068	-.558	.578

a. Dependent Variable: tinttot

Table 9-55 *Job Behavior Regression*

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Nontechjob	.615[a]	.378	.340	1.231
techjob	.311[b]	.097	.044	1.227

a. Predictors: (Constant), jintot, age, Gender, teched, edlevel

b. Predictors: (Constant), jintot, edlevel, Gender, age, teched

Table 9-56 *Job Behavior Regression Coefficients*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Nontechjob	(Constant)	.070	.676		.103	.918
	gender	.186	.269	.062	.691	.492
	teched	.026	.283	.009	.092	.927
	age	-.021	.181	-.011	-.117	.907
	edlevel	.528	.236	.211	2.244	.028
	jintot	.764	.117	.580	6.540	.000
Techjob	(Constant)	2.822	.715		3.949	.000
	gender	-.069	.284	-.027	-.241	.810
	teched	-.065	.318	-.026	-.206	.838
	age	-.095	.186	-.059	-.509	.612
	edlevel	.163	.189	.091	.863	.390
	jintot	.315	.116	.287	2.721	.008

a. Dependent Variable: jbehtot

Table 9-57 *Technology Behavior Regression*

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Nontechjob	.616[a]	.379	.341	1.009
Techjob	.402[b]	.162	.113	1.079

a. Predictors: (Constant), tintot, Gender, teched, edlevel, age

b. Predictors: (Constant), tintot, Gender, edlevel, age, teched

Table 9-58 *Technology Behavior Regression Coefficients*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Nontechjob	(Constant)	.845	.589		1.433	.156
	gender	.065	.220	.026	.298	.766
	teched	.337	.232	.136	1.455	.150
	age	-.038	.149	-.025	-.257	.798
	edlevel	-.023	.195	-.011	-.116	.908
	tintot	.682	.102	.606	6.680	.000
Techjob	(Constant)	1.921	.609		3.154	.002
	gender	.085	.249	.037	.341	.734
	teched	.365	.279	.156	1.311	.193
	age	-.147	.162	-.101	-.907	.367
	edlevel	.199	.166	.122	1.194	.236
	tintot	.375	.117	.320	3.201	.002

a. Dependent Variable: tbehtot