2006-07-12

Understanding Brigham Young University's Technology Teacher Education Program's Sucess in Attracting and Retaining Female Students

Katrina M. Cox
Brigham Young University - Provo

UNDERSTANDING BRIGHAM YOUNG UNIVERSITY'S TECHNOLOGY TEACHER EDUCATION PROGRAM'S SUCCESS IN ATTRACTING AND RETAINING FEMALE STUDENTS

by

Katrina M. Cox

A thesis submitted to the faculty of

Brigham Young University

in partial fulfillment of the requirements for the degree of

Master of Science

School of Technology

Brigham Young University

August 2006

BRIGHAM YOUNG UNIVERSITY

GRADUATE COMMITTEE APPROVAL

of a thesis submitted by

Katrina M. Cox

This thesis has been read by each member of the following graduate committee and by majority vote has been found to be satisfactory.

Date	Thomas L. Erekson, Chair
Date	Steven L. Shumway
Date	Jared V. Berrett

BRIGHAM YOUNG UNIVERSITY

As chair of the candidate's graduate committee, I have read the thesis of Katrina M. Cox in its final form and have found that (1) its format, citations, and bibliographical style are consistent and acceptable and fulfill university and department style requirements; (2) its illustrative materials including figures, tables, and charts are in place; and (3) the final manuscript is satisfactory to the graduate committee and is ready for submission to the university library.

Date

Thomas L. Erekson
Chair, Graduate Committee

Accepted for the Department

Val D. Hawks
Graduate Coordinator

Accepted for the College

Alan R. Parkinson
Dean, Ira A. Fulton College of Engineering and Technology

ABSTRACT

UNDERSTANDING BRIGHAM YOUNG UNIVERSITY'S
TECHNOLOGY TEACHER EDUCATION PROGRAM'S
SUCESS IN ATTRACTING AND RETAINTING
FEMALE STUDENTS

Katrina M. Cox
School of Technology
Master of Science

The purpose of the study was to attempt to understand why Brigham Young University Technology Teacher Education program has attracted and retained a high number of females. This was done through a self-created survey composed of four forced responses, distributed among the Winter 2006 semester students. Likert-scale questions were outlined according to the five theoretical influences on women in technology, as established by Welty and Puck (2001) and two of the three relationships of academia, as established by Haynie III (1999), as well as three free response questions regarding retention and attraction within the major. Findings suggested strong positive polarity in four of the five influences and in both relationships, with particular emphasis on subject content, positive teacher/student relationships, as well as an overall

positive environment as major contributors to attraction and retention at this university. "Role Models, Mentors, and Peers" was the only influence that scored in the negative range. Though the effect size showed differences between males and females on individual questions as well as the two relationships and "Messages from Counselors", no practical difference was found between the male and female perceptions under the five remaining general categories. In all three categories where a medium to large effect size was shown, females were favored in having more positive responses and perceptions than males.

ACKNOWLEDGMENTS

In memory of my father, Robert D. Cox Jr. and his constant inspiration. I would also like to thank the other members of my family for the time, love and support, without which I would not have been able to finish this.

I would also like to thank Dr. Thomas L. Erekson for guiding me through this and for providing me with many wonderful educational and research opportunities; Dr. Steven L. Shumway for the research, continued support, and phenomenal example; Dr. Jared V. Berrett for his professionalism and his endless supply of reference material; Dr Christine Hailey for her support, encouragement and assistance; and the patience and support from friends and neighbor

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Introduction

Women have been key players in the development of technology throughout the ages. For example, Marie Curie was the first nuclear technologist by creating the science of nuclear chemistry (Try Science [A], 2005); Lady Agusta Ada Byron Lovelace was the first information technologist by initiating the field of computer programming (Try Science [B], 2005); Maria Telkes, as an environmental technologist, invented the solar oven and the solar house (Reeves, 1998); and Linda Bean, as a medical technologist, "pioneered fitting babies and young children with myoelectric upper extremity prosthesis" (Bean, Bean, & Morgan, 2005). The fire escape, windshield wipers, computer compilers, Scotchgaurd ™, liquid paper, and Kevlar® are all inventions credited to women (Welty & Puck, 2001, p.1).

1.1 Technology Education

Despite the contributions of individual women in technology, as a whole, they have been underrepresented in the profession of Technology Education (Lewis, 2004, p.10). At its inception in the late 1800's, "technology education was initially designed specifically to prepare young men for the roles that they would need to play in society as educated gentlemen" (Welty, 2004, p.1). It was a subject "taught exclusively by men for male students." It was not until 40 years ago that "the technology education

classroom and laboratory have…been open to girls and women" on a broader scale (p.1). Even as late as the 1950's the boys who enrolled in these courses and the men who taught them, "viewed them as a "man's world" and there was little effort to foster participation by females" (Haynie III, 1999, p.1).

Since that time, attitudes and titles (Industrial Arts to Technology Education) have shifted, and consequently the numbers of females enrolled in these courses have risen (p.1). However, the high amounts of males enrolled have persisted over females (Welty, 2004, p.1). Additionally, This introduction of women into Technology education has been slow, and at times, despite some gains, there have been reports of a decline in enrollment over half the number of female students that participated in such courses more than 20 years ago (p.1).

1.2 Technology Teacher Education

Not only have Technology Education courses faced inequity in enrollment, but today, women " are basically absent from the field, among teaching ranks, and especially at the leadership levels" (Lewis, 2004, p.10). Iley agreed in that when "[c]ompared to other academic subjects[,]… technology [is still]…disproportionately low in both the number of female students and teachers" (Iley, 2003, p.2).

Because "classroom teachers serve as role models that may attract students to the field" and a lack of female technology teachers and leaders produces a lack of female role models, thus proliferating the problem of fewer females in technology education overall (Iley, 2003, p.5), female technology teachers are necessary in the field of technology. Females offer "a unique perspective to the study of technology that is woefully under-represent[ed] in the current curriculum" (Welty, 2004, p.1). The goal

of the Technology Education is "to be an integral part of the general education of all students," but when females are absent as technology teachers it denies future generations of students a full education in what technology can be by the efforts, contributions, and perspectives of women, not just men (p.1).

With the importance of having female technology teachers and with their lack of representation, the question must be raised as to how a woman can become a technology teacher.

> For a woman…to become a technology teacher in the public schools or a faculty member in a teacher education program, one must successfully complete necessary degrees in order to obtain the position. This means that each one was previously attracted or successfully recruited into a program, retained, prepared, and graduated (Iley, 2003, p.2).

1.3 Brigham Young University's Program

In 2003, Iley identified Brigham Young University (BYU) as one of seven universities having medium to large enrollment with active and successful recruitment programs in Technology Teacher Education (TTE) (p. 17). To better understand who BYU's TTE program was recruiting, in 2004, further independent research was conducted in which it was discovered that, over a five year time period (1999-2004), BYU consistently recruited positive numbers of females with low female losses (see Figure 1-1). It was also found that BYU's female enrollment numbers were not only higher than the other universities in 2004 (see Figure 1-2), but also were consistently high over the same five year period (see Figure 1-3). With BYU consistently maintaining high female enrollment in its TTE program and with such low representation of women in the field as a whole, it would clearly benefit the profession

to understand why BYU is succeeding in attracting and retaining a greater number of women when other universities did not.

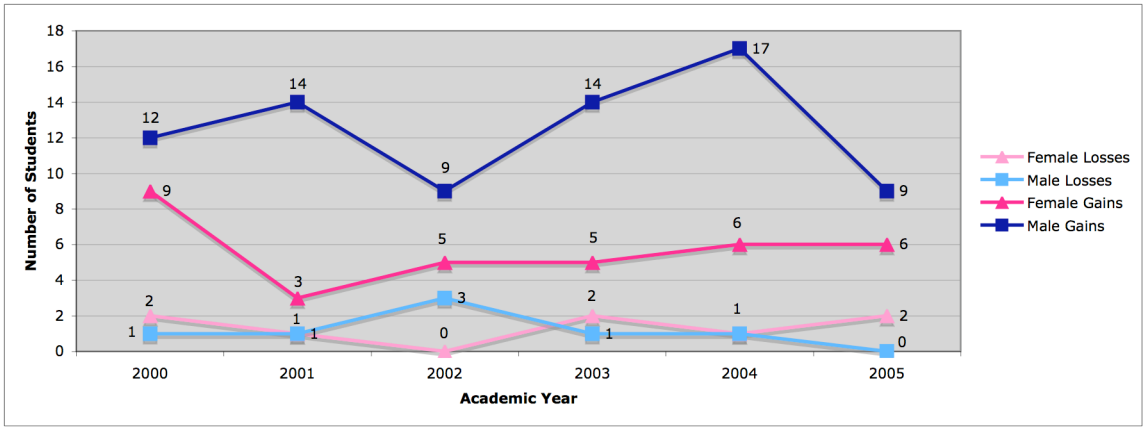


Figure 1-1 BYU TTE Student Enrollment Losses and Gains by Gender

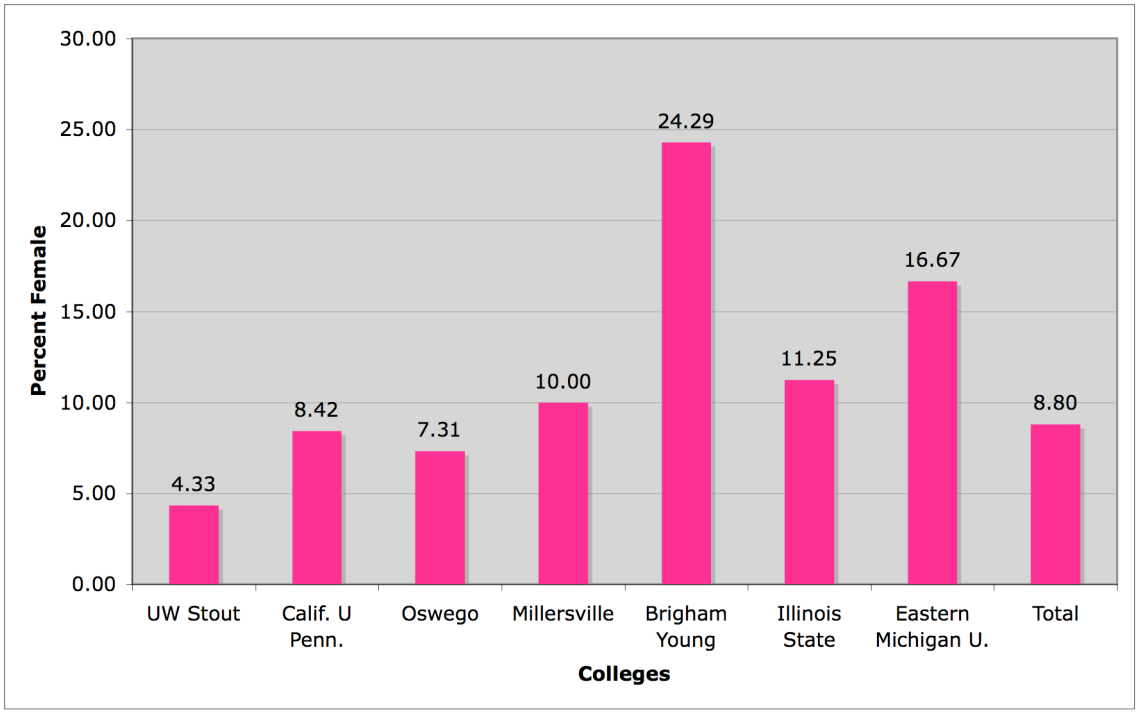


Figure 1-2 Technology Teacher Education Female Enrollment Comparisons: Fall 2004

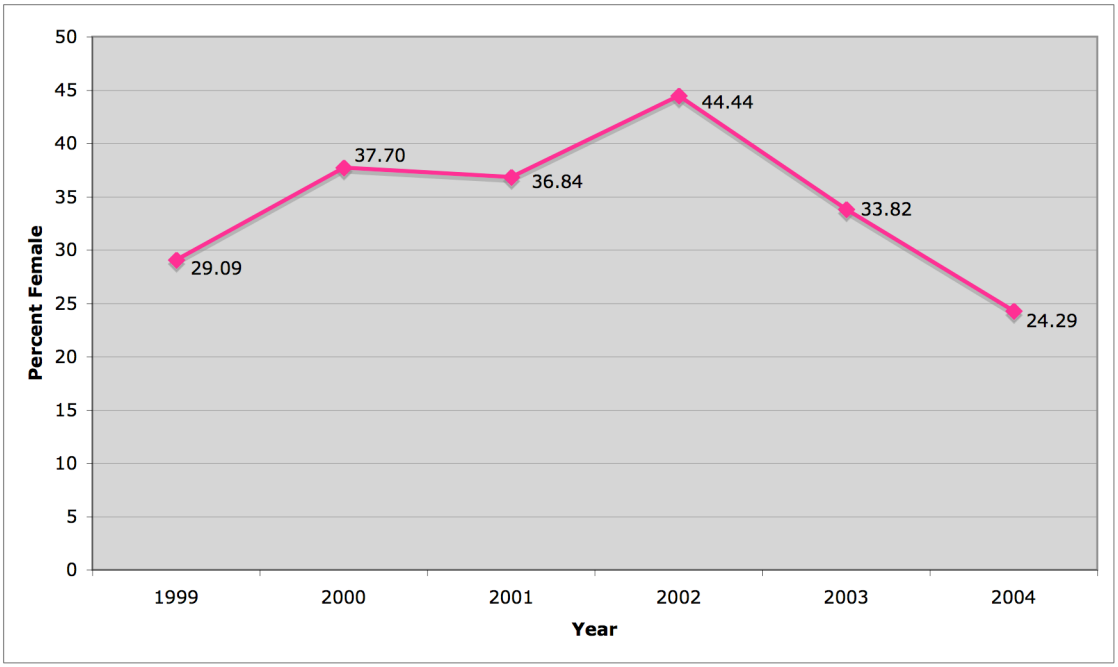


Figure 1-3 BYU TTE Female Enrollment Trends

1.4 Influences on Women in Technology Education

Welty and Puck (2001) identified five major influencing factors on females in the school environment and their choices in technology education, including:

1. Sense of Self and Social Fit
2. Curriculum and Instruction
3. Role Models, Mentors and Peers
4. Messages from Counselors/Advisors
5. Classroom Climate. (Welty and Puck, 2001, p.1)

Welty and Puck's synthesis of research has been supported by similar studies and research (e.g., Silverman and Pritchard, 1993, 1994, 1996; Haynie III, 1999, 2003; Iley 2003; Erekson and Young, 1983; and Donald, 1992). Of particular note were the findings of the Silverman and Pritchard's (1996) study in that their survey of boys' and girls'

perceptions of the school environment's relationship to females found a correlation between negative perceptions and low enrollment of girls in elective technology education classes. A correlation between the opposite, positive influences in an educational environment and a rise in female enrollments, was suggested, leading to a possible explanation as to why BYU has such a high numbers of females enrolled in their technology education classes.

1.5 Problem Statement

Brigham Young University's Technology Teacher Education program has successfully attracted and retained a high percentage of female undergraduate students; however, due to low involvement of women in the field of technology as a whole and because of the absence of any other prior studies done at this university, it would be beneficial to attempt to describe why this is occurring.

1.6 Purpose

The purpose of this study was to attempt to describe why Brigham Young University's Technology Teacher Education program has successfully attracted and retained a high percentage of females in the undergraduate program.

1.7 Research Questions

The following questions were answered by this study:

1. Did both genders in the population perceive the following to be positive in the Technology Teacher Education program?
    a. Sense of Self and Social Fit
    b. Curriculum and Instruction

c. Role Models, Mentors, and Peers

d. Messages from Counselors/Advisors

e. Classroom Climate

2. Were the following relationships considered by students to be positive for both genders in the Technology Teacher Education program?

   a. Teacher-Student

   b. Student-Student

3. Were the perceptions of students about the environment as a whole in the BYU Technology Teacher Education program positive for both genders?

1.8 Significance

This study was important to provide a description of why the Brigham Young University Technology Teacher Education program has successfully attracted and retained females in the program by documenting the perceptions of the undergraduate students enrolled during the Winter 2006 semester, about this environment's influences. By doing so, this study provided a baseline for further research to be conducted into future enrollment gender trends and perceptions of Technology Teacher Education programs and their environment at this and other universities.

1.9 Delimitations

This study was delimited to:

1. The Brigham Young University undergraduate Technology Teacher Education program students enrolled in the program in the Winter 2006 semester.

2. The sphere of the five influences on females in technology education identified by Welty and Puck (2001) in technology education as: Sense of Self and Social Fit; Curriculum and Instruction; Role Models, Mentors and Peers; Messages from Counselors/Advisors; and Classroom Climate.
3. The sphere of two of the relationships established by Haynie III (1999) as: Teacher-Student and Student-Student.

1.10 Procedure

The study consisted of the creation and use of an electronic survey of the population: Brigham Young University (BYU) Technology Teacher Education (TTE) program students enrolled in the Winter 2006 semester. The survey questions, randomly mixed by topic throughout the survey, were created and equally divided among the five influences on females identified by Welty and Puck (2001) in technology education with subtopics of two of the three academic relationships identified by Haynie III; student-student, and student-teacher (1999). The survey also included three free response questions based on the attraction and retention of the program. All survey questions were tested on subjects similar to the population in question prior to their use among the actual population.

The responses were categorized by the five influences and the two relationships. Due to the small size of the population, each response was then statistically analyzed using an effect size to determine practical significant differences between the means of gender. The responses to the final three open questions were also analyzed, categorized, and counted so as to compare and document the information similar to the other analysis performed.

Chapter 2: Review of Literature

In an attempt to assess the current status of the programs identified by Iley (2003) and establish a framework of assessment whereby the perceptions of students in the Brigham Young University (BYU) Technology Teacher Education (TTE) program, during the Winter 2006 semester, about this environment's influences on the attraction and retention of females enrolled in the undergraduate program might be documented, the following literature review and research was done. First, a thorough search of the literature was done to establish the current state of women's involvement in TTE. Second, a survey of enrollment in the college programs identified by Iley (2003) was performed through personal research. Third, a review of past studies performed regarding attraction, retention and influences on women in technology was done. Finally, a confirmation and refined definition of the philosophies established by Welty and Puck (2001) regarding women in technology and Haynie III (1999) regarding two of the three relationships of academia was completed.

This chapter is divided into five sections. The first section is a brief review of the procedures done to accomplish the review of the literature and preparatory research. The second section reports the findings of the personal research done to survey the enrollment of males and females in the college programs identified by Iley (2003). The third and fourth sections are a review of related articles and studies pertinent to the topic of

influences on women in technology. The fifth section is a synopsis of conclusions that can be drawn based on the previous sections.

2.1 Review of Procedures

The literature review was done from 2003-2006 using the online source Digital Library Archives, universities libraries, Virginia Tech, under the search engines of "E-journals" and "ETD's (Electronic Theses and Dissertations)" as well as the ERIC database. In both mediums searches were done using descriptors of "Technology Education," "Women," and "Technology Teacher Education," with key words such as "gender," "influences," "college," "career," "attraction," "retention," "environment," and "enrollment." This search yielded numerous articles in the *Journal of Engineering and Technology Education* and various related publications. In an attempt to review more up-to-date information, personal notes and papers were acquired through attendance at the 91st Mississippi Valley Technology Teacher Education Conference, in Chicago, on November 4, 2004 during the second session entitled "The Diversity Imperative." A search of the US Department of Education, National Center for Education Statistics using keywords such as "college," "enrollment," "women," "degree," "female," "education," and "gender" were also conducted for the years 1999-2005. BYU's TTE program Professor recommendations, publications, and research within the topic area were also reviewed.

The personal research of enrollments in the Technology Education Programs identified by Iley (2003) was conducted via phone calls, and emails using contact information provided by the *2002 Industrial Teacher Education Directory* (Schmidt & Custer, 2002-04) during the Winter semester of 2005. Specific information was provided

either by the department secretaries at the various universities within the Technology Education department, or from the statistical reporting body at the various institutions. Responses were then recorded by total, male, and female undergraduate enrollment for the fall of 2004 and analyzed accordingly. The information on the BYU TTE enrollment history, graduation rates, and department losses and gains were collected from the department advisor in person from her records for the years 1999-2005.

2.2 Personal Research

In a list, created by Iley (2003), of universities with large to medium sized, active and successful recruitment programs in Technology Teacher Education, it is interesting to note that BYU was chosen as one among seven. Yet, in 2004, it was the university with the highest percentage of females enrolled, by as much a 7.6% above any other university on the list (Figure 1-1). However, this was not a unique year in that BYU had maintained an average 34.36% female population from 1999-2004, at times with percentages reaching as high as 44.4% as in 2002 (Figure 1-2). Not only had BYU exceeded the percentage, but they have also attracted an average of 5.7 females per academic year between 2000-2005, with only an average loss of 1.3 females (Figure 1-3).

With 8.8% as the total percentage of females enrolled in the Technology Education programs on this list in 2004, with BYU consistently maintaining high female enrollment and with such low representation of women in the field as a whole, it would be beneficial to understand why BYU is succeeding in attracting and retaining a greater number of women.

2.3 Review of Previous Reviews

A review of research into the influences on women choosing to participate in technology was conducted in order to determine the need for further research in the areas of these influences and their affect on attraction and retention females in college Technology Teacher Education programs. Few reviews of literature were located specifically regarding the influences of enrollment on women in college Technology Teacher Education programs, but several articles were found regarding the influences on girl's enrollment in high school and middle school technology courses, college mathematics, engineering and science courses, as well as influences on women in general choosing to participate in technology. Research findings, methodology, limitations and further research recommendations were considered during the review.

In 1994, Klein and Ortman, along with 12 plus other researchers conducted a review of 20 years of studies and literature in which it identified successes, failures, new opportunities for research and useful strategies in attaining the goals of "Providing the same access and treatment to female and male learners" in education (p.13). Throughout the review they identified several advancements in equitable education, including a closing gap between male and female achievement and enrollment in elementary and high school mathematics, the establishment and implementation of title IX, increased awareness of gender equity, and increases in college offerings of women's study courses. Yet, they noted that " [d]espite these and other successes, there is still a great deal to learn about increasing gender equity in all curricular areas" (p.16). They continued to say that, " researchers need to learn more about how the best of these equity programs or courses have an impact on female and male students so that this information can be

shared" (p.16). The specific areas for research that they suggest and identified as influential factors in creating gender equity within schools include curriculum, instruction, teacher and parental expectations, equity practices, and gender stereotyping within cultures throughout all levels of education. This was identified in not just elementary and secondary schools, but colleges and graduate levels as well. Klein and Ortman (1994) also identified "aggressive recruiting, [and] a positive learning environment" as contributing factors that helped females continue to participate in graduate mathematics programs (p.15). In addition, they suggested that "an examination of the gender composition of the schools is not likely to be sufficient," but that "researchers will need a coherent, rational…strategy that builds on successes, avoids or overcomes failures, and takes advantage of new opportunities" (p.18-19). This research was not recommended for one area only, but "in all areas that contribute to increasing gender equity" (p.19).

Several such statistical analysis of gender composition in college enrollments by major and subject throughout college have been done by the National Center for Educational Statistics under classifications of Engineering, Engineering Technologies, Mathematics and Statistics, and Education, but none was found that specifically considered the area of Technology Teacher Education (NCES, 2004). In fact, when a review of statistics reported by Integrated Postsecondary Education Data System specifically under the search results for Brigham Young University by gender and major regarding enrollment and graduation statistics, data was found to be missing and often grossly inaccurate when compared to the official records maintained by the college advisement centers and department registration records (IPEDS, 2005).

In a review of literature composed by Iley in 2003 entitled "Strategies Used by Program Leaders for Increasing Interest and Enrollments in Technology Teacher Education Programs," he identified Technology as one among three "academic areas that are disproportionately low in both the number of female students and teachers" (p.2). He stressed that to correct this imbalance researchers in the field must begin by "reviewing successful strategies used by teacher preparation programs" (p.2). He also stated

> Technology teacher education programs throughout the world are implementing successful strategies for developing a diverse and gender equitable student body and faculty, and fostering leadership opportunities for them. These ideas need to be shared with others in the field (p.2).

Within the successful strategies he identified in "Successful Models for Increasing the Supply of Minority Teachers" were: student mentoring by advisors and teachers, stressing career opportunities associated with the field of technology teacher education, clubs, flexibility in class scheduling, curriculum allowing for learning about histories and cultures of the groups within their schools, and diverse teaching styles (p. 29-32).

In an attempt to create recommendations in establishing strategies for improving gender diversity in the field of technology education, Welty and Puck, in 2001, conducted a review of literature pertaining to the influences affecting women in the field. This was also done for the purpose of establishing a theoretical framework that would further define the influences on women in technology, thereby producing recommendations that would inform educators how to "truly attract and subsequently serve the technological literacy needs of young women" (p.18). This theoretical framework consisted of five main influences on women in technology:

1. Sense of Self and Social Fit
2. Curriculum and Instruction

3. Classroom Climate
4. Role Models, Mentors and Peers
5. Messages from Counselors/Advisors

Sense of Self and Social fit was defined as personal feelings of aptness of interest or pursuit of a field of study in comparison to parental, cultural, and social perceptions of what was considered gender appropriate. These included parent discussions and encouragements about future careers; "gender schema attached to school subjects"; and social relation's opinions, support, and participation in fields of interest (p.2-4).

Curriculum and Instruction was defined as the content and methods where by a technology course is taught in accordance with gender equity. This included using gender neutral examples familiar to students (ex: cookie dough press for extrusion); definitions of the purpose of technology (to control or communicate); team role stereo typing (girls: note taker, boys: laborer); frequency and types of feedback and expectations of teachers on evaluations of student work; and cooperative versus competitive learning strategies (p. 8-12).

Role Models, Mentors and Peers was defined as the exposure of young girls to professionals involved in technology (particularly women) to whom they could look up to, utilize as a mentor, see as a peer or a good example of what they would like to be. These people act as inspirations or guides that encourage students to pursue their field. They included males and females that are successful, but not heroes or "heroines of technology," introduced in person, or other media (p.12- 15).

Messages from Counselors/Advisors was defined as comments and direction offered as encouraging or discouraging, helpful or otherwise in a student's pursuit of

technology. These included conversations explanations and assistance in finding future careers; distributed information such as handouts and career maps; and arranging career presentations by professionals (p.15-18).

Classroom Climate was defined as positive or negative feedback perpetuated by teachers and students within the classroom. These included disrespectful jokes; stereo-typing; inclusive language such as "human made" instead of "man made;" use of first not last names; body language; sexual harassment; teacher gender preference in paying attention to students; teacher approachability; and classroom decorations, order and cleanliness (p. 5-8).

It was determined that "In order for girls and young women to participate in our technological society, classroom teachers, guidance counselors, and administrators need to act on the recommendations outlined in" the positive side of these five influences and work towards eliminating or dispelling the negative. The reward "not the least of which will be to inspire future technology educators" (p.18).

2.4 Review of Previous Studies

A review of research studies centered on the perceptions of women in technology classes was performed so as to not only confirm the framework established by the reviews, but to add to it. Additionally, it was done to provide an exemplary basis upon which to build the methods of similar studies, and establish recommendations for future research.

In a research study, by Sheng and Hall (1996), concerning the perceptions of vocational educators toward female participation in nontraditional vocational programs, a 4-point Lickert type scale (1 Strongly Disagree, 4 Strongly Agree) was used in survey

format distribution. A high score established a positive perception and a negative score established a negative perception (items negatively set were interpreted reversely). Analysis of variable by gender, age, and ethnicity were also performed. Position (administrator, instructor, counselor) and gender were found to be the predominant predictors of a more positive or more negative perception of females in nontraditional vocational education. If the survey participant was a female they were far more likely to encourage promoting female participation through "recruitment efforts, guidance materials in relevant offices, counselor's encouragement,… teaching materials, … and focused efforts in placement" (p.14). Additionally, Counselors were more likely than administrators and administrators more than instructors were more likely to encourage females to enter nontraditional programs. Hence, in collaboration with past results, it can be assumed that a female counselor or administrator knowledgeable about technology education would be more likely to take efforts to persuade females to enter technology education. Additionally, although their findings focused primarily on instructor perceptions, it was recommended

> [f]uture research should focus on…the connection of vocational instructors' perceptions and behaviors toward female participation in nontraditional programs, and feelings of female students in nontraditional programs regarding vocational instructors treatment toward them, as these would greatly affect female students' involvement. (p.24)

In 2004, a study concerning the state of female student involvement and performance in vocational-technical courses after the implementation of a project called the TACKLE Box initiative was performed by Geraghty, Niles, Shager and Strei. The project was patterned after the recommendations of Welty and Puck's framework (2001) in acknowledgement of the five influences. The project and evaluation took place from

1999-2003. They found that while participant team members had increased their awareness of gender equity issues, none of the interventions resulted in enrollment increases. Female enrollment in technology and vocational education classes in the state of Wisconsin had actually dropped. However, the researcher attributed this to a lack of female role models (90% of tech. educators in the state were male) in the state of Wisconsin, that these changes were "not well accessed by other districts," and that "progress in attracting girls to nontraditional technology education courses and careers will need to be made on an incremental basis, utilizing multiple approaches" suggesting that change takes time and good implementation (p.16). It is possible that research done at a later period will suggest improved changes, as it will give time for incremental change and program dissemination. It was recommended though, that more mentorships, and better counseling programs with better standardized career education and differential counseling approaches for boys and girls would have a greater effect (p.17).

In 1994, a study was done in among students (72 male, 42 female) following a GCSE (General Certificate of Secondary Education) course in a technology based subject (CDT- craft design and technology) and A-level pupils in Wales concerning the "Comparison of Male and Female Pupil Perceptions of Technology in the Curriculum" (McCarthy and Moss). This study was done to establish "the extent to which school experiences had influenced the perceptions of males and females towards different groups of subjects and to see whether the differences [of gender discrimination] still applied" (p.6). They also attempted to assess what factors had influenced their choice in taking a technology subject. Methods of evaluation included a questionnaire with "a mixture of basic attitude questions formulated as closed question responses similar to

multiple choice format and employing a Likert-like response scale whenever possible together with a seven point response scale" as well as 12 interviews among the subjects and questionnaire distribution with non-technology course enrollers to check for validity of responses and accuracy of perceptions (p.7). It was found that students took technology classes "largely for positive reasons related to perceived employment prospects and interests" (p.8). In fact, it was revealed that students' personal attitudes towards technology were the major determining factor for students having chosen to take the course. They also found that parental and teacher attitude had little influence on this choice. However, they believe that this influence would have been marked far greater if this influence was more "overt and clear" at the time the decision was made (p.8).

Differences among genders emerged in GCES student when they responded to feelings of future usefulness of technology related courses. Females took the course because of past enjoyment and success in it while males took it for future usefulness. No differences emerged between A-level students, as they responded at equal high levels in both genders with subject enjoyment, previous success and perceived value.

They also discovered that "[c]onstraints imposed by option choices do not seem to be a significant factor in choosing technology" (p.12) or in other words, given the option, students would have chosen to take technology courses anyway, regardless of outside influences. Overall, their findings suggest that there are no longer any significant differences between males and females in the perceptions of technology related subjects (p.12).

In 1996, the findings of a study produced by Silverman and Pritchard concerning why a disproportionate number of girls turn away from math and science in Connecticut

was published. This was a study conducted in two phases. The first was an analysis of boy and girl behavior within two to four technology classes over the period of three weeks in three middle schools each for a total of 77 observations. This was followed up by focus group interviews with females from the class, as well as interviews with middle and high school teachers, guidance counselors and principals. The second phase consisted of a survey of 737 high school technology education students (boys and girls) with approximately equal representations from 9-12th grade, then focus group interviews with both boys and girls, followed by a quiz on women in the workforce.

Their findings in phase I (middle school) concluded that hands-on experiences were very attractive to girls, and that there was no perceived disadvantage to girls' inexperience with tools and machinery; girls and boys received equal classroom attention in questions and evaluations; and male monopolization of tools and teacher allowances of it. They also found teachers "who were aware of the need to control sexist behavior but who didn't know how" (p. 6). Most importantly they discovered two major barriers for girls choosing to participate in technology courses: 1) "traditional stereotypes about male/female occupations are still operating and are strong enough to outweigh girls' positive feelings about their experiences in technology education classes" and 2) " girls were uninformed about economic realities and the world of work. They lacked basic information about careers, including any sense of salaries, promotion prospects or the amount of education and training needed to pursue different occupations" (p.6).

They also found that "more girls than boys reported being discouraged from taking technology education" (p.7). There was also a striking lack of reported encouragement by family, teachers, friends and guidance counselors. When asked who

influenced their choice to take technology education, over 43% of the students chose other, 28% of the girls wrote myself, and only 36% of students wrote teachers and guidance counselors (p.7).

Under Phase II (high school), they reported that girls did not mind being one of a few girls in a technology class, but they did worry that the teacher would treat them differently because of their gender. Additionally, girls were neither aware nor encouraged to pursue nontraditional gender stereotyped courses due to their middle school experiences. Some girls actually reported being discouraged from taking technology education (p.8).The primary reasons they identified as being why girls do not take technology education classes were: fear of being one of few girls in the class; lacking confidence in their abilities; physical demands of jobs; and fear of the reaction of family and friends (p.8).

Their recommendations for overcoming these issues are similar in nature to the findings of Welty and Puck (2001). Among them are minimizing and eliminating sexist behavior and forcing of girls into stereotyped roles; providing more career knowledge to girls about technological careers; creating gender appropriate curriculum; providing positive role models and positive programs to overcome stereotypes; hiring more female technology teachers; and creating physical classroom environments that are welcoming to females (Silverman and Pritchard, 1996, p.9-11).

In summation, they concluded:

> If we only look at girls taking technology education, we might conclude that everything is fine and well. The real picture is revealed in the enrollment numbers…As long as participation is limited to a few girls willing to be "pathbreakers", the critical mass needed to convince a majority of girls that technology education is really for them will not be reached (p.13).

In 1999, Haynie III conducted the first of two studies concerning cross gender interaction in Technology Education among 95 (39 females and 56 males) practicing technology educators. The purpose of his study was to uncover the perceptions of these teachers concerning how males and females can interact most comfortably within technology education. His methods included a continuum line scale survey ranking the appropriateness of a variety of interactions in and outside the classroom within the professional relationships of education. The findings were later analyzed via comparison of means overall, by gender, and by age, with an ANOVA comparison of means, and LSD option for t-testing with a .05 level of significance. His methods were also significant in that he generally identified the three main relationships of academia within the context of gender interactions: teacher-teacher, teacher-student, and student-student. Each type of interaction was defined by the names of the participants involved.

Although his findings uncovered the perceptions of a sample of professionals in the field, he did recommend that "[p]erhaps this or similar research should be conducted again in ten years" (p.12). Unfortunately, by 2003, Haynie III reported that this had not happened. He said that this "lack of action [hadn't] meant there are no problems to study, and … failure to proceed was not good for the health of our profession" (p.1). He also stated that a quasi-ethnographic study was recommended to pursue further research.

2.5 Conclusion

In conclusion, the age of present studies, stated need and lack of studies and information available concerning the influences on attraction and retention of females in technology education programs have clearly declared the need for this a study. In addition, suggested methods such as Likert-scale surveys and open response

questionnaires have also proven to be appropriate, useful and accurate measure of perceptions of both males and females within the field of technology education, as well as established forms of analysis such as mean comparison is also acceptable. Additionally, a framework of theoretical influences on women in technology as well as the three relationships of academia have been stated and revealed by one literature review and the findings and recommendations of other successful studies.

Chapter 3: Methodology

The purpose of this study was to attempt to describe why Brigham Young University's Technology Teacher Education program has successfully attracted and retained a high percentage of females in the undergraduate program by documenting the perceptions of the undergraduate students enrolled during the Winter 2006 semester, about this environment's influences. After a thorough review of literature, it was determined that a survey based on the five influences established by Welty and Puck (2001) delivered in methods used by Sheng and Hall (1996) and Silverman and Pritchard (2004) in a similar study would be appropriate in accomplishing the purpose of this study.

3.1 Environment

The Technology Teacher Education program that existed during the Winter 2006 semester emerged out of the Industrial Education program at BYU in the early 1930's. At the time of this study, the purpose of this program was to prepare students to receive a six through twelfth grade, level one, Utah state teaching certificate with options for other specializations such as Trade and Technical (T & T) certification.

At the time of this study, the teaching staff consisted of two full-time male faculty dedicated to subjects related to technology teacher education such as: multi media,

electronics, teaching methodology, and creativity. Male faculty from other programs housed in the School of Technology taught technical electives such as: woodworking, model building and prototyping, furniture design, and industrial design.

The major is administratively housed within the School of Technology and the College of Engineering and Technology. The advisor for undergraduate students was shared within the School's majors and consisted of one female. The advisor has been employed in this position for over five years and was physically housed within the building where the Construction Management and Technology Teacher Education faculty were housed.

The TTE program consisted of a four year degree that required 71-72.5 credits of inner program courses and 49 credits of general education for a total of 120-121.5 credits to complete. The program included three areas of technical emphasis: Communication/ Multimedia, Engineering, and Design. However, students, with approval, were allowed to develop other technical depth emphases such as Construction, Manufacturing, Electronics, and so forth.

3.2 Population

The population for this study was undergraduate students majoring in BYU's TTE program during the Winter 2006 semester. The total population consisted of 78 students; 15 females and 63 males. This population was selected due to its high percentage of females enrolled in the TTE program when compared with the seven actively recruiting medium to large sized programs at other universities identified by Iley (2003) and through personal gathering of data from university departments for actual enrollment numbers for the fall of 2004 (Figure 1-2).

All population information was acquired through the School of Technology's advisement office computerized lists of students enrolled in the TTE major. Due to the small number of the total population, the entire population was asked to participate in the survey. The actual participants were self-selected through voluntary response.

3.3 Procedures

The study consisted of the distribution of an electronic survey produced on Virginia Tech's SurveySuite® program. Participants were informed of the survey via classroom announcements and e-mails (Appendix A) distributed by three of the major's professors: Dr. Thomas L. Erekson, Dr. Steven L. Shumway, and Dr. Jared V. Berrett. After one week, an additional announcement was made in class and an e-mail was broadcast for the remainder of non-respondents. One week after that, no further responses were accepted, and results were recorded and analyzed.

3.4 Research Design

The following section contains a description of the design and implementation of the survey. As such, it is broken down into two sections: Delivery Format and Instrumentation.

3.4.1 Delivery Format

While the survey was being developed, the delivery format was considered. It was found that e-mail notification and a website based survey would be the most practical. This decision was made due to the fact that: 1) students could complete the survey at a more convenient time outside of class 2) most students do not keep up to date address information in the campus database, 3) students are most often contacted by faculty via e-

mail and therefore keep up to date e-mail account information, 4) being technology education students, all have been educated in the use of web surveys and e-mail, 5) being technology education students, all have access to or own a computer with internet capabilities, 6) every BYU student has an e-mail account as a part of registering with the university, and 7) Web site surveys have faster returns on responses due to the nature of its format.

3.4.2 Instrumentation

Due to the nature of the research and the absence of a device for measuring student perceptions of the five influences (Welty & Puck, 2001) and the two relationships (Haynie, 1999), a self created survey was produced based on the afore mentioned literature. Because the questions in the survey were developed from the literature, the instrument had face validity.

The forty-four questions on the survey were separated into three sections (see Appendix B). The description of the development and reasoning behind each section are as follows:

3.4.2.1 Section 1

Section one consisted of five questions used to gather demographic information relevant to the study. They were used to categorize responses in accordance with groups of commonality or interest as found at BYU. Each demographic was discussed, suggested, and approved by the research committee chair. These demographics were: gender, year in school, marital status, ethnicity, and age.

Gender was the main demographic of interest because of the nature of the study and was therefore used as the primary identifier. The second demographic became year in school in that this would identify the subject's familiarity with and years of exposure to the environment of the study. Marital status was chosen to determine if there was a pattern in the nature of BYU TTE female students in continuing their college career once they are married. Finally, ethnicity and age were chosen to determine patterns in opinions and to establish an accurate description of the population.

One additional question, asking the name of the respondent's college advisor, was used to identify the actual population under study and eliminate non-population responses. This was reasoned by the facts that anyone outside the population would either 1) have a different major advisor, 2) enter in the wrong name or 3) have no knowledge as to who the BYU TTE advisor really was.

3.4.2.2 Section 2

Thirty-five questions on the survey were developed from and equally divided among the five influences on females, in regards to technology education, identified by Welty and Puck (2001) as:

1. Sense of Self and Social Fit
2. Curriculum and Instruction
3. Role Models, Mentors and Peers
4. Messages from Counselors/Advisors
5. Classroom Climate

Seven questions were developed for Sense of Self and Social Fit. These include such questions as: 2.01"My parents agree that Technology Teacher Education is a good

field for me." This particular question was based on Welty and Puck's statements made regarding the important role parents play in the development of their children's gender identity and in shaping a child's thinking about potential occupations (2001). This is also echoed in the work of Erekson and Young who's conglomeration of research site "parents as the most influential people in the career paths of males and females" (1985, p.4). It was suggested that a positive influence by parents in support of pursuing technology created a positive sense of self and social fit for females wishing to do so.

Seven questions were developed for Curriculum and Instruction. These include such questions as: 2.11 "At BYU, Technology is primarily taught for the improvement of communication and collaboration" and 2.17 "At BYU, Technology is primarily taught so we can master and control the technologies that surround us." These two questions in particular were based on the research of Bank Street College (1991, as cited by Welty & Puck, 2001, p.10), discussing the differences between the way genders perceive and value the purpose of learning technology. According to their work, "women tended to value and perceive technology as a means of facilitating collaboration, communication, and linkages between people. Men on the other hand, tended to see technology as a means of extending their control over their physical environment." If it was perceived by the students that BYU's primary reason for teaching technology favored the male point of view, it would produce evidence of conflict and discomfort for females in learning technology and hence the curriculum and instruction would have been creating a negative atmosphere for them.

Seven questions were developed for Role Models, Mentors and Peers. These include such questions as: 2.30 "While in this major, I have seen few professional female

technologists in any form of media (ex: books, films, pictures)." This question was based on the recommendation made by Welty and Puck that teachers should "review course materials like textbooks, multimedia programs, and videotapes to ensure that they depict women in technical situations and in a positive light" so as to provide females with good role models that "can help compensate for the current male bias in society and the workplace" (2001, p.14). Quite simply, if there are females depicted in such materials in a positive way, it meets their recommendations for creating a positive environment for females. If not, it shows evidence to the contrary.

Six questions were developed for Messages from Counselors/Advisors. These include such questions as: 2.32 "My TTE advisor has clearly explained how I can accomplish my academic and professional goals." This question was created in response to recommendations made by Welty and Puck regarding the use and availability of information about technical careers as provided by counselors and advisors: "Guidance programs should provide more information to …students…about salaries, necessary preparation, and promotion prospects of various kinds of technological careers" (2001, p.17). If students, females in particular, have not been told how to attain a career in technology education this "information, or the lack thereof, significantly impacts the impressions that [students] form about the world around them and the decisions they make about potential roles that they will play in this world" (p.15). In other words, no information on how to become technology educators equals non-fulfillment and frustration in accomplishing career success, thence promoting a negative environment for students.

Eight questions were developed for Classroom Climate. These include such questions as: 2.09 "Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.)." This question emerged from statements made by Welty and Puck regarding the use of humor in a classroom:

> [I]nappropriate attempts at humor can perpetuate stereotypes and alienate populations. In the case of gender, sexist jokes that capitalize on popular stereotypes (e.g., blond jokes)…can severely damage a woman's morale, hampering learning, and discourage participation in technology classes (2001, p.7).

Hence, if a majority of female students agreed with this question statement, then the environment would be determined as negative for them.

There were also sub-topics within the questions regarding two of the three relationships of academia as identified by Haynie III (1999): student-student and student-faculty. These questions were a secondary analysis of the pre-existing 35 questions of this section. It was determined that six of the 35 fit into the student-student category (any interaction between students) and nine of the 35 fit into the student-teacher category (any interaction between teachers and students).

Also considered during the development of the section 2 was the method of response. A Likert-scale system was chosen with four varying levels of agreement to 35 supplied statements: strongly agree, agree, disagree, and strongly disagree. The four-point scale was chosen over the five-point scale so as to "force" a response with no option for neutrality. This particular forced response scale was also used in a previous study used in measuring student perceptions about technology. The numbers of responses available were consistent throughout the questions of this section.

3.4.2.3 Section 3

This section consisted of two free response questions used to identify the reasons of attraction and retention of the students (ie, "Why did you join the TTE major?", "What have you enjoyed most about the TTE major?"). One additional question was asked to determine dissatisfaction with the major ("What do you dislike about the TTE major?"). Due to the qualitative and varying nature of these responses, it was determined that free responses would be most accommodating.

3.5 Pilot Study

All survey questions were tested on subjects similar to the population in question prior to its use. The test population consisted of three females and two males. All were undergraduate students currently enrolled at Brigham Young University in various majors besides Technology Teacher Education, so as not to pre-introduce the actual population to the study before its final distribution.

The test population reported finding little or no difficulty in taking, understanding and completing the survey online. Only one test subject reported a difficulty in reading the text because of the color of the background. As a result the background color was changed. The average time it took them to complete the survey was 10 minutes, hence the initial estimate of 20 minutes stated as the average time to complete the survey was changed to 10-15 minutes.

It is also important to note that before distribution among the actual population, all sections of the final survey were reviewed and approved by the three committee members: Dr. Thomas L. Erekson, Dr. Steven L. Shumway, and Dr. Jared V. Berrett; and the Institutional Review Board at BYU.

3.6 Data Analysis

Responses were scored according to the polarity of the question and the individual response. Responses ranged from strongly agree, to agree, to disagree, to strongly disagree. If a question was of positive polarity the responses were scored in descending order: strongly agree received a score of four, agree a score of three, disagree a score of two and strongly disagree a score of one. If the question was of negative polarity the responses were scored in ascending order: strongly agree as one, agree as two, disagree as three, and strongly disagree as four. The higher the score, the more positive the response.

Each response category of the five influences and the two relationships was then statistically analyzed using a standardized mean difference effect size (SMDES) to determine practically significant differences between the means of the various demographics. The purpose of using this and not a t-test, was due to the small number of responses and the size of the population as a whole. Extremely large differences would have to occur between the means in order for it to be shown in a t-test for a population this size, whereas the SMDES is measure of the magnitude of the difference between the mean scores that is independent of sample size and scale.

SMDES were calculated using the following formulas:

$$ES = \frac{\bar{X}_{Group_1} - \bar{X}_{Group_2}}{SD_{Pooled}} \qquad SD_{Pooled} = \sqrt{\frac{s_1^2(n_1 - 1) + s_2^2(n_2 - 1)}{(n_1 + n_2) - 2}}$$

Practical significance, often synonymous with educational significance, was determined using standards suggested by leading researchers in the social sciences in rating SMDES: .3-.6 is small, .61-.9 medium, and >.9 large (Shumway, 1999).

Differences were only considered practically significant if they were medium or large. Conglomerate means were also analyzed to establish polarity of responses between males, females, and total category means. This data was calculated using the 2000 version of Excel® for Macintosh OSX operating systems.

The qualitative analysis was performed through open coding as suggested by Creswell (1998). This was done through categorization of the final three responses by question and then by topics that emerged within the responses. Some topics were further categorized into subtopics in order to expand large response topics or topics of interest. The occurrences of these responses by respondent within the topics were then counted and analyzed according to the gender of the respondents.

Chapter 4: Results and Findings

The results and findings in this chapter are organized into four sections. The first section contains a description of the demographics of the respondents. The second section contains a description of the responses of the non-responders. The third section contains a quantitative analysis of questions 2.1-2.35 dealing with the five influences and the two relationships (Appendix B). The fourth section contains the qualitative analysis of the free response questions concerning the attraction and retention of the students in the BYU TTE major.

Because this was the first attempt at using this instrument, only face validity can be established from the interpretation of results. Further testing of the survey needs to be done in order to establish actual validity.

4.1 Demographics

The respondents to the survey included 11 females and 18 males for a total of 29 students. This was 73.3 % of the females, 28.6 % of the males and 37.2 % of the total population. Twenty-eight students were White, one was Hispanic, one was Asian. Fourteen were married and 15 single. There were no freshmen, three sophomores, two juniors and 24 seniors. Three were ages 20-21, 13 ages 22-23, five ages 24-25, two ages 26-27, and six ages 30 or older.

4.3 Non-Responders

An analysis of the male non-responders was done three weeks after the study to establish the validity of the male responses, due to their initial low response rate. Response means of each category were compared for questions 2.1-2.35 using the standard mean deviation effect size. No practically significant difference was found within the categories (i.e., no medium or large differences were found) hence it was hypothesized that the following results are accurate descriptors of the entire sample population.

4.4 Quantitative Analysis

In an attempt to answer the research questions posed in the first chapter, the findings for this section were categorized by the five influences established by Welty and Puck (2001): Sense of Self and Social Fit, Curriculum and Instruction, Classroom Climate, Messages from Counselors, and Role Models Mentors and Peers; and two of the relationships of academia established by Haynie III (1999): Teacher-Student and Student-Student. After this, each question was then scored according to the four-point scale. Strongly agree (4) was considered the most positive, followed by agree (3), still considered at the positive level. Strongly disagree (1) was considered the most negative, followed by disagree (2), still considered at the negative level. Questions with negative connotations were scored in a reversed polarity to establish the overall positive nature of the atmosphere. In general, the higher the score, the more the positive the response. After this, each section was analyzed using a standardized mean deviation effect size (SMDES) to determine a difference between the groupings of male and female individual total responses under each of the categories. Findings were considered practically significant

at the medium (.61-.9) and high (>.9) difference levels. In addition, because of the way the SMDES was calculated, a positive SMDES represents more positive responses favoring females. Conversely, a negative SMDES represents more positive responses favoring males. Total, female and male means were also reported to determine the levels of a perceived positive or negative atmosphere.

4.4.1 Sense of Self and Social Fit

The first sub-research question was:

a. Did both genders in the sample population perceive Sense of Self and Social Fit to be positive in the Technology Teacher Education program?

To respond to this, seven questions were developed in the survey under the category "Sense of Self and Social Fit" (Table 4-1). Responses were then used to calculate question means and total group means of each respondent by gender, which were then used to calculate standardized mean difference effect size (SMDES). The SMDES was then compared for practical significance. In this category, both males and females found their comfort levels to be positive at slightly higher than the agreement level (total mean = 3.25, male mean = 3.17, female mean = 3.38). Additionally, as seen in Table 4-1, there was also no practically significant difference reported between males and females under the area of Sense of Self and Social Fit in total (SMDES = .56). The positive nature of the total SMDES also suggests that this section favored females in being more positive than males. However, the difference was small and not large enough to be considered significant. The only specific question that favored males more positively was 2.34 or "The general consensus at BYU is that Technology is a masculine

subject," but the SMDES was so low (-.19), that it too had only a small difference and was not considered significant.

Table 4-1: Questions, Means, and Their Effect Size for Sense of Self and Social Fit

Question Number	*Question*	*Male Mean*	*Female Mean*	*Total Mean*	*SMD ES*
2.01	My parents agree that Technology Teacher Education is a good field for me.	3.39	3.4	3.39	.02
2.02	The TTE teachers always act against gender stereotypes.	3	3.6	3.21	.81
2.08	Teachers have expressed the need for me to be in this major.	3.22	3.4	3.29	.23
2.14	My friends support my involvement in this major.	3.28	3.55	3.38	.55
2.20	I have many friends in the TTE program.	3.44	3.91	3.62	.72
2.33	The BYU culture supports the idea that Technology has a feminine side.	2.83	2.9	2.86	.11
2.34	The general consensus at BYU is that Technology is a masculine subject.***	3	2.91	2.97	-.19
Total		3.17	3.38	3.25	.56

Key: 1=Strongly Disagree 2=Disagree
3=Agree 4=Strongly Agree
Note: The higher the mean score the more positive the student response.
Positive SMDES represent a more positive response favoring females.
Negative SMDES represent a more positive response favoring males.
****Denotes reverse polarity question*

Two individual questions did reach practical significance with a medium (.61-.9) difference: 2.02 (SMDES = .81) or "The TTE teachers always act against gender

stereotypes" and 2.20 (SMDES = .72) or "I have many friends in the TTE program." Question 2.14, "My friends support my involvement in this major." had a small (.3-.6) difference (SMDES = .55), but it was not considered significant. In all three questions, however, females were still favored as having had more positive responses than males.

The question, in this section, with the highest reported mean of males, females, and in total was 2.20 or "I have many friends in the TTE program." The various reported means for this question include: a male mean of 3.44, a female mean of 3.91, and a total mean of 3.62. These scores can be interpreted as agree with high strongly agree tendencies or as being highly positive.

The question, in this section, with the lowest reported mean for males, females, and in total was 2.33 or "The BYU culture supports the idea that Technology has a feminine side." The various reported means include: a male mean of 2.83, a female mean of 2.9, and a total mean of 2.86. These scores can be interpreted as between disagree with high agree tendencies or that it was perceived to be mostly positive with some negative responses.

4.4.2 Curriculum and Instruction

The second sub-research question was:

b. Did both genders in the sample population perceive Curriculum and Instruction to be positive in the Technology Teacher Education program?

To respond to this, seven questions were developed in the survey under the category "Curriculum and Instruction" (Table 4-2). Responses were then used to calculate question means and total group means of each respondent by gender, which were then used to calculate standardized mean difference effect size (SMDES). The

SMDES was then compared for practical significance. In this category, both males and females found the appropriateness in the gender equality of the curriculum and instruction to be positive at the agree level or slightly higher (total mean = 3.03, male mean = 3, female mean = 3.14). Additionally, as seen in Table 4-2, there was no practically significant difference reported between males and females under the area of Curriculum and Instruction in total (SMDES = .17) or in any of the questions. The positive nature of the SMDES in total also suggests that this section favored females in being more positive than males. However, this was not even a small difference and therefore not significant. The only question that favored males more positively was 2.17 or "At BYU, Technology is primarily taught so we can master and control the technologies that surround us," but the SMDES was also too low (-.17) to even show a small difference and therefore was not significant.

Two questions had a small difference: 2.11 (SMDES = .53) or "At BYU, Technology is primarily taught for the improvement of communication and collaboration." and 2.29 (SMDES = .49) or "The TTE teachers frequently give constructive feedback on my class work." However, small differences were not considered significant, but it is important to note that, in both, females were still favored as having had more positive responses than males.

The question, in this section, with the highest reported mean of males, females, and in total was 2.23 or "The TTE teachers hold high expectations for the work I do for my TTE classes." The various reported means include: a male mean of 3.78, a female mean of 3.82, and a total mean of 3.79. These scores can be interpreted as agree with high strongly agree tendencies or as highly positive.

Table 4-2: Questions, Means, and Their Effect Size for Curriculum and Instruction

Question Number	*Question*	*Male Mean*	*Female Mean*	*Total Mean*	*SMD ES*
2.04	When we have group assignments, I usually get stuck in the same role (i.e., note taker, laborer).***	3.17	3.18	3.17	.03
2.10	TTE Teachers use examples that I am familiar with when describing difficult principles and ideas.	3.67	3.73	3.69	.13
2.11	At BYU, Technology is primarily taught for the improvement of communication and collaboration.	2.89	3.27	3.03	.53
2.16	We have a lot of competitions in our TTE classes.***	2	2	2	0
2.17	At BYU, Technology is primarily taught so we can master and control the technologies that surround us.***	2.11	2	2.07	-.17
2.23	The TTE teachers hold high expectations for the work I do for my TTE classes.	3.78	3.82	3.79	.1
2.29	The TTE teachers frequently give constructive feedback on my class work.	3.39	3.64	3.48	.49
Total		3	3.14	3.03	.17

Key: 1=Strongly Disagree 2=Disagree
3=Agree 4=Strongly Agree
Note: The higher the mean score the more positive the student response.
Positive SMDES represent a more positive response favoring females.
Negative SMDES represent a more positive response favoring males.
****Denotes reverse polarity question*

The question, in this section, with the lowest reported mean for males, females, and in total was 2.16 or "We have a lot of competitions in our TTE classes." This particular question was reversed polarity; hence the appropriate reversed phraseology of

this question for this scoring is "We do not have a lot of competitions in our TTE classes." The reported score for male, female, and a total mean was 2. These scores can be interpreted as in disagreement or negative.

4.4.3 Role Models, Mentors, and Peers

The third sub-research question was:

c. Did both genders in the sample population perceive role models, mentors, and peers to be positive in the Technology Teacher Education program?

To respond to this, seven questions were developed in the survey under the category "Role Models, Mentors, and Peers" (Table 4-3). Responses were then used to calculate question means and total group means of each respondent by gender, which were then used to calculate standardized mean difference effect size (SMDES). The SMDES was then compared for practical significance. As seen in Table 4-3, no practically significant difference was reported between males and females under the area of Role Models, Mentors, and Peers (SMDES = -.56). In fact, both males and females perceived that female role models, mentors and peers were absent and mostly negative at the disagree level or slightly higher (total mean = 2.23 , male mean = 2.2, female mean = 2.25). The only exception was with their positive perceptions of exemplary male teachers as role models (3.83 total mean, question 2.12).

One question, 2.25: "I can name at least two male technologists," was considered unscorable upon secondary analysis. Though it provided interesting information about what students perceived they knew about male role models in technology, it did not uncover perceptions about what students knew of female role models, the focus of this section.

Table 4-3: Questions, Their Means, and Effect Size for Role Models, Mentors, and Peers

Question Number	*Question*	*Male Mean*	*Female Mean*	*Total Mean*	*SMD ES*
2.05	There have been 2 or more presentations given by female technologists in this major.	3	2.6	2.86	-.45
2.12	The teachers in this major are great examples of what I want to be like.	3.78	3.91	3.83	.28
2.18	I can name at least two female technologists	3.17	2.55	2.93	-.7
2.24	While in this major, I have been taught the history of many female technologists.	2	2	2	.24
2.25	I can name at least two male technologists.	…	…	…	…
2.30	While in this major, I have seen few professional female technologists in any form of media (ex: books, films, pictures).***	2.72	2.18	2.52	-.72
2.31	I am aware of/participate in clubs and associations for women in technology at BYU.	1.83	2.36	2.03	.63
Total		2.23	2.2	2.25	-.56

Key: 1=Strongly Disagree 2=Disagree
3=Agree 4=Strongly Agree
Note: The higher the mean score the more positive the student response.
Positive SMDES represent a more positive response favoring females.
Negative SMDES represent a more positive response favoring males.
****Denotes reverse polarity question*

The negative nature of the SMDES in total (-.56) suggests that this section favored males in being more positive than females. The questions that favored females more positively were: 2.12 (SMDES = .28) or "The teachers in this major are great examples of what I want to be like," 2. 24 (SMDES = .24) or "While in this major, I have

been taught the history of many female technologists," and 2.31 (SMDES = .63) or "I am aware of/participate in clubs and associations for women in technology at BYU." Yet, the SMDES was so low for questions 2.12 and 2.24, that they were not significant. However, question 2.31 did show practical significance with a medium difference level.

There were three questions in this section that favored males as having been more positive in their responses than females with negative SMDES. Questions 2.18 (SMDES = -.7) or "I can name at least two female technologists." and 2.30 (SMDES = -.72) or "While in this major, I have seen few professional female technologists in any form of media (ex: books, films, pictures)." reached practical significance at the medium difference level. Question, 2.05 or "There have been 2 or more presentations given by female technologists in this major," showed small difference with an SMDES of -.45. However, small differences were not considered significant.

The question, in this section, with the highest reported mean of males, females, and in total was 2.12 or "The teachers in this major are great examples of what I want to be like." The various reported means include: a male mean of 3.78, a female mean of 3.91, and a total mean of 3.83. These scores can be interpreted as agree with high strongly agree tendencies or as highly positive.

The question, in this section, with the lowest reported mean in total and for females was 2.24 or "While in this major, I have been taught the history of many female technologists." The reported mean for both was 2. These scores can be interpreted as in disagreement or negative. The lowest male reported mean was 1.83 for question 2.31 or "I am aware of/participate in clubs and associations for women in technology at BYU."

These scores can be interpreted as strongly disagree with high disagree tendencies or as negative.

4.4.4 Messages from Counselors

The fourth sub-research question was:

d. Did both genders in the sample population perceive messages from counselors to be positive in the Technology Teacher Education program?

To respond to this, six questions were developed in the survey under the category "Messages from Counselors" (Table 4-4). Responses were then used to calculate question means and total group means of each respondent by gender, which were then used to calculate standardized mean difference effect size (SMDES). The SMDES was then compared for practical significance. As seen in Table 4-4, a practically significant difference was reported between males and females under the area of Messages From Counselors in total (SMDES = .63) at the medium difference level. The positive nature of the SMDES in total also suggests that this section favored females in being more positive than males. In fact, both males and females found the messages from counselors to be mostly positive at the agree level leading more towards strongly agree (total mean = 3.53, male mean = 3.44, female mean = 3.68).

All questions in this section but one gave a positive SMDES. This question, 2.07 or "Materials about this major (like academic maps) are readily available," received a -.34 SMDES. Though it was a small difference, it was not considered significant.

Two questions, in this section, were practically significant with medium levels of difference: question 2.13 or "The TTE advisor knows me by name." and question 2.32 or "My TTE advisor has clearly explained how I can accomplish my academic and

professional goals." Both received a SMDES of .76. Hence, in both, females were still favored as having had more positive responses than males.

Table 4-4: Questions and Their Means for Messages from Counselors

Question Number	*Question*	*Male Mean*	*Female Mean*	*Total Mean*	*SMD ES*
2.06	I feel comfortable talking with my TTE advisor.	3.67	3.91	3.76	.57
2.07	Materials about this major (like academic maps) are readily available.	3.56	3.27	3.44	-.38
2.13	The TTE advisor knows me by name.	3.22	3.82	3.45	.76
2.19	While at BYU, I have been advised not to pursue this field because of my gender.***	3.83	3.91	3.86	.21
2.26	My TTE advisor is rarely available.***	3.22	3.46	3.43	.43
2.32	My TTE advisor has clearly explained how I can accomplish my academic and professional goals.	3.17	3.73	3.38	.76
Total		3.44	3.68	3.53	.63

Key: 1=Strongly Disagree 2=Disagree
3=Agree 4=Strongly Agree
Note: The higher the mean score the more positive the student response.
Positive SMDES represent a more positive response favoring females.
Negative SMDES represent a more positive response favoring males.
****Denotes reverse polarity question*

Three questions achieved a small level of difference: question 2.06 (SMDES = .57) or "I feel comfortable talking with my TTE advisor," question 2.07 (SMDES = -.38), and question 2.26 (SMDES = .43) or "My TTE advisor is rarely available." Two of them,

2.06 and 2.26, favored females in having been more positive. Only one, 2.07, favored males in having been more positive. Though these questions did have small differences between males and females, they were not considered significant.

In this section, the highest means for males, females and in total were in different questions. The highest reported female mean was tied at 3.91 in questions 2.06 or "I feel comfortable talking with my TTE advisor." and 2.19 or "While at BYU, I have been advised not to pursue this field because of my gender." Question 2.19 was a reverse polarity question; hence the appropriate phraseology for this scoring would be "While at BYU, I have not been discouraged from pursuing this field because of my gender." The reported female mean can be interpreted as agree with very high strongly agree tendencies or as highly positive. The highest reported male mean was 3.83 in question 2.19 as well. The reported male mean can be interpreted as agree with high strongly agree tendencies or as highly positive, but not as high as the female mean. The highest total mean was 3.86 for question 2.19 as well. This reported total mean can also be interpreted as agree with high strongly agree tendencies or as strongly positive.

The question, in this section, with the lowest reported mean in total and for males was 2.32 or "My TTE advisor has clearly explained how I can accomplish my academic and professional goals." The lowest reported total mean was 3.38. The lowest reported mean for the males was 3.17. These scores can be interpreted as agree with slight strongly agree tendencies or as positive. The lowest female reported mean was 3.27 for question 2.07 or "Materials about this major (like academic maps) are readily available." This scores can also be interpreted as agree with slight strongly agree tendencies or as positive.

4.4.5 Classroom Climate

The fifth sub-research question was:

e. Did both genders in the sample population perceive the classroom climate to be positive in the Technology Teacher Education program?

To respond to this, eight questions were developed in the survey under the category "Classroom Climate" (Table 4-5). Responses were then used to calculate question means and total group means of each respondent by gender, which were then used to calculate standardized mean difference effect size (SMDES). The SMDES was then compared for practical significance. As seen in Table 4-5, there was no practically significant difference reported between males and females in the total under the area of Classroom Climate (SMDES = .21). In fact, both males and females found the classroom climate to be positive at the agree level with a medium tendency towards strongly agree (total mean = 3.45 , male mean = 3.42, female mean =3.49). The positive nature of the SMDES also shows that females were favored as having had more positive responses than males.

One question, 2.35 "Females get more attention from teachers in TTE classes than males," was considered unscorable upon secondary analysis. This is primarily because the value of the question in scoring a positive atmosphere was lost when the polarity of the question was shifted during the creation of the survey. The original question dealt with males getting more attention, where if the students had agreed, the perceived female atmosphere would have been scored low, but because it was changed to center on females, it lost its meaning.

Table 4-5: Questions, Their Means, and Effect Size for Classroom Climate

Question Number	*Question*	*Male Mean*	*Female Mean*	*Total Mean*	*SMD ES*
2.03	I have always been called by my first name in my TTE classes.	2.89	4	3.31	1.56
2.09	Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.).***	3.5	3	3.31	-.8
2.15	The TTE classrooms and labs are always clean and inviting.	3.5	3.18	3.38	-.52
2.21	I have been offended by TTE faculty comments/behavior directed at my gender.***	3.83	3.91	3.86	.21
2.22	There are many enjoyable social events in this major.	3.5	3.91	3.66	.91
2.27	I feel comfortable talking with the TTE faculty about matters that concern me.	3.61	3.9	3.71	.65
2.28	I feel inadequate using the materials and tools necessary for doing my TTE class work.***	3.11	2.91	3.03	-.24
2.35	Females get more attention from teachers in TTE classes than males.	…	…	…	…
Total		3.42	3.49	3.45	.21

Key: 1=Strongly Disagree 2=Disagree 3=Agree 4=Strongly Agree
Note: The higher the mean score the more positive the student response.
Positive SMDES represent a more positive response favoring females.
Negative SMDES represent a more positive response favoring males.
****Denotes reverse polarity question*

Three questions in this section favored males as having had a more positive response than females: question 2.09 (SMDES = -.8) or "Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.)," question 2.15 (SMDES = -.52) or "The TTE classrooms and labs are always clean and inviting," and question 2.28 (SMDES = -.24) or "I feel inadequate using the materials and tools necessary for doing my TTE class work." In this group, question 2.09 is the only one with practical significance at the high level. Question 2.15 showed a small difference, while question 2.28 showed no level of difference. Both were not high enough to be considered practically significant.

Four questions, in this section, favored females as having had more positive responses than males: questions 2.03 (SMDES = 1.56) or "I have always been called by my first name in my TTE classes," question 2.21 (SMDES = .21) or "I have been offended by TTE faculty comments/behavior directed at my gender," question 2.22 (SMDES = .91) or "There are many enjoyable social events in this major," and question 2.27 (SMDES = .65) or "I feel comfortable talking with the TTE faculty about matters that concern me." All of these questions, with the exception of 2.21, which did not even show a small difference, achieved practical significance. Questions 2.03 and 2.27 did so at the high level of difference. Question 2.27 did so at the medium level of difference.

In this section, the question with the highest mean for females, is also the lowest reported male mean in question number 2.03 or "I have always been called by my first name in my TTE classes." The reported female mean was four and can be interpreted as strongly agree or highly positive. The male mean (lowest reported) was 2.89 and can be interpreted as disagree with high agree tendencies. Meaning that most male students

agreed, but there were still a number that disagreed. The highest reported male (3.83) and total means (3.86) were for question 2.21 or "I have been offended by TTE faculty comments/behavior directed at my gender." This question was a reverse polarity question; hence the appropriate phraseology for this scoring would be "I have not been offended by TTE faculty comments/behavior directed at my gender." These reported male and total means can be interpreted as agree with high strongly agree tendencies or as highly positive.

The lowest female and total reported means was for question 2.28 or "I feel inadequate using the materials and tools necessary for doing my TTE class work." This question was a reverse polarity question; hence the appropriate phraseology for this scoring would be "I do not feel inadequate using the materials and tools necessary for doing my TTE class work." The reported mean in total was 3.03. This score can be interpreted as agree or as positive. The reported mean for the females was 2.91. This score can be interpreted as disagree with very high tendencies to agree or that the responses were mostly positive with a few negative responses.

4.4.6 Teacher-Student

The sixth sub-research question was:

f. Was the relationship between students and faculty positive for both genders in the Technology Teacher Education program?

To respond to this, nine questions that were previously developed for the five influences were re-categorized in the survey under the category "Teacher-Student" (Table 4-6). Responses were then used to calculate question means and total group means of each respondent by gender, which were then used to calculate standardized

mean difference effect size (SMDES). The SMDES was then compared for practical significance. As seen in Table 4-6, there was a practically significant difference reported between males and females in total under the area of the Teacher-Student relationship at the medium difference level (SMDES = .84). The positive nature of the SMDES also shows that females were favored as having had more positive responses than males. In fact, none of the questions in this section favored males as having had higher responses than females. The total mean for this section was 3.57 and was interpreted as agree with high strongly agree tendencies or as highly positive. The total female mean of 3.78 was also interpreted in this way. The total male mean was 3.07 and was interpreted as agree or as positive.

There were four questions in this section that reached practical significance: question 2.02 (SMDES = .81) or "The TTE teachers always act against gender stereotypes," question 2.03 (SMDES = 1.56) or "I have always been called by my first name in my TTE classes," question 2.22 (SMDES = .91) or "There are many enjoyable social events in this major," and question 2.27 (SMDES = .65) or "I feel comfortable talking with the TTE faculty about matters that concern me." Questions 2.03 and 2.22 were significant at the high difference level, while the other two were at the medium difference level. Question 2.29 (SMDES = .49) or "The TTE teachers frequently give constructive feedback on my class work." reached a small level of difference, thus it and the remainder of the questions did not achieve practical significance due to low differences.

Table 4-6: Questions, Their Means, and Effect Size for Teacher-Student

Question Number	*Question*	*Male Mean*	*Female Mean*	*Total Mean*	*SMD ES*
2.02	The TTE teachers always act against gender stereotypes.	3	3.6	3.21	.81
2.03	I have always been called by my first name in my TTE classes.	2.89	4	3.31	1.56
2.08	Teachers have expressed the need for me to be in this major.	3.22	3.4	3.29	.23
2.12	The teachers in this major are great examples of what I want to be like.	3.78	3.91	3.83	.28
2.21	I have been offended by TTE faculty comments/behavior directed at my gender.***	3.83	3.91	3.86	.21
2.22	There are many enjoyable social events in this major.	3.5	3.91	3.66	.91
2.23	The TTE teachers hold high expectations for the work I do for my TTE classes.	3.78	3.82	3.79	.1
2.27	I feel comfortable talking with the TTE faculty about matters that concern me.	3.61	3.9	3.71	.65
2.29	The TTE teachers frequently give constructive feedback on my class work.	3.39	3.64	3.48	.49
Total		3.07	3.78	3.57	.84

Key: 1=Strongly Disagree 2=Disagree
3=Agree 4=Strongly Agree
Note: The higher the mean score the more positive the student response.
Positive SMDES represent a more positive response favoring females.
Negative SMDES represent a more positive response favoring males.
****Denotes reverse polarity question*

In this section, the highest means for females, males and total means were in different questions. The highest reported female mean was four for questions 2.03 or "I have always been called by my first name in my TTE classes." The reported female mean can be interpreted as strongly agree or highly positive. The highest male mean was 3.83 for question 2.21 or "I have been offended by TTE faculty comments/behavior directed at my gender." The highest reported total mean was 3.86 in question 2.21 as well. This question was a reverse polarity question; hence the appropriate phraseology for this scoring would be "I have not been offended by TTE faculty comments/behavior directed at my gender." This reported total mean can be interpreted as agree with high strongly agree tendencies or as highly positive.

The lowest reported mean for males, females and in total and for males was in three different questions as well. The lowest female reported mean was 3.4 for question 2.08 or "Teachers have expressed the need for me to be in this major." This score can be interpreted as agree with slight strongly agree tendencies or as positive. The lowest reported mean for males was 2.89 for question 2.03 (the highest for the female). This score can be interpreted as disagree with very high tendencies to agree. Meaning that most male students agreed, but there were still a number that disagreed. The lowest total mean was 3.21 for question 2.02 or "The TTE teachers always act against gender stereotypes." This score can be interpreted as agree with very slight strongly agree tendencies or as positive.

4.4.7 Student-Student

The seventh sub-research question was:

g. Was the relationship among students positive for both genders in the Technology Teacher Education program?

To respond to this, six questions that were previously developed for the five influences were re-categorized in the survey under the category "Student-Student" (Table 4-7). Responses were then used to calculate question means and total group means of each respondent by gender, which were then used to calculate standardized mean difference effect size (SMDES). The SMDES was then compared for practical significance. As seen in Table 4-7, there was practically significant difference reported between males and females in total under the area of the Student-Student relationship (SMDES = .91). The positive nature of the SMDES also shows that females were favored as having had more positive responses than males. This was seen in the lower total of the male mean (3.3) and the higher female mean (3.59). With these and the total mean of 3.41 both in general found the relationship between students to be positive at slightly higher than the agree level.

Only one question had a negative SMDES, question 2.09 (SMDES = -.8) or "Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.)." This difference between male and female responses was considered practically significant at the medium difference level. All other questions in this section had positive SMDES and favored female responses as being more positive than the males.

Table 4-7: Questions, Their Means, and Effect Size for Student-Student

Question Number	*Question*	*Male Mean*	*Female Mean*	*Total Mean*	*SMD ES*
2.03	I have always been called by my first name in my TTE classes.	2.89	4	3.31	1.56
2.04	When we have group assignments, I usually get stuck in the same role (i.e., note taker, laborer).***	3.17	3.18	3.17	.03
2.09	Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.).***	3.5	3	3.31	-.8
2.14	My friends support my involvement in this major.	3.28	3.55	3.38	.55
2.20	I have many friends in the TTE program.	3.44	3.91	3.62	.72
2.22	There are many enjoyable social events in this major.	3.5	3.91	3.66	.91
Total		3.3	3.59	3.41	.91

Key: 1=Strongly Disagree 2=Disagree
3=Agree 4=Strongly Agree
Note: The higher the mean score the more positive the student response.
Positive SMDES represent a more positive response favoring females.
Negative SMDES represent a more positive response favoring males.
****Denotes reverse polarity question*

Four questions in this section were practically significant: question 2.03 (SMDES = 1.56) or "I have always been called by my first name in my TTE classes," question 2.09 (SMDES = -.8) or "Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.), " question 2.20 (SMDES = .72) or "I have many friends in the TTE program," and question 2.22 (SMDES = .91) or "There are many enjoyable social events in this major." Questions 2.03 and 2.22 were

significant with a high level of difference, while 2.09 and 2.20 only had a medium level of difference.

Question 2.14 (SMDES = .55) or "My friends support my involvement in this major." showed a small difference between males and females, while questions 2.04 (SMDES = .03) or "When we have group assignments, I usually get stuck in the same role (i.e., note taker, laborer)." showed an even lower difference. Both were positive and favored females as having higher responses then males, but they were so low that neither were considered practically significant.

In this section, the highest means for females, males, and total means were in different questions. The highest reported female mean was four for questions 2.03 as well as the lowest for males (2.89) as previously reported. The highest male mean was 3.5 for questions 2.22 or "There are many enjoyable social events in this major." and 2.09 or "Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.)." The highest reported total mean was 3.65 in question 2.22 as well. This question was a reverse polarity question, hence the appropriate phraseology for this scoring would be "Fellow students have not told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.)." This mean can be interpreted as agree with medium strongly agree tendencies or as positive.

The lowest female reported mean was three for question 2.09. This score can be interpreted as agree or positive. The lowest total mean was 3.17 for question 2.04 or "When we have group assignments, I usually get stuck in the same role (i.e., note taker, laborer)." This question was a reverse polarity question; hence the appropriate phraseology for this scoring would be "When we have group assignments, I don't get

stuck in the same role (i.e., note taker, laborer)." This score can be interpreted as agree with very slight strongly agree tendencies or as positive.

4.4.8 Overall Environment

The eighth sub-research question was:

h. Were the perceptions of students about the environment as a whole in the BYU Technology Teacher Education program positive for both genders?

To respond to this the male and female mean of all the responses by category were compared to each other and the overall mean of all the responses and then transferred into graphical representation for ease of interpretation as seen below (Figure 4-1, Figure 4-2).

Under the five influences, in general, the area with the highest total, male, and female means was Messages from Counselors (see Figure 4-1). These mean scores were primarily in the agree range with medium to high strongly agree tendencies or as positive. In contrast the area with the lowest total, male and female means was Role Models, Mentors, and Peers. These mean scores were primarily in the disagree range with only slight agree tendencies or mostly negative with some positive responses. This can be interpreted as a majority response in disagreement with only a few in agreement.

Under the two relationships, in general, the area with the highest and lowest means for males and females was in the Teacher-Student relationship (see Figure 4-2). The area with the least significantly different means in this subtopic between males and females was the Student-Student relationship.

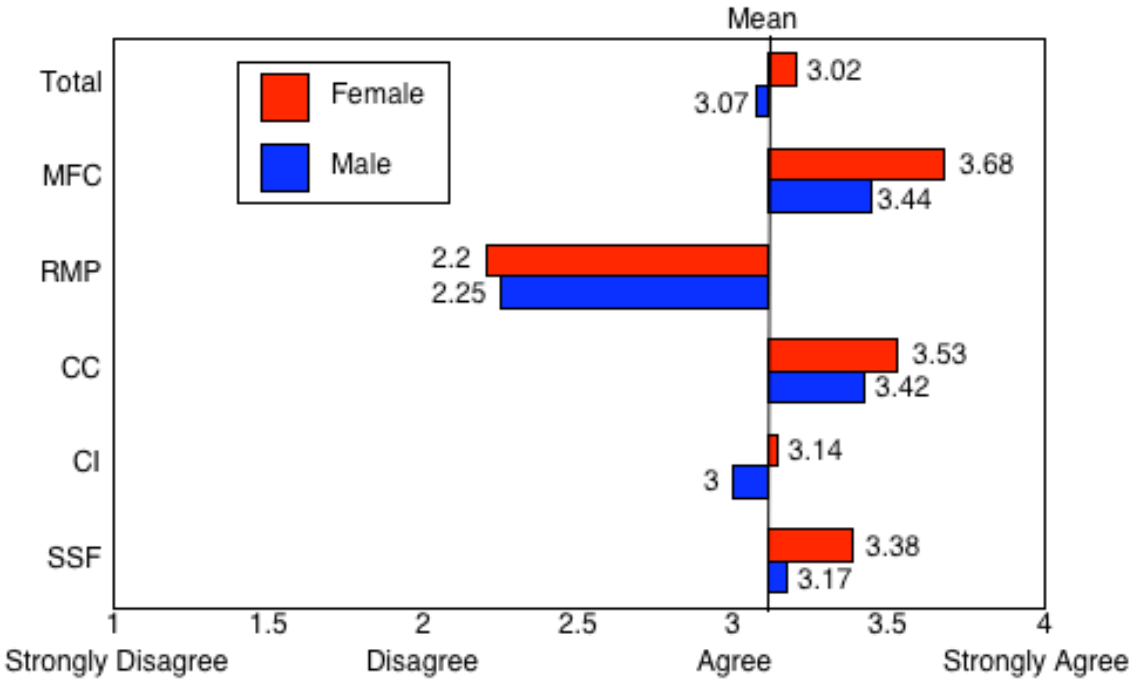


Figure 4-1: Male/ Female Mean Comparisons for the Five Influences

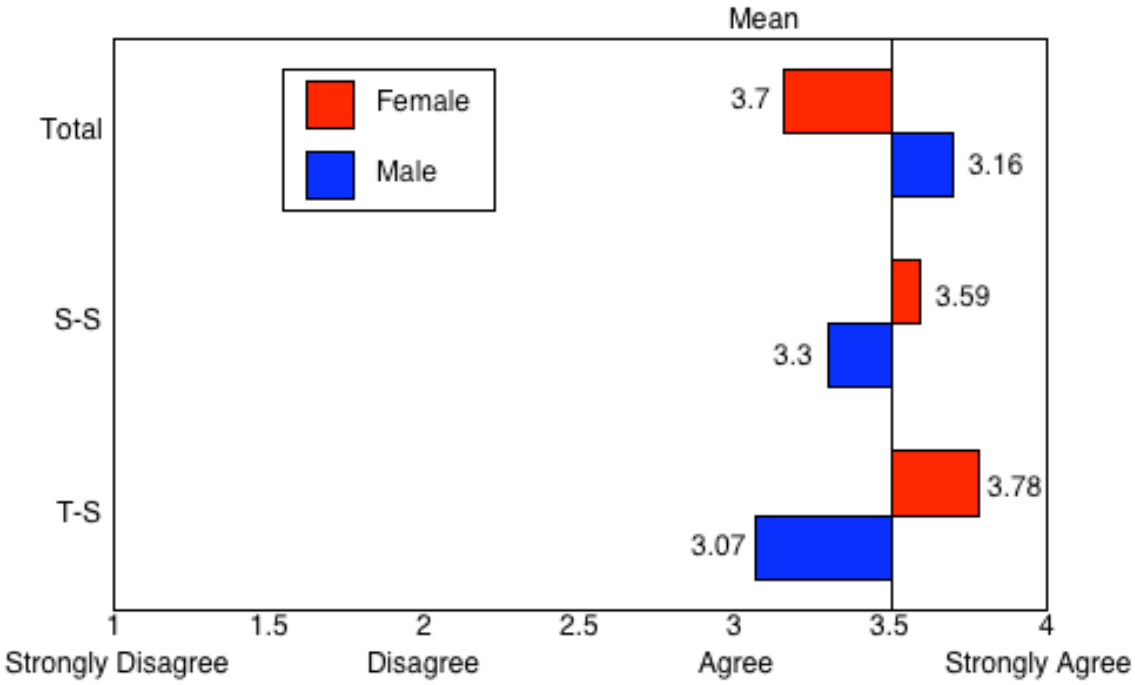


Figure 4-2: Male/ Female Mean Comparisons for the Two Relationships

4.5 Qualitative Analysis

The purpose of these three questions was to establish the reasons why people were attracted to the program, what they like about it (possible reasons for staying) and what they dislike about it (possible reasons for leaving). These questions were formatted as free response due to the varying nature of responses and for the free expression it allows. Due to this format, a qualitative form of analysis was necessary.

The findings and results for this section were produced through open coding as suggested by Creswell (1998). This was done by categorizing the responses to the questions under the topic of the question asked: "Why did you join the TTE major?" becomes "Attraction," "What have you enjoyed the most about the TTE major?" becomes "Likes," and "What do you dislike about the TTE major?" becomes "Dislikes." The responses under each category were then read and grouped according to similarities with emerging subtopics. The number of times each student mentioned the subtopics were counted with one count per category per student. For instance, under the topic "Attraction" the comment "I like to teach, and I like technology. Here I get to acutally [sic] do hands on activities and gain experience in both areas of interest." becomes one count in "To Teach" one count in "Content" and one count in "Methodology." These responses were then organized according to male, female and total response headings. Total counts were then taken and compared by amounts.

4.5.1 Attraction

In an attempt to understand why people were attracted to the program, the question "Why did you join the TTE major?" was asked. Twenty-nine students (11

females, 18 males) responded to this question. Four main categories emerged between theses responses: Content, To Teach, Methods, and People (Table 4-8).

Table 4-8: Response Tallies for Attraction

Category	*Total*	*Male*	*Female*
Content	23	12	11
Breadth	6	4	2
To Teach	15	10	5
Methods	1	1	0
People	8	5	3
Professor	2	1	1
Environment/Students	3	2	1
Recommendations	4	3	1

4.5.1.1 Content

"Content" is defined as general references to the subject matter with responses containing such phrases as "Because I like the subject matter" or "Because I love Technology." This category contains one subtopic "breadth" defined as references to the variety or combination of multiple subjects offered to TTE majors with responses containing such phrases as "It gives you a chance to learn many different and fun aspects of industrial arts technology." or "I was looking for a major that would allow me to take technology classes from multiple departments." This category contained the highest number of responses in total (23) as well as for both males (12) and females (11). Only six people in total referred specifically to the breadth aspect, with twice as many males (4) as females (2) responding in this sub category.

4.5.1.2 To Teach

"To teach" is defined as any response that specifically uses this phrase or refers to future employment opportunities as a teacher. Phrases include such statements as "I wanted to teach" or "I love teaching." There were 15 responses in total that related to this topic. Additionally, twice as many males (10) as females (5) had responses related to this category.

4.5.1.3 Methods

"Methods" is defined as any reference to the activities or methodology used in teaching the TTE classes. This section received the least amount of responses. Only one male made reference to this in the second half of his response to this question. His response was, "Here I get to actually do hands on activities and gain experience."

4.5.1.4 People

"People" is defined as any reference to faculty, family, teachers, friends, or within or without the TTE program as being of quality or referring them to the major. References to the overall social environment were also included in this category. These include phrases such as "The instructors are top notch" or "the major is a more fun and relaxed major." There were a total of eight responses that referred to this and was split between five male responses and three female responses. These were also broken down into three sub categories: professors, environment/students, and recommendations. Two people made direct reference to professors as the reason they joined; one male and one female. Three people made reference to the students or the positive environment; two males and one female. Four people said they joined because of other people's

recommendations; three males and one female. Two of those males said they were recommended by a student within the major, one of those males said it was a family member. Only one female said her roommate encouraged her to join.

4.5.2 Likes

In an attempt to understand what people liked about the major to establish possible reasons for retention, the question "What have you enjoyed the most about the TTE major?" was asked. Twenty-nine students (11 females, 18 males) responded to this question. Four main categories emerged between theses responses: Content, Methodology, People, and Class sizes (Table 4-9). Many of these categories meet the same definitions as previously stated and will therefore not be repeated, but only reported.

Table 4-9: Response Tallies for Likes

Category	*Total*	*Male*	*Female*
Content	16	10	6
Breadth	6	5	1
Methodology	9	3	6
People	20	10	10
Professors	14	6	8
Student/Environ.	13	5	8
Class Size	1	0	1

4.5.2.1 Content

In contrast to "Attraction", in this category, "Content" was only the second largest response rate with 16 total responses corresponding. Additionally, the number of male responses (10) that refer to this topic is almost twice as large as the female responses (6).

The similarity falls with the breadth references, only in this case, more than half of the references were made by males (6) (and one female).

4.5.2.2 Methodology

This section contained only nine references in total, but was still only second to last place in the total number of references. Females (6) referred to this category twice as much as males (3).

4.5.2.3 People

"People" was the most dominantly referred to reason that the students liked this major. In total, 20 students made reference to this with an equal number of responses from both males and females (10). Under the subtopic of professors, 14 students in total made references to the faculty either directly by name or by position. Six of these respondents were male and eight were female. Under the subtopic of students/environment, 13 students in total made reference directly to "students" or in statements such as "we're like our own little family" or "friendly atmosphere." Five of these respondents were male and eight were female.

4.5.2.4 Class Size

Class size is defined as any reference to the small amount of students in each class. Only one female made reference to this category and related it to the closeness she felt within the atmosphere it created.

4.5.3 Dislikes

In an attempt to understand what people disliked about the major to establish possible reasons for leaving, the question "What do you dislike about the TTE major?" was asked. Twenty-seven students (11 females, 16 males) responded to this question. Five main categories emerged between theses responses: None, Classes, People, Equipment, and Future (Table 4-10).

Table 4-10: Response Tallies for Dislikes

Category	*Total*	*Male*	*Female*
None	6	4	2
Classes	15	8	7
Structure/Offering	5	3	2
Content/Workload	9	4	5
Secondary Ed.	3	2	1
People	2	1	1
Equipment	5	2	3
Future	2	2	0
Age	1	0	1

4.5.3.1 None

None is defined as null responses such as "Not much" or "I haven't found anything thus far." Six students in total made responses like this: four males, two females. Only one of the students, a male, continued in his commentary to complain about the Secondary Education classes taught outside the major. The rest left the response as one of satisfaction.

4.5.3.2 Classes

This section is defined as references made to the content, the workload, the structure, the amount of offerings, the subject taught, or any comment related to the Secondary Education classes (teacher quality or subject matter) taught outside the major. This category was the one that the most students responded with for this question (15). Although more males than females made a response under this classification, it was only by one student; eight males, seven females, 15 total.

4.5.3.3 Structure/ Offerings

The same can be said of the subtopic of "Structure/ Offerings"; three males, two females, five total. This subtopic can be defined as references made to the limited number of course offerings and the tight schedules it creates as a result. This is seen in comments like "Often there will be one class you need to graduate but it is only offered once a year and in one section, so you are forced to adapt your life to TTE schedule." This also refers to the organization of the major in such phrases as "Course maps are a little confusing" or "We aren't very organized." This subtopic in total received five total student responses, three male responses, and two female.

4.5.3.4 Content/Workload

The second subtopic "Content/Workload" is defined as commentary made directly about what is taught in the classes such as "I'm not particularly interested in drafting or woodshop" or complaints about the amount of work each class requires such as "The workload is very heavy." This subtopic received the largest number of references under this category. There were nine total, four male and five female respondents.

4.5.3.5 Secondary Education

The third subtopic "Secondary Education" refers to complaints made about courses and teacher quality of the classes offered outside the TTE department, but are required for graduation with a TTE degree. This is seen in such comments as, "Several of them [the Sec. Ed. Courses] were taught by faculty that are of a lower caliber than the professors in the TTE major" and "I didn't get very much out of some of the secondary ed. classes." Only three people in total reported dislike of the classes, two of which were male and only one was female.

4.5.3.6 People

This category is similar to those used before, only here, it is used in a negative connotation in phrases such as "the woods teacher intimidated (and sometimes belittled) me" and "It is the dumping ground for those who fail at other majors." Only two people, one male, one female, made responses to this effect.

4.5.3.7 Equipment

Equipment is defined as references made to a fear of operating the equipment, or the disorganized and unclean nature of the labs as seen in such phrases as "I was scared to use equipment because I didn't want to hurt myself" or "The labs were not as organized as they could have been, nor as clean." Five students, in total, made reference to this as a dislike about the program. Two of the students were male and three were female.

4.5.3.8 Future

Future is defined as references made to possibilities of future employment or pay as seen such phrases as "There is a nationwide movement to downsize technology courses (particularly woodshop), and it is stressful to doubt employment opportunities." Only two males made responses that corresponded to this category.

4.5.3.9 Age

Age is defined as a reference made to the age of the student in contrast to the age of the technology they are being taught. Only one female made reference to being a "fossil" in that her age was an inhibiting factor in learning new technologies.

4.5.4 Qualitative Summary

In general, the area that received the most responses was "content' under "Attraction." This was true for the total tally (23), male (12), and female (11) responses. The second largest response was "People" under "Likes" with 20 total responses and 10 responses each for both genders. The third largest number of responses was tied between the "Classes" category of "Dislikes" and the "To Teach" category under "Likes." Both received 15 responses, but the "Classes" category received eight male and seven female responses whereas the "To Teach" category received 10 male and five female responses.

Chapter 5: Conclusions

5.1 Summary

The purpose of this study was to attempt to describe why Brigham Young University's Technology Teacher Education program has successfully attracted and retained a high percentage of females in the undergraduate program. This was done by documenting the perceptions of students enrolled in the program, during the Winter 2006 semester, about the environment's influences on the attraction and retention of females. A review of literature revealed a few similar studies pertaining to student and teacher perceptions of gender acceptance within the field of technology education. Mixed results of the acceptance and perceptions of males and females (Haynie III, 1999; McCarthy and Moss, 1994; Silverman and Pritchard, 1996; Sheng and Hall, 1996) were reviewed. In combination with the findings of personal research, and the review of previous reviews of literature, and their findings and recommendations, these results demonstrated the need for further research in the field to document the perceptions of males and females in an environment where the retention and attraction of females within the field of Technology Teacher Education is successful.

A survey instrument based on Welty and Puck's research was developed into a Likert-scale, four point, forced response and was distributed electronically to the entire population of BYU TTE undergraduate students through e-mail notifications and a return

rate of 73.3 % of the females, 28.6 % of the males and 37.2 % of the total population was obtained. Analysis was conducted using a standardized mean deviation effect size (SMDES) of individual responses within the various categories of the five influences of Welty and Puck (2001) and the two relationships of Haynie III (1999) as well as a comparison of means between males and females to establish the perceived polarity of the environment.

Results showed that only one category, messages from counselors, had a practically significant difference of perception within the categories of the five influences. Role models, mentors and peers was the only one of the five influences that had a negative SMDES or a negative total mean rating at the disagree level. So in general, four of the total means of the five influences were positively rated at the agree level (3) or higher and females were favored with more positive responses, except for role model mentors and peers. Both genders found the environment to be positive in the two relationships of academia and both relationships had practical significance in total between male and female responses with females favored with higher responses than males. The free response questions of this section also found that a majority of the students were attracted to the program because of the love of the content and the desire to teach. The dominant reasons they liked the major, and possibly the reasons they stay, was the people, mainly the professors, followed closely by the content. The dominant dislike or dissatisfaction with the major was in the classes themselves, predominantly in the subtopic of course content and workload.

5.2 Conclusions

Based upon the literature review and the findings of this study, the following conclusions were made:

1. The positive and supportive student and teacher relationship (collegiality) combined with the positive nature of four of the five influences was enough to overcome the lack of available female role models, mentors and peers in creating a positive environment.
2. Students perceived the relationship between students and the relationship between students and teachers to be positive.
3. Females perceived the relationship between students, the relationship between students and teachers, and the messages from counselors to be more positive than the males did.
4. The BYU TTE program had a positive overall perceived environment for females.
5. Students were primarily attracted to/ liked the major because of the content (teaching and technology) and the people in it (students, and professors).
6. Students primarily disliked the major because of its required classes. Main dissatisfaction was with course content or workload, closely followed by the structure or schedule of offerings, and lastly the quality of the secondary education courses taken outside the major.

5.3 Discussions

Based on the recommendations of five influences of Puck and Welty (2001) and the responses to the survey, the BYU TTE program has succeeded in recruiting and retaining females because the environment offers a close, positive and supportive social

network with faculty and students. The only area that was in disagreement with the five influences was "Role Models, Mentors, and Peers", suggesting that only four of the five influences were necessary for such an environment seeing as such role models and mentors were not readily available. All educators in the BYU TTE major were male. The only females were in the secretarial and advisory staff. These findings were in direct contrast to the reasoning behind the failure of the Wisconsin TOOL Box project as attributed to a lack of female role models (90% of tech. educators in the state were male) (Geraghty, Niles, Shager and Strei, 2004). It is also interesting to note that despite the presence and availability of membership in a technology and engineering club for women, the Society for Women Engineers, to TTE students and at least two presentations by female technologists on the BYU campus specifically for the TTE majors, it was generally perceived that there was little or no knowledge of them. Despite the lack of female role models available, based on the qualitative analysis of the free response section and the high polarity of the relationship responses, a good relationship with the faculty and students, as well as good role models of any gender proffers continued retention and satisfaction of students within this environment. It was also important for the females in this environment to have a good relationship with advisory staff who send positive, helpful messages that assist students in accomplishing educational goals. Another explanation for the success of four of these five influences in this setting and not in the secondary and primary levels could be that these influences only function well only at the collegiate level.

In agreement with the findings of the Wales study (McCarthy and Moss, 1994), it was the attitude towards the content itself, the subject matter that attracted students to the

courses. In other words, with high counts of statements such as "I love technology. I love teaching" as the reason they selected the major, means the reason they initially selected it was a positive attitude towards the content. As a result, the reasons students joined and stayed in the BYU TTE program was because it offered the content students wanted and were interested in.

It was also interesting to note that the classes were also found to be the primary topic in the dislikes of the major. In other words, though the classes are what attracted them, it is also what students are most dissatisfied with. It was possible, however, that it was the general attitudes towards the subject matter as a whole and not specific classes required by the major that generated the attraction and retention within the major.

5.4 Recommendations

Due to the established lack of research and documentation of student perceptions of the environment and its effect on attraction and retention in Technology Teacher Education, and the general lack of diversity in the field, several recommendations were made:

1. Further research needs to be done at other universities identified by Iley (2003) with low reported female enrollment using the same methods and instruments in this study to validate and compare with the findings of this study.
2. Further research into the third relationship of academia (teacher-teacher) at this and other universities, similar to the research conducted by Haynie III (1999, 2003), needs to be done specifically among the teachers of TTE programs along with a tracking of their effect on female and male enrollment patterns.

3. Further qualitative research needs to be done concerning the reasons females have left this and other university TTE programs.
4. Further research needs to be conducted into the various demographics of religion, marital status, age, and class standing and their affects on gender decisions within the field of TTE.
5. Further research into future tracking of enrollment trends of this and the other universities identified by Iley (2003) need to be conducted.
6. Studies exploring the effect of the presence or lack of female role models on females pursuing technology education at the collegiate level needs to be conducted.
7. Efforts to maintain the positive atmosphere, as it currently exists, and a deeper understanding of the findings need to be made known to this and other universities.
8. Repeated research using this instrument at this university to acquire a better population response rate and to determine changes in perception as compared to changing enrollment patterns need to been done to establish more generalizeable results of this survey among a broader population.

References

Bean, K., Bean, L., & Morgan, D.. (2005). Pediatric Prosthetics, Incorporated. Retrieved June 28, 2005, from Company Founders Web site: http://www.kidscanplay.com.company_founders.htm

Creswell, J.W. (1998). Qualitative Inquiry and Research Design: Choosing among Five Traditions. Thousand Oaks, CA: Sage.

Donald, J.W. Socialization process and demographic variables: Their effect upon the gender imbalance in engineering technology education at the associate degree level (Doctoral Thesis, University of Bridgeport, March 1992) Pro Quest Digital Dissertations, AAT 9228368.

Erekson, T. L. & Young, P. M. (1985). The Influence of Parents on the Educational and Occupational Decision Making of Their Children: Reducing Sex Role Stereotyping in Vocational Education. Laramie, WY: Department of Vocational Education, College of Education, University of Wyoming. (ERIC Document reproduction No. ED 277 813).

Geraghty, L., Niles, A., Shager, H., & Jennifer, S. (2004). K-12 Science, Math, Computer Science, and Vocational-Technical Education: Continuing Gaps for Girls in Wisconsin. Educational Achievement Task Force: Wisconsin.

Haynie III, W.J. (1999, Spring). Cross-Gender Interaction in Technology Education: A Survey, *Journal of Technology Education*. 10, (2).

Haynie III, W.J. (2003, Fall). Gender Issues in Technology Education: A Quasi-Ethnographic Interview Approach, *Journal of Technology Education*. 15, (1).

Schmidt, K., & Custer, R. L. (Eds.). (2002-03). *Industrial Teacher Education Directory,* CTTE and NAITTE, Department of technology, Illinois State University, Normal, IL.

Iley, J. L. (2003). *Strategies Used by Program Leaders for Increasing Interest and Enrollments in Technology Education Programs: Issues in Technology Education*. Unpublished manuscript.

Klein, S. S. & Ortman, P. E., et.al. (1994). Continuing the Journey Toward Gender Equity, *Educational Researcher.* 23, (8).

Lewis, T. (2004). *Ownership, Voice, and the Transformation of Technology Education: Perspective on the Profession*. Unpublished manuscript.

McCarthy, A. C. & Moss, G. D. (1994). A Comparison of Male and Female Pupil Perceptions of Technology in the Curriculum. *Research in Science & Technology Education*. 12, (1).

Microsoft Excel (Version 11.2.3) [Computer software]. (2004). Microsoft Corporation.

National Center for Educational Statistics (2004). Institute of Education Sciences U.S. Department of Education. Retrieved February 18, 2005, from Digest of Educational Statistics 2004 Web site: http://nces.ed.gov/programs/digest/d04/tables/dt04_380.asp

Reeves, B. T. (1998). Virtual Museum of Women in Electrical Power Engineering at Virginia Tech. Retrieved June 28, 2005, from Dr. Maria Telkes Web site: http://www.ee.vt.edu/~museum/women/maria/a_maria.html

Sheng, P. & Hall, H. C. (1996). Perceptions Held by Vocational Educators Toward Female Participation in Nontraditional Programs. *Journal of Vocational Technical Education*. 13, (1).

Shumway, S. L. A Comparison of Cooperative-Cooperative and Cooperative-Competitive Goal Structures and Their Effect on Group Problem-Solving Performance and Student Attitudes Toward Their Learning Environment. (Doctoral Thesis, Utah State University, 1999).

Silverman, S., & Pritchard, A. M. (1996, Spring). Building Their Future: Girls and Technology Education in Connecticut. *Journal of Technology Education*. *7*, (2).

Silverman, S., & Pritchard, A. M. (1993, September). Building Their Future: Girls in Technology Education in Connecticut: Executive Summary. Connecticut: Vocational Equity Research, Training and Evaluation Center.

Silverman, S., & Pritchard, A. M. (1996, Spring). Building Their Future II: High School Girls in Technology Education in Connecticut: Executive Summary. Connecticut: Vocational Equity Research, Training and Evaluation Center.

SurveySuite [Computer Software]. University of Virginia, Virginia: Internet Commerce Group (InterCom).

Try Science [A], (2005, November 20). 4000 Years of Women in Science. Retrieved March 26, 2005, from Curie, Marie Web site: http://crux.astr.ua.edu/4000ws/

Try Science [B], (2005, November 24). 4000 Years of Women in Science. Retrieved March 26, 2005, from Lovelace, Lady Augusta Ada Byron Web site: http://crux.astr.ua.edu/4000ws/

Welty, K. (2004). *Attending to Gender Differences in Technology and Pre-engineering Education: The Diversity Imperative.* Unpublished manuscript.

Welty, K. & Puck, B. (2001). Modeling Athena: Preparing Young Women for Citizenship and Work in a Technological Society. Madison: Wisconsin Department of Public Instruction.

APPENDICES

Appendix A. Cover letter

Dear TTE Students,

In the fall of 2004, 24.28% of the students in BYU's Technology Teacher Education (TTE) program were females. When compared with 6 other universities with growing Technology Teacher Education programs, BYU clearly has the highest percentage of female TTE majors (see table1).

A survey, conducted by a BYU Grad student, is being distributed among BYU's TTE students enrolled in the Winter 2006 to understand why BYU has succeeded in retaining and attracting a larger number of female students in the TTE program where other universities have not. As one of these students you have been selected as a participant.

There are minimal risks and/or benefits to your participation in this study. *Risks*: physical discomfort taken in the amount of time it requires to sit and complete the survey, some may find the nature of the questions sensitive. *Benefits:* this study will provide a baseline for further research to be conducted into future enrollment gender trends and perceptions of TTE programs and their environment at this and other universities.

Involvement in this research project is voluntary. You may withdraw at any time without penalty and may refuse to participate entirely. There will be no reference to your identification at any point in the research.

If you have questions regarding this study you may contact Katrina Cox, Researcher, via email at kmc@cc.usu.edu. If you have questions regarding your rights as a participant in the research projects, you may contact Dr. Renea Beckstrand, Chair of the Institutional review Board for Human Subject, 422 SWKT, Brigham Young University, Provo, UT 84602; phone (801)-422-3873; email renea_beckstrand@byu.edu.

The survey is provided online, consists of 44 questions and will take 10-15 minutes to answer. To participate, click on the following link to complete the survey, and when finished, submit it online.

By clicking on this link you give your consent to be a participant in this research study

http://intercom.virginia.edu/SurveySuite/Surveys/thesissurvey

Thank you for you time and dedication to the TTE program. Most importantly thank you for participating in this research.

Sincerely,

Katrina Cox

Graduate Student and Research Assistant

Tom Erekson

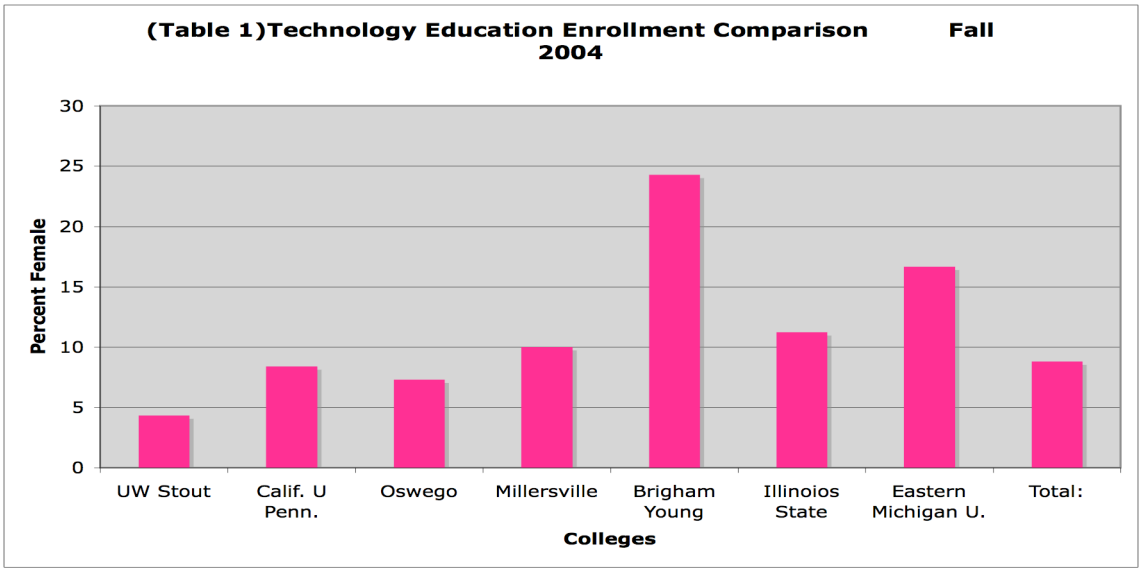
Director of the School of Technology

Steve Shumway

Associate Prof. of Tech. Ed.

Jared Berrett

Assistant Prof. of Tech. Ed.



Appendix B. Survey

Technology Teacher Student Survey

PLEASE SUBMIT ONLY COMPLETE SURVEYS ONCE.

1. Demographics

[Top] [Demographics] [Level of Agreement] [Free Response] [Submit]

Please fill in the blank with the appropriate information.

1.1. What is the name of your major's advisor?

1.2. What is your gender?
Male
Female

1.3. What is your age?
17 or younger
18-19
20-21
22-23
24-25
26-27
28-29
30+

1.4. What year are you in school?
Freshmen (0-29.9 credits)
Sophomore (30-59.9 credits)
Junior (60-89.9 credits)
Senior (90 + credits)
Other, Please Specify:

1.5. What is your ethnicity?
White
Hispanic

Asian/Pacific Islander
Native American
African American
Other, Please Specify:

1.6. What is your marital status?
Single
Married
Divorced
Widowed
Other, Please Specify:

2. Level of Agreement

[Top] [Demographics] [Level of Agreement] [Free Response] [Submit]

Please read the Statements below and choose the response that best describes your level of agreement.

2.1. My parents agree that Technology Teacher Education is a good field for me.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.2. The TTE teachers always act against gender stereotypes.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.3. I have always been called by my first name in my TTE classes.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.4. When we have group assignments, I usually get stuck in the same role (i.e., note taker, laborer).
Strongly Agree
Agree
Disagree
Strongly Disagree

2.5. There have been 2 or more presentations given by female technologists in this major.
Strongly Agree
Agree

Disagree
Strongly Disagree

2.6. I feel comfortable talking with my TTE advisor.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.7. Materials about this major (like academic maps) are readily available.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.8. Teachers have expressed the need for me to be in this major.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.9. Fellow students have told jokes about my gender in the TTE classroom (blonde jokes, macho man jokes, etc.).
Strongly Agree
Agree
Disagree
Strongly Disagree

2.10. TTE Teachers use examples that I am familiar with when describing difficult principles and ideas.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.11. At BYU, Technology is primarily taught for the improvement of communication and collaboration.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.12. The teachers in this major are great examples of what I want to be like.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.13. The TTE advisor knows me by name.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.14. My friends support my involvement in this major.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.15. The TTE classrooms and labs are always clean and inviting.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.16. We have a lot of competitions in our TTE classes.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.17. At BYU, Technology is primarily taught so we can master and control the technologies that surround us.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.18. I can name at least two female technologists
Strongly Agree
Agree
Disagree
Strongly Disagree

2.19. While at BYU, I have been advised not to pursue this field because of my gender.
Strongly Agree
Agree

Disagree
Strongly Disagree

2.20. I have many friends in the TTE program.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.21. I have been offended by TTE faculty comments/behavior directed at my gender
Strongly Agree
Agree
Disagree
Strongly Disagree

2.22. There are many enjoyable social events in this major.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.23. The TTE teachers hold high expectations for the work I do for my TTE classes.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.24. While in this major, I have been taught the history of many female technologists.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.25. I can name at least two male technologists.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.26. My TTE advisor is rarely available.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.27. I feel comfortable talking with the TTE faculty about matters that concern me.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.28. I feel inadequate using the materials and tools necessary for doing my TTE class work.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.29. The TTE teachers frequently give constructive feedback on my class work.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.30. While in this major, I have seen few professional female technologists in any form of media (ex: books, films, pictures).
Strongly Agree
Agree
Disagree
Strongly Disagree

2.31. I am aware of/participate in clubs and associations for women in technology at BYU.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.32. My TTE advisor has clearly explained how I can accomplish my academic and professional goals.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.33. The BYU culture supports the idea that Technology has a feminine side.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.34. The general consensus at BYU is that Technology is a masculine subject.
Strongly Agree
Agree
Disagree
Strongly Disagree

2.35. Females get more attention from teachers in TTE classes than males.
Strongly Agree
Agree
Disagree
Strongly Disagree

3. Free Response

[Top] [Demographics] [Level of Agreement] [Free Response] [Submit]

Write your response in the area below each question. Please limit your answers to 100 words or less.

3.1. Why did you join the TTE major?

3.2. What have you enjoyed the most about the TTE major?

3.3. What do you dislike about the TTE major?

Appendix C. Participant Free Response Comments

Question	*Gender*	*Comment*
3.1	Male	Because I like the subject matter
3.1	Female	I wanted to be a teacher. More specifically I wanted to teach technology (computer classes & multimedia).
3.1	Female	I was looking for a major that would integrate my love of computers and teaching. This was the perfect fit!
3.1	Male	I embrace the need to promote technical literacy.
3.1	Male	I enjoy technology.
3.1	Male	I like to teach, and I like technology. Here I get to acutally do hands on activities and gain experience in both areas of interest.
3.1	Male	It gives you a chance to learn many different and fun aspects of industrial arts technology. Also, the major is a more fun and relaxed major. It is not competitive like accounting or engineering. The instructors are top notch also.
3.1	Female	It was a major that I could choose the emphasis that I am interested in.
3.1	Male	The major entails all that interests me and has great people in it.
3.1	Female	Because I got tired of the politics of being a female drafter. But I still wanted to be in the field, so I came back to school so I could teach drafting.
3.1	Female	Because I like computers.

Question	*Gender*	*Comment*
3.1	Female	I wanted to major in technology stuff, but then I really also wanted to be a teacher. So when I found out they had TTE it was perfect, I got to have both things I wanted!
3.1	Female	I enjoy participating in all the activities it encompases: multimedia, construction, etc...
3.1	Male	I want to teach high school woodshop.
3.1	Male	It was the union of all of the things that I was passionate about in life
3.1	Male	I love technology and I love teaching- seemed like a good choice.
3.1	Female	I liked the faculty and the subject matter.
3.1	Male	It is a conglomerate of all of my interests. I get to keep learning.
3.1	Male	Ever since I was a kid I loved playing with things on the computer. I love technology. I have also enjoyed public speaking and teaching. Eventually I found that the best field for me is Technology Teaching.
3.1	Male	I was looking for a major that would allow me to take technology classes from multiple departments. This major allows it.
3.1	Female	Becauase I love technology.
3.1	Male	I felt like it was the one that best fit my desires for who I want to become and what I would like to do in life.
3.1	Female	I wanted to do more than program all day in the CS major. I looked in the course book, and found this major. I talked to my roommate, and she encouraged me by saying she could see me as a shop teacher. So, I signed up.
3.1	Male	I wanted to teach. Heard about it from a female friend in the major.
3.1	Male	I love teaching and love learning new technologies.
3.1	Male	I'm teaching technology with only an A.S. degree and want a B.S.

Question	*Gender*	*Comment*
3.1	Male	I want to teach students subjects that will prepare them for the future and open their minds to the principles of creativity and design.
3.1	Male	i actually started as computer science with the intent of teaching high school. while on my mission, my dad found this major which was more along the lines of what i wanted to do for a profession.
3.2	Male	How much stuff it covers
3.2	Female	The small class sizes, and the professors. The professors made technology even more fun with their enthusiasm for the subject as well as their emphasis on teaching and student comprehension. They made coming to class enjoyable and worth the extra effort. Knowing everyone in the class by name was also helpful.
3.2	Female	Everything about TTE makes it appealing. The professors are knowledgabe and willing to help students, even if it inconviences their schedule. My peers were also willing to help if they knew a particular topic better than I did. This interactive, hands-on major is the best major at BYU. We're like our own little family.
3.2	Male	Outstanding examples within the faculty.
3.2	Male	The classes are fun and informative
3.2	Male	Hands on labs, real world experience.
3.2	Male	I have enjoyed the instructors and the curriculum
3.2	Female	The instructors are great. They can take topics that could be very dull and make them fun.
3.2	Male	I love learning about many diverse things and TTE has a lot of that. The people are great, friendly and is a great environment to be part of.
3.2	Female	The teachers! What I am learning about human interaction and learning how to inspire youth. I love working with people and seeing how good teaching can create a love of learning.
3.2	Female	My professors, classes, and classmates.

Question	*Gender*	*Comment*
3.2	Female	The professors, they are the best I have ever had. They can make anythign fun and interesting. I have learned so much while in TTE.
3.2	Female	Having the opportunity to work on complicated problems freely. Having friends in the major. Learning many different things like construction, electronics, physics, multimedia, etc...
3.2	Male	Shumway.
3.2	Male	The family atmosphere that permeates all of the classes and labs
3.2	Male	The creative, friendly atmosphere that leads to innovation within education.
3.2	Female	The faculty, the subject matter, and the friends I have had in the major.
3.2	Male	Projects, fun relaxed informal atmosphere.
3.2	Male	Getting to learn so many different technologies and becoming technologically literate. Also the philosophies of education that are taught and stressed.
3.2	Male	The instructors, curriculum , communication and peer group
3.2	Female	Becoming more knowledgeable with the software and being able to express my creativity.
3.2	Male	It's a lot of fun and we get to do something of everything. I can't think of a subject that isn't applied at some point in this major.
3.2	Female	The classes are fun, and you learn too. The skills are applied, and not just on paper. The atmosphere is also enjoyable. I love the people.
3.2	Male	Broad spectrum in curricula
3.2	Male	The professors have been great!
3.2	Male	the things that i have learned about education and applying technology

Question	*Gender*	*Comment*
3.2	Male	Faculty
3.2	Female	The people are great! The students and professors are enjoyable and very friendly. The classes are very interactive and the material is fun because of the actvities.
3.3	Male	Not much
3.3	Female	The labs were not as organized as they could have been, nor as clean.
3.3	Female	It was almost assumed that if you selected this major that you were good at using your hands. I could have used more instruction on using tools and the best ways to create the ideas I had inside my head. I felt inadequate in the shop area because safety wasn't explained well. As a result, I was scared to use equipment because I didn't want to hurt myself. I should have taken more initiative to ask for clarification and help, but the woods teacher intimidated (and sometimes belittled) me, so I did not feel comfortable asking him for help.
3.3	Male	Not much.
3.3	Male	course maps are a little confusing.
3.3	Male	There are not very many people in it therefore there is very little selection in classes or variation in schedule. Often there will be one class you need to graduate but it is only offered once a year and in one section, so you are forced to adapt your life to TTE schedule.
3.3	Female	I am a "fossil" trying to learn computer programs,and I don't grasp the info as fast as my younger piers. But the instructors have been fair with me.
3.3	Male	I can't think of anything right now, and I might never think of anything.
3.3	Female	I haven't found anything yet! This is the best major on campus and I love it!!

Question	*Gender*	*Comment*
3.3	Female	Some of the classes I'm required to take--I'm not particulary interested in drafting or wood shop.
3.3	Female	classes are only offered once a year, but it is understandable because the major is so small.
3.3	Female	There are not more specific classes to take for certain interests. There are not more classes to take, period.
3.3	Male	There is a nationwide movement to downsize technology courses (particularly woodshop), and it is stressful to doubt employment opportunities.
3.3	Male	The future pay.
3.3	Male	It is not well known, at all!! I wouldn't have known about it if it wasn't for a friend within the major.
3.3	Female	I didn't get very much out of some of the secondary ed. classes.
3.3	Male	sometimes too much information not enough depth.
3.3	Male	The major itself, I like everything. The only thing I didn't like were the Secondary Education classes that I had to take. Several of them were taught by faulty that are of a lower caliber than the professors in the TTE major.
3.3	Male	As with many BYU majors. Once you decide on one you get stuck into it. It is hard to switch majors and have previous classes count for anything. If I started BYU over I would have been a Business managment major with Information technology as a minor.
3.3	Female	The work load is very heavy.
3.3	Male	Some of the education classes that we have to take even though they are taught in the TTE program, it's redundant.
3.3	Female	We aren't very organized or well known. But, we are getting better at both.

Question	*Gender*	*Comment*
3.3	Male	It is the dumping ground for those who fail at other majors; I feel many students are here because it is easy and not because they want to become teachers, and enjoy the atmosphere but take little consideration about their future after graduation.
3.3	Male	the facility could be a little better and up to date with newer technologies avaliable.
3.3	Male	Some of the creativity classes are difficult for me because this is not a strong area for me. I also dislike the use of Macintosh computers as I feel they are not as intuitive nor as stableas the PC platform. This makes the learning experience more difficult.
3.3	Male	paper work and reflections.
3.3	Female	I haven't found anything thus far.