A Study of Guidance Barriers that Affect Female Student Enrollment in Technology Education Programs At Four Green Bay Wisconsin High Schools

By

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ABSTRACT

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Technology education at the high school level continues to attract male students in greater numbers than female students. There are many factors that contribute to this difference in gender enrollment, one of which may be perceptions held by guidance counselors about female student participation and enrollment in technology education programs. Counselors may still be of the opinion that while male students are appropriate candidates for technology education, female students should be guided toward other courses of study.

This investigator surveyed guidance personnel at four Green Bay Wisconsin High Schools to determine if there are guidance barriers that contribute to low female

enrollment and participation in technology education classes. A questionnaire was designed and administered to guidance counselors to determine their attitudes toward female student participation in these programs. The survey also queried their knowledge and understanding of the content of modern technology education.

The findings of this study were based on the results of the survey administered in the fall of 2003. These results and recommendations may lead to (a) improved understanding by guidance counselors about the benefits of technology education for female students, (b) improved counselor understanding of modern technology education goals, and (c) improved opportunities for female secondary students to participate in technology education programs.

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Chapter I: Introduction

Our society, and the world of work, is increasingly technological in nature. As the technological work world expands, technological work and employment opportunities increase for young people. Careers in the technology field are now as available, appropriate, and attractive for females as for males. This new technology work world requires young men and women to be technologically trained and prepared in order to function effectively and successfully in this environment. Elizabeth Burmaster, Wisconsin Superintendent of Public Instruction, stated

> We need students who are technologically literate because they will be the creators of our future, they will be the users of the next generation of technology, and they will be making technology-related decisions more sophisticated than we can possibly imagine. (Wisconsin Department of Public Instruction, 2002b, p.1)

According to Gilberti (1991), the modern work world demands greater understanding of technology but a large part of the American population has been deemed "technologically illiterate"(as cited in Welty & Puck, 2001). A part of that technologically illiterate sector includes high school girls. Gloeckner and Knowlton (1996) indicate that despite efforts to make the study of technology an integral part of all students' general education, it is still perceived to be a male subject.

In spite of technological progress, relatively few females participate in the study of technology and pursue technical careers. In 2002, 49% of high school students in Wisconsin were female. However, less than 20%, or about one in five high school technology students, were female (Wisconsin Department of Public Instruction, 2002, p. 3). Nationwide, the same picture exists: significantly fewer females participate in technology education compared to the entire female school population and also to the

male school population (Zuga, 1998). Although this problem has received increased attention recently, female enrollment continues to lag behind male enrollment.

There is an urgent need for more females to enter technological careers (Morella, n.d., as cited in Wisconsin Department of Public Instruction, 2002). This need could be met, in part, by bringing more female students into technology education classes now so that they will enter technology careers later. However, low female enrollment figures persist despite recent increased attention to this situation.

According to Welty and Puck (2001), there is no single reform that can be quickly applied so that technology education is more attractive to the needs and interests of girls and young women. Five factors that contribute to low enrollments of female high school students in technology education include social fit, classroom climate, curriculum and instruction, role models/mentor, and messages from guidance counselors. Silverman and Pritchard (1993a) cite additional reasons: girls are discouraged from taking technology education in high school because stereotypes about appropriate careers for women still exist; girls do not connect what they learn in the classroom with careers; and that girls are uninformed about economic realities and the world of work.

Statement of the Problem

Low female student enrollment in technology education programs has been documented at secondary schools nationally. Many reasons have been cited by other researchers as causes for this problem. Low female enrollment in technology education classes also exists at Green Bay Wisconsin High Schools. The problem of low female enrollment in technology education at Green Bay High Schools is the topic of this research paper.

Purpose of the Study

The specific aspect of the problem that will be researched: Are there guidance barriers that exist at the secondary level that contribute to low female enrollment in technology education programs at Green Bay Wisconsin High Schools? If it is determined, as a result of this study, that counselor barriers to female enrollment in technology education exist, then information and education efforts can be developed and directed at guidance counselors to reduce or eliminate those barriers. With such reduction and/or elimination, then it may be anticipated that counselors will be more willing to encourage female students to enroll in technology education programs at Green Bay High Schools.

Research Questions

1. To what extent do guidance counselors at Green Bay High Schools think that technology education is an appropriate high school program for females?
2. To what extent do guidance counselors at Green Bay High Schools understand the goals and purposes of modern technology education?
3. To what extent do guidance counselors at Green Bay High Schools value their school's technology education programs?
4. To what extent do guidance counselors at Green Bay High Schools feel that salaries and careers in the technology field are sufficient for females?

Significance of the Study

With a better understanding of guidance counselor perceptions and beliefs about female student participation in technology education, and also about the value of technology education, this study will benefit guidance counselors, technology education instructors, school administrators, and female students in the following ways:

1. The survey results may help to identify if there is gender bias among guidance counselors with regard to female participation in technology education. If that is the case, steps can be taken to educate counselors about job and career opportunities for females in the technology field. New understanding may encourage counselors to promote technology education to females through their guidance efforts.

2. Guidance counselors (and teachers and administrators) may have a better understanding of those factors that influence female enrollment in different secondary education programs in general and in technology education in particular.

3. With a better understanding of the level of guidance counselors' knowledge of the modern goals and philosophy of technology education, efforts can be made to educate/inform counselors about today's technology education. These efforts may result in guidance counselor encouragement of female students to participate/enroll in technology education programs.

4. The survey results will provide this researcher with the opportunity to meet with guidance counselors to explain the study that may result in further collaborative efforts between education staff and guidance staff.

5. An additional significant problem relates to federal funding for technology education to local school districts. According to a study conducted by the Green Bay District in 1999-2000, less than 8.4 % of females were enrolled in middle school and high school technology education courses (J. Hoppe, personal communication, (10/29/03). With funding for Green Bay High Schools vocational programs partially provided by Carl Perkins grants, the required enrollment is a minimum of 10% female enrollment. Therefore, the future of the Carl Perkins

funding may be jeopardized by under enrollment of female students in vocational programs. Guidance counselor efforts toward increasing the enrollment of female students to the Carl Perkins minimum are necessary to ensure future funding.

Limitations of Study

1. A limited number of guidance counselors (21) responded to the survey. A larger sample might result in different outcomes.

2. A survey bias of guidance counselors may exist. Some may be answering survey items "the way they should be answered."

Assumptions of the Study

1. The researcher assumes that a bias against female participation in technology education exists among guidance counselors.

2. Guidance counselors do lack information about modern day technology education.

3. The questionnaire will be answered honestly.

Definition of Terms

For clarity and better understanding, the following have been defined:

Technology. Made by humankind to solve a problem, improve quality of life, or allow mankind to do something that could not be done before.

Technology Education. An experience-based program involving the application of math and science concepts in technological systems. Emphasis is on thinking processes and problem solving rather than developing particular skills (Silverman & Pritchard, 1993a).

Industrial arts. A study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these (Bonser & Mossman, 1923).

Guidance counselor.

A school counselor [who] creates and implements guidance and counseling activities designed to help all students learn to develop educational/career plans in order to become responsible and productive citizens. A [guidance] counselor provides leadership for and works in conjunction with other educator and community resources to accomplish these efforts. (Green Bay Area Public School District, p. 9).

Gender bias. Preferences for or favoring one sex over the other.

Manual arts. Teaches, by means of actual or simulated work situations, activities such as woodworking, photography, metalworking, agriculture, electricity, graphic arts, and assists in maintaining, improving, or developing work skills.

Technological literacy. The ability for individuals to access, comprehend and interpret information independently and use it efficiently.

Chapter II: Literature Review

Female secondary students enroll in technology education courses to a much lesser extent than male students (Welty & Puck, 2001). What are the reasons for this difference? This literature review traces industrial arts history, the predecessor to technology education, and its contribution to male dominated classes. The review also discusses the evolution of technology education, perceptions that still exist between the old industrial arts and the new technology education, technology education and women's stereotypes, and guidance counselor's roles in technology education. The investigation of literature includes a review of books, journal articles, related Plan B research, and websites related to technology education.

Industrial Arts

Industrial arts education in American schools came about as the result of the Industrial Revolution of the late 1800's and early 1900's (Pucel, 1993). The need existed for trained male workers to perform the many kinds of industrial jobs that were being created in the American workforce. Offering industrial arts classes in American schools was seen as a primary way to fill those job vacancies. These classes were taught almost exclusively to boys. Female students were not encouraged to enroll in industrial arts programs (Zuga, 1998) and were largely absent from participation in industrial arts programs.

Bonser and Mossman (1923) described industrial arts as a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these. In industrial arts classes, students typically learned the effective use of tools and machinery. Traditional industrial arts classes involved woodworking, metalworking, and other "shop" types of programs where students typically learned how to use tools (Cummings, 1998; Hill, 1998).

Technology Education Evolvement

Present day technology education grew out of the disciplines of manual arts training, industrial education, and industrial arts. Pucel (1993) noted that factories and mass production were the impetus behind people becoming literate in using industrial skills and practices, or, in other words, industrial arts.

The modern vision for technology education is an experience-based program involving the application of math and science concepts within technological systems (Silverman & Pritchard, 1993a). Technology education has been defined as "an integrated, experience-based instructional program designed to prepare students to be knowledgeable about technology that result in the application of mathematics and science concepts to technological systems" (Mikulski, p. 1). The International Technology Association states that technology education is "a study which provides an opportunity for students to learn about the processes and knowledge related to technologies that are needed to solve problems and extend human capabilities" (International Technology Association, 1995, p. 1).

Technology Education and Old Perceptions

Old perceptions continue to exist; technology education is still often referred to as a shop class (Clark, 1989). Foster (1994) said technology education is simply another name for industrial arts. Sanders (2001) referred to technology education as "old wine in a new bottle." (p. 33-34). Many professional educators still perceive that technology education remains a male field (Daugherty & Wicklein, 1993). These old and dated perceptions may be a contributing barrier to females entering technology education.

Lack of encouragement of female participation in technology education is not just an old problem (Husher, 1993). Even today, females are not guided in large numbers toward technology education (Wisconsin Department of Public Instruction, 2002).

Despite efforts to make the study of technology an integral part of all students' general education, a study conducted by the Green Bay School District in 1999-2000 indicated that less than 8.4 % of females were enrolled in middle school and high school technology education courses (J. Hoppe, personal communication, 10/29/03).

In response to low female technology education enrollment, a number of studies have been completed by University of Wisconsin-Stout graduate students pertaining to the general problem of female enrollment in technology education. Phillips (2002) investigated possible counselor barriers to female participation in technology education. York (2002) researched the attitudes and perceptions of high school teachers, administrators, and guidance personnel. Haisler (2000) and Buker (2000) investigated male and female students in regard to their attitudes toward technology education. Hughes (1997) researched ways to increase girls' interest in technology education. All studies took place in Wisconsin high schools.

Stereotypes and Technology Education

In spite of U.S. technological progress, very few girls and young women participate in the study of technology and pursue technology careers (Welty & Puck, 2001). One reason is because of historic vocational gender traditions and resulting stereotyping. Males are expected to pursue more industrial paths while females are to pursue more domestic paths such as home economics, nursing and teaching (Greene, 1998). Humanities and social sciences were perceived to be especially appropriate for females because they focused on beauty, relationships, people, and society (Welty & Puck, 2001). Even now, young girls typically view technology education as a male domain, especially after having had a course in technology education (Hendley, Stables, Parkinson, & Tanner, 1996). Silverman and Pritchard (1993b) found evidence that 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.

Like many occupations, the subjects taught in school are often perceived as either masculine or feminine. The gender schema attached to school subjects tends to be consistent with the gender stereotypes held by society at large (Whitehead, 1996). These stereotypes are confirmed early in a female's development, and it is more difficult to persuade a female student to step out of that stereotype as she grows older.

The dramatic development of technology cannot be attributed to males only. Females have played significant roles in technology development and advancement. Inventive women have created or improved many of the products and practices that support and contribute to our quality of life. Many cultures had heroines of technology who eventually became cultural icons (Stanley, 1993). Feminine ingenuity has given us inventions like the fire escape, the windshield wiper, Scotchgard, liquid paper, and Kevlar (Macdonald, 1992; Thimmesh, 2000). These women's contributions demonstrate their interest and ability for involvement and success in technology areas. As Elizabeth Dole stated in a speech delivered in 2002, "Women share with men the need for personal success, even the taste for power, and no longer are we willing to satisfy those needs through the achievements of surrogates, whether husbands, children, or merely role models." (as cited in Welty & Puck, 2001, p. 30).

Counselor's Role

The role of the guidance counselor is to provide information and advice so that students (including females) have the opportunity to explore different options. The International Technology Education Association (1999) stated that the most needed service provided by counselors was to assist students by providing information about course selections and career opportunities. However, one study indicated that only 10%

of girls picked "my guidance counselor said I should take it" as a response to the question of why they decided to take technology education (Silverman & Pritchard, 1993b). Also, according to Flowers (1995), a study of female students indicated that guidance counselors had the greatest negative influence on their decision to become involved in technology education.

Silverman and Pritchard (1993b) point to three issues that, if attended to, may result in an increase in female student interest in technology education classes and careers: lack of information, lack of connection, and lack of flexibility.

Lack of information. In Silverman's study (1993b) middle school girls indicated that they were not well informed about technological careers. In the same study, counselors agreed that students were not well informed about technological careers. She lists a number of reasons for this information gap which include the following:

- Information resources about careers have been reduced in recent years due to budget cuts.
- Counselors do not have the time to provide specific information about careers.
- Counselors agreed that ninth graders do not have enough information about technological career salaries and promotion possibilities. Girls often see work narrowly as some kind of profession like a doctor or lawyer.
- Counselors need to inform females about the attractiveness of salaries and promotions in technological careers.
- Counselors need to support the concept of gender equity in technology education courses which would include help to break down the "male" dominated stereotype of technology related courses.

- Counselors did not take the opportunity to expose female (and other students) to non-traditional careers through such opportunities as career days and classroom visits by females employed in technology careers.
- Counselors did not take the opportunity to describe the range of technology education classes available at their school.

Lack of connection. Besides the lack of information about technology career options guidance counselors and instructors may fail to make the connection between technology classes and careers in the technology field. Silverman (1993a) lists a number of reasons for lack of connections.

- Counselors may not take or have the time to work collaboratively with the teachers to promote technology education. Teachers may not have or wish to take the time for such initiatives.
- Counselors may not take the initiative to build links with local business and industry to provide exposure to technology careers.

Lack of flexibility. Silverman (1993b) also reports that counselors cite lack of time and flexibility in curriculums for students to take technology electives particularly if students are planning to attend college and need to take college preparatory courses. Counselors may be reluctant to "push" technology education elective courses for fear that such choices may jeopardize college bound students' admissions chances. Not taking more language, math and science may be perceived as resulting in a less attractive high school record.

Counselor Actions

Counselors must act specifically and strategically to counter these barriers in order to ensure that young women will consider their course options thoughtfully. According to a Wisconsin Department of Public Instruction pamphlet titled Preparing

Young Women for Work and Citizenship in Technological Society (2002), five factors are identified that strongly influence whether girls and young women will participate in technology education:

1. Social fit or messages girls receive from different groups of people (peers, parents, culture) that they do not belong in technology education or nontraditional occupations likely means that will not participate in technology education.

2. Classroom climate or what is communicated and taught in the classroom, teacher-to-teacher, student-to-student, verbal and non-verbal. Females may avoid technology education classrooms and related careers because they are intimidated by the dirty, rough, and stressful learning environments or by the physical strength required. Girls also get messages from teachers that they do not belong in technology education and boys communicate to girls that they do not belong which makes female students uncomfortable.

3. Technology education should use gender-neutral language, gender-balanced media, and female role models in order to level the playing field between males and females and to make technology education less intimidating and more inviting.

4. Role models and mentors are powerful influences on females who pursue careers in technology. However, perceptions remain that the absence of women in technology careers means that women are not as welcome.

5. It appears that not all guidance counselors are communicating effectively with girls about considering technology classes or careers.

Chapter III: Methodology

The researcher's initial interest in this topic stemmed from his own experience as a technology education teacher at East and West High Schools in Green Bay, Wisconsin. This researcher was curious about the relatively few females who were enrolled in technology education classes at the four Green Bay high schools. One possible reason for the low enrollment of females that occurred to the researcher was that guidance counselors were not promoting technology education to female students and not encouraging their enrollment in those classes.

The problem investigated in this study focused on the low enrollment of female students in technology education classes at Green Bay, Wisconsin high schools. The purpose of the study was to examine a possible cause; that is, do guidance counselors contribute to this lack of female enrollment because of their perceptions about females participating in technology education programs.

Demographics

Green Bay, Wisconsin, population approximately 130,000, is located in the northeast corner of the state. The city has four public high schools: Preble, West, East, and Southwest. Approximately 6300 students make up the combined enrollment of the four schools.

Population and Sample Selection

The survey group included 21 counselors from each of the four Green Bay district high schools. Each of the four high schools has between four and seven counselors on staff (full-time, part-time, traveling, interns). Names of the individual counselors were obtained from the Green Bay School District Administrative Center. Individual packets including the survey and an explanatory cover letter (included in Appendix A and B) were sent to each of the individual counselors through the district's inter-school mail. The

cover letter explained the purpose of the survey and indicated that participation was voluntary. An ending date was indicated for completion and return to the investigator. A self-addressed stamped envelope was provided. Of the 26 surveys sent out, 21 counselors chose to participate and complete the survey for an 80% return rate.

Instrumentation

In the literature search, the researcher discovered that another Stout student (Gary Phillips) had completed a somewhat similar research project that focused on the placement of special needs students in technology education classes. The Phillips instrument was adapted to the information needs of this particular research, which focused instead on female participation in technology education. A number of items were deleted and others were re-phrased and re-written to reflect the needs of this specific research.

The initial section of the survey instrument requested demographic information including the respondent's gender, age, position (full, part-time, etc.), and years in service.

The instrument was modeled on a 5-point Likert-type scale with a range from Strongly Disagree (SD-value of 1) to Strongly Agree (SA-value of 5).

For the purpose of counselor understanding of the instrument, the 22 survey items were grouped into four categories as follows:

1. Historical perspectives of technology education
2. Perceived appropriateness of technology classes for females
3. Perceived content of technology education classes
4. Perceptions of careers related to technology education classes

Data Analysis

The UW-Stout Research and Statistical Consultant reviewed the survey. The Statistical Program for Social Sciences, Version 11 for PCs was used to analyze the data. Results of the analysis included frequency counts and percentages on school, gender, age category, position, and years of service for the total group of respondents. For the 22 survey items, frequency counts, percentages, mean, and standard deviations were included for the group of respondents. Results and interpretations are provided in Chapters IV and V in both table and descriptive narrative form.

Limitations

1. The instrument was not piloted. Piloting may have resulted in changes, additions, or deletions of survey items.

2. While it is assumed that the guidance counselors (participants) were honest in their responses, it is not possible to conclude whether this is true.

Chapter IV: Results

The purpose of the study was to determine if guidance barriers existed at the counselor level that contributed to low female enrollment and participation in technology education programs at Green Bay, Wisconsin High Schools. Twenty-six guidance counselors at four Green Bay Wisconsin High Schools received surveys. Completed surveys were returned by 21 counselors for an 80% response rate.

Research Questions

This study attempted to answer four questions:

1. To what extent do guidance counselors at Green Bay High Schools think that technology education is an appropriate high school program for females?
2. To what extent do guidance counselors at Green Bay High Schools understand the goals and purposes of technology education?
3. To what extent do guidance counselors at Green Bay High Schools value technology education?
4. To what extent to guidance counselors at Green Bay High Schools feel that salaries and careers in the technology field are sufficient for females?

Demographic Information

Of the 21 counselors who completed the survey, 9 were male and 12 were female. Sixteen of the counselors worked full-time, two worked part-time, and three were interns. Schools of the counselors who responded are as follows: six from East, five from Preble, four from Southwest, and six from West. Counselors' ages ranged the full spectrum (see table 1 for details). Years of service also varied with most counselors at 6-10 years (see table 2).

Table 1

Age of respondents

Item Response	Frequency	Percentage
20-29 years old	1	4.8
30-39 years old	4	19.0
40-49 years old	8	38.1
50-59 years old	7	33.3
60-69 years old	1	4.8

Table 2

Years in service

Item Response	Frequency	Percentage
01-05 years	5	23.8
06-10 years	7	33.3
11-15 years	3	14.3
16-20 years	3	14.3
21-25 years	1	4.8
26-30 years	1	4.8
31 years or longer	1	4.8

Survey Item Results

Participants were given a survey of 22 statements. Each was rated on a five point Likert-type scale with Strongly Agree (SA) worth five points and Strongly Disagree (SD) worth one point. The survey instrument is located in Appendix B. A table with means

and standard deviations for each item on the survey can be found in Appendix C. Following are analyses of each survey item.

Item one: Historical factors reduce female enrollment in technology education classes. Of the 21 responses, 66.6% (14) respondents agreed or strongly agreed that historical factors reduce female enrollment while 19% (4) disagreed or strongly disagreed. Three (14.3%) were neutral. Mean 3.57.

Item two: Salaries are adequate for females in non-traditional careers. Of the 21 responses, 42.9% (9) respondents felt that salaries for females were adequate in non-traditional careers. Five (23.8%) disagreed; 7 (33.3%) were neutral. Mean 3.24.

Item three: The philosophy of technology education is different than that of industrial arts. Eleven respondents (52.4%) agreed or strongly agreed with this statement. Five (23.8%) disagreed; five (23.8%) were neutral. Mean 3.43.

Item four: The District needs to provide a TSA (Technology Student Association) or VICA Skills USA Chapter (Vocational Industrial Clubs of America). Of the 21 responses, 66.7% (14) respondents agreed or strongly agreed that the District needs a TSA or VICA chapter. Six (28.6%) were neutral; one (4.8%) disagreed. Mean 3.86.

Item five: Counselor's personal feelings may influence the guidance of female students. Of the 21 responses, 61.9% (13 respondents) agreed or strongly agreed that counselor's personal feelings may influence their guidance of female students. Seven (33.3%) disagreed or strongly disagreed; one (4.8%) was neutral. Mean 3.43.

Item six: Technology education classes are appropriate for females. Of the 21 responses, 95.3% (20) agreed or strongly agreed that technology education classes were appropriate for females. One respondent was neutral. Mean 4.60.

Item seven: Communicating appropriately with females should occur continuously throughout high school. Of the 21 responses, all (100%) agreed or strongly agreed. Mean 4.86.

Item eight: Technology education classes are more appropriate for males than females. Of the 21 responses, 81%, (17) disagreed or strongly disagreed that technology education classes were more appropriate for males. Three (14.3%) agreed or strongly agreed; one (4.8%) was neutral. Mean 1.90.

Item nine: Counselors at this school value technology education classes. Of the 21 responses, 85.7% (18) agreed or strongly agreed that technology education is of value. One (4.8%) disagreed; two (9.5%) were neutral. Mean 4.05.

Item 10: Male students are more likely than female students to ask questions during technology education classes. Of the 21 responses, 38.1% (8) agreed or strongly agreed that male students are more likely to ask questions in class. Five (23.8%) disagreed or strongly disagreed; eight (38.1%) were neutral. Mean 3.24.

Item 11: Technology education enhances other areas of study. Of the 21 responses, 85.7% (18) agree or strongly agree that technology education enhances other subject areas of study. One (4.8%) disagreed; two (9.5%) were neutral. Mean 4.19.

Item 12: This school's administrators support technology education for females as well as males. Of the 21 responses, 76.2% (16) indicated that they felt that their schools administrators supported technology education for female students. Five (23.8%) were neutral. Mean 4.14.

Item 13: Technology education is similar to industrial arts. Of the 21 responses, 47.6% (10) strongly disagreed or disagreed that technology education is similar to industrial arts. Eight (38.1%) agreed or strongly agreed; three (14.3%) were neutral. Mean 2.86.

Item 14: Technology education classes are project oriented. Of the 21 responses, 52.4% (11) agreed or strongly agreed that technology education classes are project oriented. Two (9.5%) disagreed; eight (38.1%) were neutral. Mean 2.86.

Item 15: The technology education program at this school is well developed and operated. Of the 21 responses, 76.2% (16) agreed or strongly agreed that the technology education programs at the Green Bay High Schools are well developed and operated. Two of the counselors (9.5%) disagreed or strongly disagreed. Three (14.3%) were neutral. Mean 3.95.

Item 16: Students at this school value technology education courses. Of the 21 responses, 81% (17) agreed or strongly agreed that students at their schools value technology education courses. Two (9.5%) disagreed or strongly disagreed; two (9.5%) were neutral. Mean 3.95.

Item 17: Counselors should have an appropriate understanding of the technology education curriculum adopted by the school district. Of the 21 responses, 95.2% (20) agreed or strongly agreed that counselors should have an understanding of the technology education curriculum. One (4.8%) disagreed. Mean 4.48.

Item 18: Technology education courses aid in improved student achievement on standardized test scores. Of the 21 responses, 71.4% agreed or strongly agreed that technology education courses aid in improved student achievement on standardized test scores. One (4.8%) disagreed; five (23.8%) were neutral. Mean 3.81.

Item 19: The job market is limited for females in the technical areas. Of the 21 responses, 91% (17) disagreed or strongly disagreed that the job market is limited for females in the technical areas. Three (14.3%) agreed or strongly agreed; one (4.8%) was neutral. Mean 2.00.

Item 20: Discussing non-traditional careers with your female students is important. Of the 21 responses, 100% (21) agreed that discussing and encouraging females to consider non-traditional careers was appropriate and important. Mean 4.62.

Item 21: Technology education courses should be included in high school college preparatory courses. Of the 21 responses, 66.7% (14) counselors agreed or strongly agreed that technology education courses should be included as a part of a college preparatory curriculum. Three (14.3%) disagreed; four (19.0%) were neutral. Mean 3.81.

Item 22: Technology education classes lead to lower paying entry-level jobs for females. Of the 21 responses, 95.2% (20) counselors disagreed or strongly disagreed that technology education courses lead to lower paying entry level jobs for females. One (4.8%) was neutral. Mean 1.76.

Chapter V: Discussion, Conclusions and Recommendations

The researcher's initial interest in the problem of low enrollment of female students in technology education programs stemmed from his own experience as a technology education teacher at East and West High Schools in Green Bay, Wisconsin. This researcher was curious about the low number of females enrolled in technology education classes at both schools. One possible reason for this was that Green Bay guidance counselors hold perceptions about the appropriateness of female participation in technology education, may not value technology education, and thus may not encourage female participation in those programs.

This chapter includes a restatement of the problem, purpose of the study, limitations of the study, survey statistics selection, discussion related to four research questions, conclusions related to the four research questions, conclusion related to the study purpose, recommendations related to the four research questions, and recommendations for further study.

Restatement of the Problem

Low female student enrollment in technology education programs has been documented at secondary schools nationally. Low female enrollment in technology education classes also exists at Green Bay Wisconsin High Schools and is the specific problem addressed in this paper.

Purpose of the Study

The specific aspect that was researched: Were there guidance barriers that existed at the secondary level that contributed to low female enrollment in technology education programs at Green Bay Wisconsin High Schools? If guidance barriers exist, then information and education efforts can be developed and directed at guidance counselors to reduce or eliminate those barriers. With reduction and/or elimination, they may be

more willing to encourage female students to enroll in technology education classes at Green Bay High Schools.

Limitations of Study

1. A limited number of results (21) were received from Green Bay High School guidance counselors. A larger sample, perhaps comparing results by different school districts, could result in different outcomes.

2. The effect of wording of some survey items may be a limiting factor. It is possible that some respondents may have answered survey items according to the way they thought they should be answered as opposed to an honest answer.

Survey Statistics Selection

Results are reported for all 22 survey items in Chapter 4 and Appendix C. Of the 22 results, 15 have been selected to report on in this chapter because of their importance and relationship to the purpose of the study and to the four research questions. Items selected for reporting tended to be those with means at either end of the five point scale; that is, counselors either strongly disagreed and disagreed or agreed and strongly agreed. Several survey items with average means are also discussed.

Discussion Related to Four Research Questions

Research question one. This research question asked about the extent to which guidance counselors at Green Bay High Schools thought that technology education was an appropriate high school program for females. Responses to survey items 6 and 8 relate to this research question.

In survey item six, 20 of 21 counselors (95.3%) agreed or strongly agreed that technology education classes were appropriate for females. Similarly, in survey item eight, 17 of 21 counselors (81%) disagreed or strongly disagreed that technology education programs were more appropriate for males than females. The results of these two survey

questions strongly indicate that guidance counselors at Green Bay High Schools believe that technology education is an appropriate high school program for females. This refutes the investigator's perception that guidance counselors at the four schools may have believed that technology education was not an appropriate high school program for females. However, the fact of low enrollment of females still exists despite the counselors' positive regard for females in technology education.

Research question two. This research question asked about Green Bay High School's guidance counselors' understanding of the goals and purpose of technology education. Responses to survey items 3, 13 and 17 relate to this research question.

In survey item three, 11 counselors (52.4%) agreed or strongly agreed that the philosophy of technology education is different from that of industrial arts. Survey item thirteen asks a similar question in a slightly different way: "Technology education is similar to industrial arts." In response to that statement, 10 counselors (41.6%) disagreed or strongly disagreed. Eight counselors (38.1%) agreed or strongly agreed that technology education is similar to industrial arts. Three counselors (14.3%) were neutral.

The results of items three and thirteen are somewhat balanced. Over half (52.4%) of the counselors responded that they thought the philosophy of technical education was different from that of industrial arts and about half (47.6%) disagreed or strongly disagreed that technology education is similar to industrial arts. These results suggest that there may be a need for further counselor education about the differences between modern technology education and the older industrial arts education.

In survey item 17, 20 (95%) counselors strongly agreed or agreed that counselors should have an understanding of the technology curriculum. One disagreed. Although this may appear to be a somewhat loaded statement (why would counselors disagree that there should be an understanding of technology curriculum?), it is, nevertheless, an

encouraging result because 95% of the counselors felt that it is important to have an understanding of the technology curriculum.

Research question three. This question explored the extent to which guidance counselors at Green Bay High Schools value technology education. Responses to survey items 9, 11, 12, 15, 16, and 21 relate to this research question.

In survey item nine, 18 counselors (85.7%) agreed or strongly agreed that technology education is of value. One counselor disagreed and two were neutral. This is an important finding. Most Green Bay counselors agreed that technology education is of value. An opposite result (lack of valuing), might suggest that guidance counselors do not promote or encourage female participation in technology education because they feel the program is of little value.

In survey item eleven, 18 counselors (85.7%) agreed or strongly agreed that technology education enhances other areas of study. This response suggests that most counselors agree that technology education classes contribute to learning in other high school areas of study. An opposite result (technology does not contribute) might suggest that counselors do not promote or encourage technology education because they do not feel technology education contributes to learning in other areas.

In survey item twelve, 16 counselors (72.6%) agreed that their school's administrators supported technology education. An assumption relating to this result is that it may be difficult for guidance counselors generally to encourage student participation (including females) in a particular area of study without perceived support from the school's administrators.

In survey item fifteen, 16 counselors (72.6%) agreed or strongly agreed that the technology education program at their respective schools was well developed and operated. This response has significance because without a counselor's opinion that the

technology education program is well developed and operated, there may be reluctance to encourage female participation in technology education classes.

In survey item sixteen, 17 counselors (87%) agreed or strongly agreed that students in their respective schools valued technology education courses. A strong result to the opposite (students do not value technology education) could have the effect of making it difficult for counselors to encourage technology education if they perceived that students did not value (or want) those courses.

In survey item twenty-one, 14 counselors (66.7%) agreed that technology education courses should be included as part of a college preparatory curriculum. Some previous research (Silverman & Pritchard, 1993b) indicated a counselor reluctance to recommend technology education courses to college bound students for concern that such course are not highly regarded as desirable acceptance factors by colleges and universities. This result would seem to suggest that Green Bay counselors value technology education classes as college preparatory as well as other traditional academic college preparatory courses.

Research question four. This question related to counselors' opinions of the sufficiency of the salaries and careers in the technology field for females. Responses to survey items 2, 19, 20, and 22 relate to this research question.

In survey item two, nine counselors (43%) agreed that salaries were adequate for females in non-traditional areas. Five counselors (23%) disagreed that salaries for females were adequate. Seven counselors (33%) were neutral. This variety of responses may suggest that counselors need more information about the status of salaries for females in non-traditional careers.

In survey item nineteen, 17 counselors (80%) disagreed or strongly disagreed that the job market was limited for females in the technical areas. This response seems to

indicate that most counselors are of the opinion that the job market for females in the technical field is not limited, but positive. This is a significant result because a negative view of the job market may result in counselors not promoting technology education to females.

In survey item twenty, all 21 counselors (100%) agreed that discussing and encouraging females to consider non-traditional careers was appropriate and important. This response is significant because it suggests that counselors are willing to encourage females to participate in technology education programs in order to later enter non-traditional career fields.

In survey item twenty-two, 20 counselors (95%) disagreed or strongly disagreed that technology education courses lead to lower paying entry level jobs. In agreement with the response to survey item 19, (job market is not limited), these two responses would seem to indicate that counselors have a positive view of employment for females in the technology field and also the pay for the jobs in that field. Because counselors have a positive view of the technology market for females, it may be suggested that they do not withhold promotion of technology education classes to females for that reason.

Conclusions Related to Four Research Questions

Research question one: Appropriateness of technology education for females. A large majority of Green Bay counselors (95.3%) believe that technology education programs are appropriate for female students. This result suggests that bias toward female participation in technology education is not a barrier among counselors at Green Bay High schools.

Research question two: Counselors' understanding of modern technology education. Over half of Green Bay counselors (52.4%) agreed that technology education is different than industrial arts education. While a significantly larger percentage about the difference

between the two was not present, this result suggests that lack of understanding about the difference may not be a significant barrier to female participation in technology education programs.

Research question three: Counselors' value of technology education programs. Green Bay counselors value technology education; eighty-five percent of the counselors agreed with this survey item. In addition, high percentages (80% or more) of counselors thought that technology education enhanced other fields of study, that their administrators supported technology education, that their school's technology education programs were well developed and operated, and that students valued technology programs at their schools. These results would suggest that because counselors are positive about the value of technology education, then lack of positive valuing of technology education is not a barrier to female participation at Green Bay High schools.

Research question four: Sufficiency of technology education careers and salaries for females. Green Bay counselors were somewhat equally divided on the adequacy of salaries for females in non-traditional areas, did not agree that the job market was limited for females, agreed that encouraging females on non-traditional careers was appropriate, and did not agree that technology education leads to lower paying jobs. These results would suggest that Green Bay counselors are generally positive about the level of salaries and also career outlook for females in non-traditional areas. Taken overall, this suggests that no strong beliefs are present in these areas that may prevent counselors from encouraging female participation in technology education.

Conclusions Related to Study Purpose

The purpose of this study was to determine if barriers existed at the guidance level that contributed to low female enrollment in technology education classes at Green Bay High Schools. Results of the study indicate that counselors believe that technology

education for females is appropriate; counselors understand the goals and purposes of modern technology education; counselors value technology education; and counselors believe that salaries and careers in the technology field are sufficient.

While low enrollment of females in technology education continues to exist at Green Bay Schools, it is not this investigator's opinion that the problem is wholly due to guidance barriers. Further research may help to pinpoint other reasons for low levels of female participation in technology education at Green Bay High Schools.

Recommendations Related to Four Research Questions

In view of the fact that 95.3 % of Green Bay Counselors agreed that technology education for females was appropriate and that 81% disagreed that technology education was more appropriate for males than females, it is recommended that the technology education department personnel seek to maintain this high level of regard through continued communication, education, and information directed at guidance personnel.

Counselors were divided on their responses to survey items regarding the differences between technology education and industrial arts. This suggests a need for more information and education by technology education personnel directed at guidance personnel about the modern vision of technology education and how it differs from industrial arts.

As in research question one, there was a high regard for the value of technology education by Green Bay counselors. Again, it is recommended that technology education personnel should seek to maintain the counselor's high regard for the value of technology education by continued communication, involvement, and education with that group.

There were a variety of responses to statements about the adequacy of salaries for females in non-traditional areas. It is recommended that technology education personnel take the opportunity to provide information to guidance personnel about current salary

levels for females in non-traditional areas. This information may be useful for technology education personnel themselves so that they can deliver this current information to their female students.

Recommendations for Further Study

- Administer an identical survey to guidance counselors in other school districts to see if results are similar.
- Further research at Green Bay High Schools is recommended to attempt to determine if there are other factors (besides counselor barriers) that result in low enrollment and participation of females in technology education.
- Survey Green Bay High School female students to see how much they understand about the technology field with possible implementation of a program to inform female students about technology and technology careers.
- Results indicated that Green Bay counselors do not have significant negative perceptions about female participation in technology education programs. An additional question may have been asked: "Do you actively promote technology education to females in your guidance activities with them?" It is one thing to indicate support and valuing of technology education for females; however, whether that support and valuing carries over into actual promotion of technology education to females was not examined by that question in this survey. It is recommended, in future research which examines the problem of low enrollment of females, that this question be asked.

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Appendix A: Cover Letter and Consent Form

October 8, 2003

Dear,

As a technology education teacher at Green Bay West High School in the Green Bay School District, I am concerned about the future enrollment of females in technology education classes. For vocational programs offered in Green Bay, funding often comes in the form of grants. Specifically, the Carl Perkins Act provides funding for many of the technology education related classes. With the districts female enrollments declining, in many of the technology education related classes, Carl Perkins funding may be in jeopardy.

As a result of your participation, you will receive information about the results of the survey providing further insight about guidance counselor's perceptions of technology education. Furthermore, the survey will address the reasons why females are encouraged to enroll in technology education related courses or why they are not. The results will be published and sent to you upon completion of the study by **June 1, 2004.**

Participation in this survey is voluntary. By your completion and return of this survey in the self-addressed stamped envelope provided, you will have agreed to participate in this study and agreed that you understand the scope and intent of the survey. **Deadline for receipt of survey is Monday, October 20, 2003.**

You may choose not to participate by simply disregarding this invitation.

Subjects will be assigned a number and that number only will appear on the survey. This will serve to maintain confidentiality of the returned data. The researcher and data center personnel will review the received data.

Thank you for your time.

Sincerely,

Marc Fry
Technology Education
Green Bay West High School
966 Shawano Ave. 54303
(920) 492-2600
frym@greenbay.k12.wi.us.

NOTE: Should you have any questions or concerns about the research study, they should be addressed to Marc Fry at Green Bay West High School 966 Shawano Ave, Green Bay, WI 54303, or at home (920) 662-0874, the research advisor, Mike Galloy (715) 232-2163. Questions about the rights of research participants can be addressed to Sue Foxwell, Human Protection Administrator, UW- Stout Institutional Review Board for the Protection of Human Subjects Research, 11 Harvey Hall, Menomonie, WI, 54751, phone (715) 232-1126.

Appendix B: Survey Instrument

Technology Education Perceptions of Counselors
Affecting Female Student Enrollment

Directions: Please mark the appropriate response

Gender: _____ Male _____ Female

Age: _____ 20-29 _____ 50-59
_____ 30-39 _____ 60-69
_____ 40-49 _____ 70-79

Position Held:

_____ Full time _____ Part time _____ Traveling _____ Internship

Years in service as a guidance counselor:

_____ 1-5 _____ 16-20 _____ 25-30
_____ 6-10 _____ 21-25 _____ 31 years or longer
_____ 11-15

Directions: Identify how important each agreement is at the High School level. *Circle* the most accurate agreement using the following key:

SD = Strongly Disagree D = Disagree N = Neutral A = Agree SA = Strongly Agree

***Historical* Perspectives of technology education classes**

1. Historical factors reduce female enrollment in technology education classes. SD D N A SA

2. Salaries are adequate for females in non-traditional careers. SD D N A SA

3. The philosophy of technology education is different than that of industrial arts. SD D N A SA

4. The District needs to provide a TSA (Technology Student Association) or VICA Skills USA Chapter (Vocational Industrial Clubs of America). SD D N A SA

Perceived *appropriateness* of classes for females

5. A counselors personal feelings may influence their guidance of female students. SD D N A SA

6. Technology education classes are appropriate for females. SD D N A SA

7. Communicating appropriately with females should occur continuously throughout High School SD D N A SA

8. Technology education classes are more appropriate for males than females. SD D N A SA

9. Individually, counselors at this school value technology education courses. SD D N A SA

10. Male students are more likely than female students to ask questions during technology education classes. SD D N A SA

11. Technology Education enhances other subject areas of study. SD D N A SA

12. This schools administrators support technology education for female students as well as male students. SD D N A SA

Perceived *content* of technology education classes

13. Technology education is similar to industrial arts. SD D N A SA

14. Technology education classes are project-oriented classes. SD D N A SA

15. The technology education program at this school is well developed and operated. SD D N A SA

16. *Students* at this school value technology education courses. SD D N A SA

17. Counselors should have an appropriate understanding of the technology education curriculum adopted by the school district. SD D N A SA

18. Technology Education courses aid in improved student achievement on standardized test scores. SD D N A SA

Perceptions of *careers* related to technology education classes

19. The job market is limited for females in the technical areas. SD D N A SA

20. Discussing non-traditional careers with your female students is important. SD D N A SA

21. Technology education courses should be included in High School college preparation courses. SD D N A SA

22. Technology education classes lead to lower paying entry-level jobs for females. SD D N A SA

Thank you for your time!

Appendix C: Means and Standard Deviations of Responses

Table 6-Responses by survey items (means and standard deviations)

	Mean	Std. Dev.
1. Historical factors reduce female enrollment in technology education	3.57	1.207
2. Salaries are adequate for females in non-traditional careers	3.24	.889
3. Philosophy of Technology Education is different than Industrial Arts	3.43	1.028
4. District should provide "TSA" or "VICA"	3.86	.854
5. Counselors' personal feelings may influence females	3.43	1.363
6. Technology Education classes are more appropriate for females	4.62	.590
7. Communication with females should be continuous	4.86	.359
8. Technology education classes are more appropriate for males	1.90	1.300
9. Counselors at this school value technology education classes	4.05	.740
10. Male students are more likely to ask questions in class	3.24	1.091
11. Technology education enhances other subject areas of study	4.19	.814
12. Administration supports technology education for female students	4.14	.793
13. Technology education is similar to Industrial arts	2.86	1.153
14. Technology education classes are project-oriented classes	3.48	.750
15. Technology education programs are well developed and operated	3.95	1.071
16. Students (at this school) value technology education courses	3.95	1.024
17. Counselors need understanding of adopted curriculum	4.48	.750
18. Technology education courses aid in achievement on standardized tests	3.81	.750
19. Job market is limited for females in technology related areas	2.00	1.140
20. Discussing non-traditional careers with females is important	4.62	.498
21. Tech. education courses should be included in HS college prep courses	3.81	1.030
22. Tech. Education classes lead to low-pay, entry-level jobs	1.76	.539