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Female Enrollment in Technology Education in Virginia During the 1993/1994 School Year

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FEMALE ENROLLMENT IN TECHNOLOGY EDUCATION IN VIRGINIA DURING THE 1993/1994 SCHOOL YEAR

A Study Presented to the Graduate Faculty
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By
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Signature Page

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CHAPTER I

INTRODUCTION

Women who enter the workforce in the 1990's have grown up in a world in which they have had opportunities to succeed in careers traditionally held only by men. Presently, many females are in middle management and are attempting to break through to the senior levels in their organizations. Breaking this barrier has been limited to only a few. Women are still facing gender barriers and finding that the glass ceiling is rising slowly.

As society works diligently to enhance gender equity by passing legislation, changing traditional attitudes is quite difficult. It is understood that if serious change is to occur, efforts must be concentrated on the youth population. By creating a school environment free from oppressive sex discrimination, sex bias, and sex-role stereotyping, our problems of gender equity may eventually be completely relieved. Although this task will not come easy, it is one that should be given great effort by educators.

In the past decade, the focus of most sex equity efforts have been to meet the requirements of legislation; yet the issue for the education profession is much larger than an existing or projected law. Essentially, the issue is the right of all students to receive equal chances. Although this focus has been widely accepted and seems easy to follow, school systems are still struggling to attract females to the non-traditional fields of study. This research study attempts to determine if there is a significant difference between male and female enrollment in the approved technology education courses across the school divisions in Virginia.

Statement of the Problem

The problem of the study was to determine if a significant difference exists between male and female enrollment in the approved technology education courses offered as electives in Virginia for the 1993/1994 school year.

Research Goals

The objectives of this study were to identify:

1. The statewide percentage of female enrollment in the approved, elective technology education programs offered in Virginia for the 1993/1994 school year.

2. The percentage of female enrollment in each approved, elective technology education course offered in Virginia for the

1993/1994 school year.

Background and Significance

Technology affects our daily living and our vision of the future more profoundly than in any previous stage of history. In a world increasingly dependent of technology, where problems and solutions tend to be framed in technical terms, technology is everyone's business. Yet statistics clearly show that the technically related areas are dominated by one gender (Whyte, 1984, p.8).

Studies have shown that many factors contribute to the relatively low numbers of women pursuing nontraditional careers. These factors include a lack of knowledge of career opportunities (Rudnick and Kirkpatrick, 1981, pp. 765-70), gender issues in the workplace (Baum, 1989, p. 556), the continued existence of sexual discrimination and harassment in male-dominated professions (Daniels, 1988, pp. 777), the pressure of meeting the responsibilities of family and personal commitments while engaged in a technical career (Onaral, 1985, pp. 236-41), and the long-term prospect of professional growth in a male-dominated field (Malcolm, 1985, pp. 190-95). Malcolm reports that when compared to male counterparts, women make less money, advance more slowly in rank or take longer to achieve a promotion, have a greater chance of being unemployed or underemployed, are less likely to hold a management position, and, because of their careers, may be forced to make family choices regarding marriage and children (Malcolm, 1985, pp. 190-95).

The Carl D. Perkins Vocational Education Act of 1984 pertains both to vocational and technology education programs. It provides federal funding to address sex discrimination, sex bias, and sex-role stereotyping at state and federal levels. "The wisdom of congress deemed that previously unserved audiences would become beneficiaries of federal dollars for vocational education" (Pautler, 1993, p. 30). This action was intended to hold the needs of various special populations as a national priority.

The International Technology Education Association's (ITEA) mission is to promote excellence in technology teaching and work to increase the effectiveness of educators to empower all people to understand, apply, and assess technology. A goal of ITEA's strategic plan is to "enhance participation of minorities and women in technology" (Householder, 1993, p. 7).

As legislation is passed and organizations restructure their goals to attack the imbalance of male and female enrollment, schools are still generally unsuccessful in attracting females in technology education. A survey of the current literature describes a lack of female representation in all technical fields of study. To indicate if a problem exists, it is essential that an investigation in the area of female enrollment occur. By analyzing statistics of female enrollments in technology education, improvement strategies can be better designed. For example, if it were known that female enrollment of a particular class (e.g. Communication Technology) was greater than that of another, a logical course of action may be to investigate deeper into that class and indicate the positive strategies being used to recruit females into these classes.

Limitations

This research study was limited to Virginia public high school students enrolled in state approved technology education courses during the 1993/1994 school year.

Assumptions

The following assumptions were made for the study:

1. The Virginia Secondary Enrollment Demographic Report forms are complete and accurate.

2. Technology education enrollments and female enrollments are normally distributed.

3. There is no significant difference in enrollment among male and female students in each technology education course.

Procedures

The Virginia Secondary Enrollment Demographic Forms (SEDF) summarizing each school's enrollment statistics for the 1993/1994 school year were obtained from the Virginia Department of Education. These data contained enrollment statistics categorized by technology education course code, by sex, and by division. The documents were reviewed and basic descriptive statistics were then used to compile profiles of the percent of females enrolled in each technology education course.

Definition of Terms

The following definitions are provided for the reader to have a better understanding of the study.

Approved Technology Education Courses	Those courses that have been approved through the Virginia Department of Education to be taught in the state's public education system.
Bias Behavior	Behavior which treats people unequally or in a dissimilar manner because of race, sex, national origin, and/or handicap condition.
Equity	Fairness and equal distribution of encouragement, opportunity, privileges, and rights to everyone.
International Technology Education Association	A professional organization designed to assist teachers of technology with professional development through various media and activities.
Sex Discrimination	The process of making a distinction in favor of, or against, a person or persons on the basis of sex rather than on individual merit.
Stereotype	A set image or conception held by, or applied to, members of a certain group.

Technology Education — The school discipline for the study of the application of knowledge, creativity, and resources to solve problems and extend potential.

Overview and Summary

In Chapter I, the reader was introduced to the perceived problems of gender inequality in technology education. The reader is now aware of the problem of the study and the subsequent goals, limitations, and assumptions within the context of this research paper.

Chapter II examines trends in the educational system and how females are being under-represented in technological areas. Chapter III addresses the methods to be used to undertake this study, while Chapter IV reports the findings of the research. Finally, Chapter V summarizes the research and makes recommendations regarding further studies.

CHAPTER II

REVIEW OF LITERATURE

The goal of this research study was to analyze statistics of female enrollment in technology education. In order to do this effectively and accurately, various levels of information were needed to properly analyze the data reported later in this document.

The Review of Literature in Chapter II has been divided into five categories. The first deals with women in the non-traditional workforce, a topic which has attracted much attention. The second category introduces the reader to gender role expectations, while the third discusses the low self-esteem and self-confidence that may have a negative impact on female students. Section four examines how factors influence females starting at birth. The fifth and final category offers several educational solutions to combat the problem of gender equity.

Women in the Non-Traditional Workforce

During the last twenty-five years, there has been a substantial increase in the participation of women in the United States workforce. "From 1972 to 1986, the percentage of women working outside the home rose from 39 to 45 percent" (Bartholomew and Schnorr, 1991,

p. 2). By the year 2000, women will comprise more than 47 percent of the labor force and 80 percent of women age 25-54 will be employed (Bartholomew and Schnorr, 1991, p. 2).

Although a large portion of women are now working, gender equity in the work force has not been achieved. Men are holding the higher paying, more prestigious professions, while women are still concentrated in low-paying, traditionally female dominated occupations. Because men generally receive the more prestigious and higher paying jobs, women are referred to as underemployed. This under-employment has direct economic implications for women. There is a substantial difference in wages between men and women and female headed households are among the poorest in the nation (Bartholomew and Schnorr, 1991, pp. 2-3).

Ferber (1987, pp. 4-22), in *Women and Work, Paid and Unpaid*, compare the occupations and earnings of women with those of men in general, as well as with those of various subgroups. They demonstrate that even though the degree of occupational segregation is substantial, it has been declining slowly but steadily. Also, the earnings gap between men and women workers appears to have narrowed slightly, although the differential is still quite large.

After examining a wide range of economic and social factors that have spurred the increased employment of women in the labor market, Barbara Bergmann (1986, pp. 9-18) concludes in *The*

Economic Emergence of Women that the dominant factor in the emergence of women into the labor market was the advance of technology, which has resulted in a long upward trend in the price of women's time. Bergmann then considered "women's place" in the labor market in terms of occupational segregation and the earnings gap between men and women. She argued that discrimination against women in the labor force resulted in both low pay and the exclusion of women from certain jobs and occupations. Exclusion of women from men's jobs led to crowding in the female labor market, which in turn led to low pay.

Gender Role Expectations

There is an expectation that establishes roles for women in our society. This early sex-role influence makes technology, and the technically oriented careers, appear incompatible with the female role (Bartholomew, 1991, p. 4). High school girls do not perceive technology as being important or useful to career goals. The majority of females still plan to enter occupations which are traditionally dominated by their own sex (Husher, 1993, p. 15).

If women are to move into the higher paying, technically related occupations, conflict between the perceived female roles and those of men must be overcome. Not only must women perceive technical careers as appropriate and useful, but they must also have sufficient confidence and self-esteem to pursue courses within these areas.

> It is not, of course, that women cannot do science, math, or physics; there is no question that they can. But they have not been encouraged to pursue these fields, and they have not been exposed to women chemists or women structural engineers. The message is that it's not feminine to care about these things (Husher, 1993, pp. 15-16).

The difference in attitude of girls and boys may be seen and continues to exist when the child enters school. Within the elementary school classroom, the traditionally feminine values of passivity and conformity are reinforced by the mostly female teachers. With most elementary teachers being women, and most administrators men, the stereotypes of the nurturing female and the decision making male are reinforced (Fuhrmann, 1990, p. 265-67). Attitudes toward technology are established at a very early age. "The notions regarding technology and technical education are formed during pre-school age, in the compulsory school, and in the upper secondary school" (Granstam, 1988. p. 6).

The curriculum has the potential for changing our youth's visions of the future and opening them to the many career opportunities being offered. Whether a woman wants to become an engineer, or a man a nurse, the curriculum has a responsibility. This responsibility is to have sexual stereotyping and biasing disappear.

For the most part, the study of technology and technically oriented careers have been thought of, by the majority of people, as areas of study that offer opportunities to men only. Society needs to understand that benefits do exist.

The labor market is one of many reasons to encourage more women to the study of technology. Currently, women have a more limited range of occupations from which to choose than do men. An increasing number of these occupations are technical; and, if more females studied technology, less girls would be underemployed.

Self-Esteem and Self-Confidence

Because society has traditionally viewed women as being less competent or capable than men, women generally have less confidence in their abilities and lower esteem. Low self-esteem has a negative impact on female students' academic and career aspirations and the subsequent choices they make (Bartholomew and Schnorr, 1991, pp. 5-6). Lack of confidence and poor self-image are particularly important factors with regard to women's participation in the math and science related occupations.

> Girls often lack self-confidence and do not believe themselves capable of coping with technical matters even if they enjoy mathematics and also physics and would

make very good engineers (Granstam, 1988, p. 6).

According to studies by the Educational Testing Service, math performance among girls was basically equal to math pérformance among boys until about the sixth grade, when girls' performance began to erode. There has been a similar proficiency gap identified in the area of science. The National Education Progress (NAEP) study indicated that girls may have lower proficiency in science as early as age nine (Husher, 1993, p. 15).

Although gains have been made, influences remain that close off technical areas of study to women. High school counselors may still be steering women away from technology or the classes associated with technology. Inadequate mathematical preparation in high schools remains a problem (Granstam, 1988, p. 6). As more and more research is completed, additional barriers can be identified. Focusing our efforts at the identified barriers will be highly effective in overcoming gender inequality.

Parental Influences

The learning of sex roles is clearly unavoidable. It starts at birth where boys are frequently wrapped in blue blankets and girls in pink. It continues throughout infancy and childhood. Parents react differently to boys than to girls, with boys getting greater attention in the first six months of life but being encouraged to be more independent by the time they are two (Fuhrmann, 1990, pp. 265-67). "There can be little doubt that parents do influence their daughters' career perceptions and attitudes and, hence, their career decisions" (Bartholomew and Schnorr, 1991, p. 11).

Problems and Solutions

With this evidence, there can be little doubt that the occupational inequities between men and women must be addressed. One of the best ways is through education. Educators are in an ideal situation to help young minds understand equality. "Education is the primary means available for reducing bias" (Bartholomew and Schnorr, 1991, p. 11).

As educators, our responsibility is to ensure *everyone* gets a quality education. Therefore, schools must be more than advocates for change. They must be part of the change itself. Gender bias is still apparent in the school system. If sex equity in the workforce is to be a realistic goal, we must recognize and address the bias in our education system.

"Women need to make more informed choices. They need to understand where and how they can make more money, and they need to explore math and science opportunities in a way they have generally not been encouraged to before" (Husher, 1993, p. 16).

Encouraging young females to examine their personal values and interests, and to explore their perceptions of their abilities is quite important. They must also learn to recognize and alter the behaviors that may be self-defeating. Attention should be given to halt the loss of self-esteem that typically occurs during the early years of adolescence (Fuhrmann, 1990, p. 265). "When freed from the limits imposed on them by their low self-esteem, women will be more able to demonstrate the as yet uncultivated strengths they have to contribute to the human enterprise" (Bartholomew and Schnorr, 1991, p. 13).

Young women should be encouraged to explore the entire range of career and lifestyle options available. Great care should be taken in considering the potential costs, rewards and consequences of each option. Emphasis should be given to the dangers of adopting a lifestyle through necessity rather than choice. It is important that young women plan their own life rather than having someone define it for them. All career options, homemaker to jet pilot, should be seen as valid.

Teachers have the power to educate young females about the non-traditional labor market. "Very often girls do not reckon they can be successful in technical subjects, as an interest in technology has traditionally been regarded something specifically male" (Granstam, 1988, p. 7).

The best angle of attack for educating anyone is as early as possible. Females should be introduced to technology as early as kindergarten, and it should continue throughout their entire education. Most importantly, the teachers need to be trained in technology, since all too often teachers have a negative attitude which they pass on to their pupils. If teachers, especially female teachers, show support with technology or technically oriented areas, more young females may choose advanced technical careers. "If the female students are not supported by people around them they run the risk of quitting their studies before graduation" (Granstam, 1988, p. 15).

It is vital that we be clear about our ultimate goal. Ideally, we seek a curriculum that teaches an awareness and appreciation of the diversity of human experiences as well as the commonalty of the human condition. Administrators, teachers, counselors, and parents must become aware of how female students are being taught. "It is imperative that an equitable, gender fair education be offered to girls" (Bartholomew and Schnorr, 1991, p. 15). It is everyone's responsibility to address gender stereotypes and occupational inequities which may negatively influence female students. Transforming the curriculum requires explicit discussion of the roles of gender in shaping the lives of everybody. This is accomplished by exploring the diversity of everyone, men and women, in the United States and around the world.

"If more women had a technical education, it is conceivable that this would broaden technical development and thus benefit society" (Granstam, 1988, p. 15). Our society is ever changing, technologically, and there is an ever growing need to utilize creative talents of both women and men. As we recruit the finest talent available, from all segments of our population, we will help to ensure our country's place as a leader in a global market (Husher, 1993, p. 16). To insure the size and caliber of the scientific, American workforce, women must participate.

Humans have a long history of sexism. Although this pattern cannot be broken overnight, we can start to turn the tide. More and more women are crossing the gender/labor line. If young people are taught to be non-judgmental and open to change, the phrase "all people are created equal" will no longer be just a phrase.

Summary

Gender role expectations, low female self-esteem and self-confidence, and the influences that parents give their children contribute greatly to the under-representation of females in technically related careers. The topics covered in this chapter reflect necessary and important factors that impact the problem of this research paper. In order to ascertain any relevancy of results from the methods described in the following chapter, an extensive review of literature covering those proceeding areas discussed was essential.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this chapter is to report the procedures used to gather data to address the problem of the study. This chapter will describe the population, instrument design, data collection procedures, and the statistical analysis used.

Population

The population of this study was comprised of all Virginia public high school students enrolled in state approved technology education courses during the 1993/1994 school year. A total of 21 courses are currently recognized by the state of Virginia as being approved technology education courses. These courses are divided into seven major programs: Design and Technology, Pre-Engineering, Communication and Information Technology, Control Technology, Production Technology, Technical Design and Illustration, and Principles of Technology. The technology education programs and sequences of courses are listed in Appendix A of this report. These courses are presently being taught in the 131 school divisions that make up the Virginia public school system. Appendix B provides a list of the recognized Virginia school divisions.

Instrument Design

The instrument used to gather the data was that of a survey. The survey was entitled the Secondary Enrollment Demographic Form (SEDF), and was distributed by the Virginia Department of Education. The form is a class enrollment form used to collect demographic data on each class. The SEDF used in this study may be found in Appendix C.

Data Collection

The Virginia Department of Education required an individual SEDF to be completed by each instructor for every technology course taught in the state. These forms were sent to the Department of Education, located in Richmond, Virginia, where the data was entered into a computer. Because it was available in hard copy only, the researcher traveled to Richmond to photocopy the data.

Statistical Analysis

Using the data contained in the SEDF, basic descriptive statistics were used to compile profiles of the percentage of females enrolled in each technology education courses. The statistics were then analyzed to identify the percent of female enrollment across the state of Virginia by each course.

Summary

The information gathered through this study was obtained from the Department of Education located in Richmond, Virginia. This data contained the enrollment numbers of every technology education course offered in Virginia. The documents were reviewed and basic descriptive statistics were used to compile profiles of the percent of females enrolled in each technology education course. Chapter IV of this research report will present the findings of the statistical analysis, with conclusions and recommendations resulting from the findings reported in Chapter V.

CHAPTER IV

FINDINGS

National studies have shown that female students often do not pursue technical courses at the same level of participation as male students (Czujko and Bernstein 1990, p. 5). The problem of this study was to determine if a significant difference exists between male and female enrollment in the approved technology education courses offered as electives in Virginia for the 1993/1994 school year. This section of the study documents the status of the participation of female and male high school students in technology education courses. The level of participation of females is compared to that of male students across Virginia as well as each individual course.

Statewide Enrollment in Technology Education

This section of the report examines the total percentage of male and female enrollment in the approved, technology education courses offered as electives in Virginia for the 1993/1994 school year and gives an individual graph illustrating the representations of each group (Figure 1).

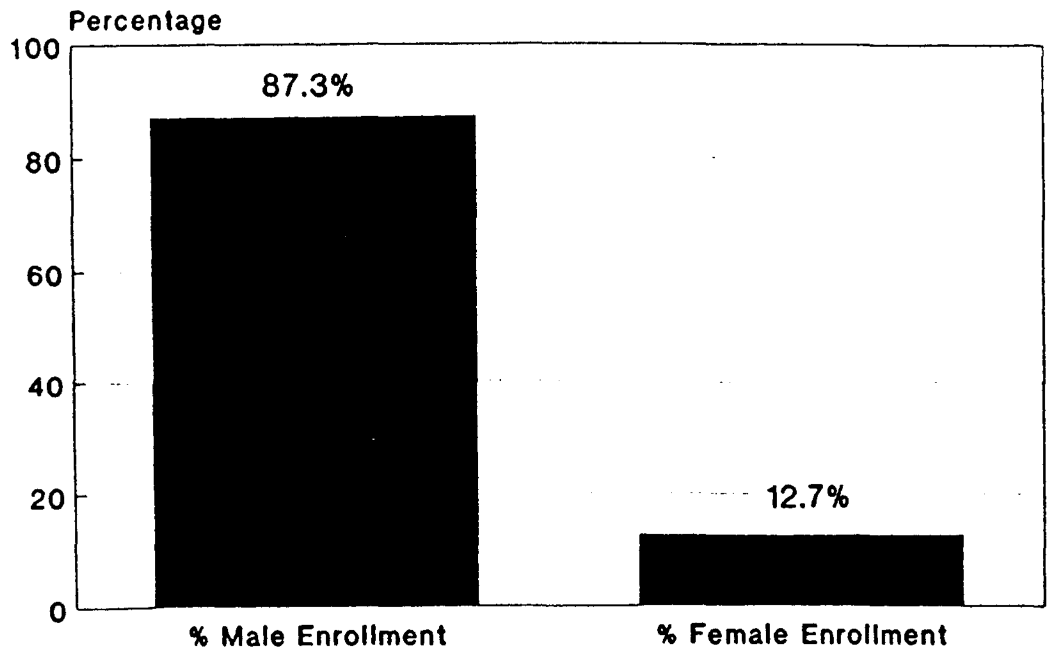

Figure 1: Comparison of Enrollment for Male and Female Students in Technology Education Courses in Virginia.

The purpose of Figure 1 is to provide an aggregate view of the enrollment data for this section. The graph shows that when the enrollment percentage of female students are compared to those of male students, a significant difference exists. The graph specifically shows that 87.3 percent of the enrollment is male, while only 12.7 percent of the enrollment is female. An examination of enrollment data for each individual course offered follows.

Enrollment in each Technology Education Course

As shown in Figure 2, females represented 11.5 percent of enrollment in the Design and Technology program, compared to their male classmates at 88.5 percent. Females participated in Pre-

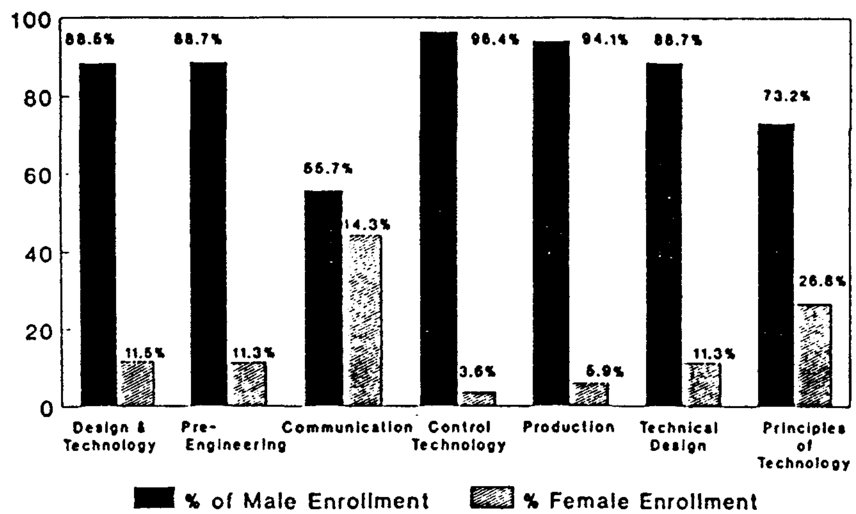

Figure 2: Comparison of Percentage of Enrollment of Male to Female Students in Technology Course Offerings.

Engineering courses at 11.3 percent, while 88.7 percent of male students were enrolled. The data also indicated that female enrollment in the Communication program was 44.3 percent, and male enrollment was 55.7 percent. While 3.6 percent of female students were enrolled in the Control Technology sequence, 96.4 percent of males were enrolled. Within the Production Technology sequence, female participation consisted of 5.9 percent, while males participated at 94.1 percent. Female enrollment in the Technical Design and Illustration program was 11.3 percent with a male enrollment of 88.7 percent. Finally in the Principles of Technology program, females comprised 26.8 percent of the enrollment, and male enrollment was that of 73.2 percent.

Design and Technology Program

Of the total enrollment within the Design and Technology Program, 11.5 percent were female and 88.5 percent were male. As shown in Figure 3, females represented 12.4 percent of the enrollment in the course Technology Foundations, while males represented 87.6 percent of the enrollment. In the course Technology Transfer,

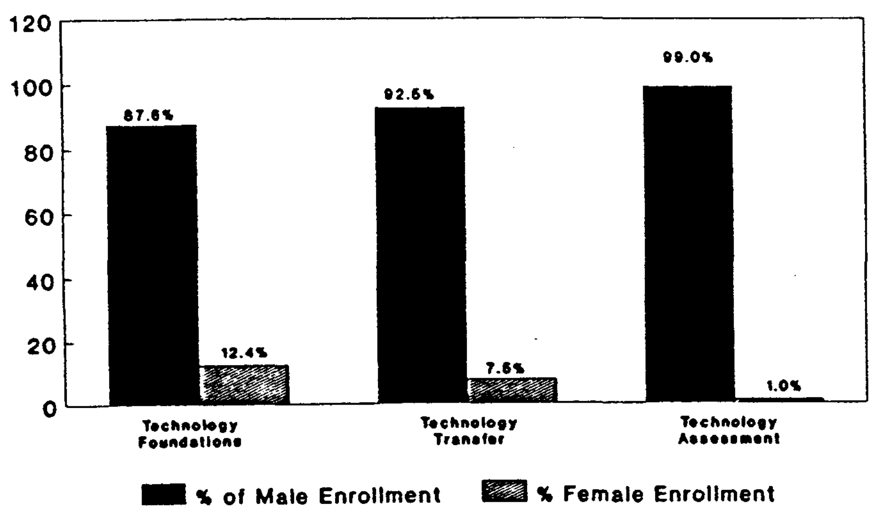

Figure 3: Comparison of Percentage of Enrollment of Male to Female Students within the Design and Technology Program.

enrollment of females consisted of 7.5 percent compared to that of males at 92.5 percent. In the last course of the program, Technology Assessment, females comprised 1.0 percent of the enrollment, and male enrollment was that of 99.0 percent.

Pre-Engineering Program

Of the total enrollment within the Pre-Engineering Program, 11.3 percent were female and 88.7 percent were male. As shown in Figure 4, females represented 11.1 percent of the enrollment in the course Introduction to Engineering, while males represented 88.9 percent of the enrollment. In the second course, Research and Development, enrollment of females consisted of 12.1 percent compared to that of males at 87.9 percent.

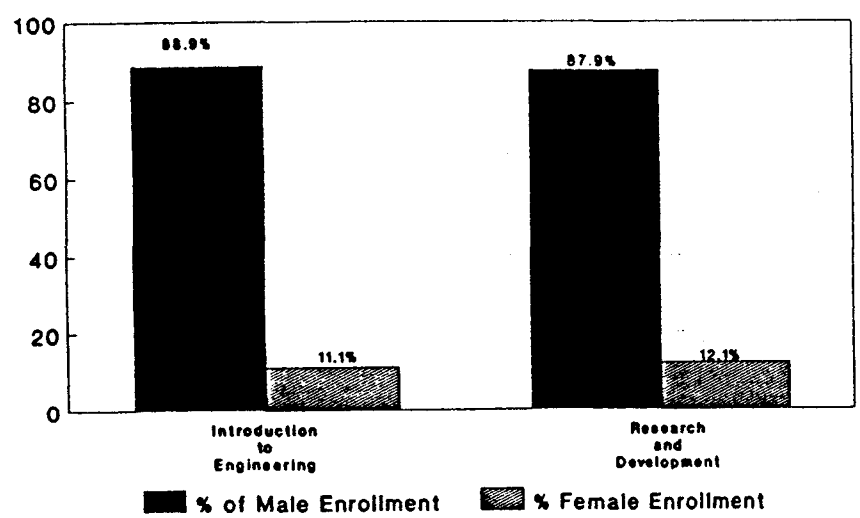

Figure 4: Comparison of Percentage of Enrollment of Male to Female Students within the Pre-Engineering Program.

Communication and Information Technology Sequence

Of the total enrollment within the Communication and Technology Sequence, 44.3 percent were female and 55.7 percent were male. As shown in Figure 5, females represented 26.7 percent of the enrollment in the course Computing Systems, while males represented 73.3 percent of the enrollment. In the course Communication Systems, enrollment of females consisted of 37.5 percent compared to that of males at 62.5 percent. In the last course of the sequence, Graphic Communications, females comprised 32.8 percent of the enrollment, and male enrollment was that of 67.2 percent.

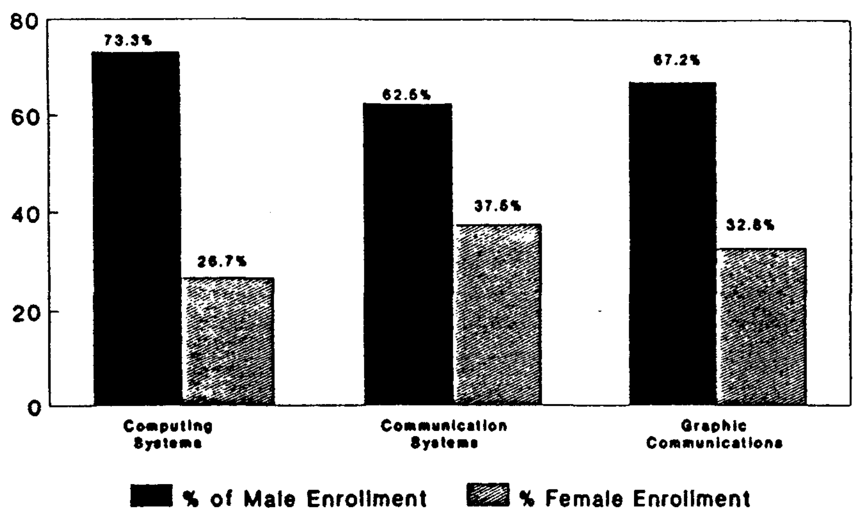

Figure 5: Comparison of Percentage of Enrollment of Male to Female Students within the Communication and Technology Sequence.

Control Technology Sequence

Of the total enrollment within the Control Technology Sequence, 3.6 percent were female and 96.4 percent were male. As shown in Figure 6, females represented 4.5 percent of the enrollment in the course Electronics Technology I, while males represented 95.5 percent of the enrollment. In the course Electronics Technology II, enrollment of females consisted of 3.2 percent compared to that of males at 96.8 percent. While female enrollment in the course Power and Transportation was 2.5 percent, male enrollment was that of 97.5 percent. In the last course of the sequence, Energy and Power, females comprised 0.8 percent of the enrollment, and male enrollment was that of 99.2 percent.

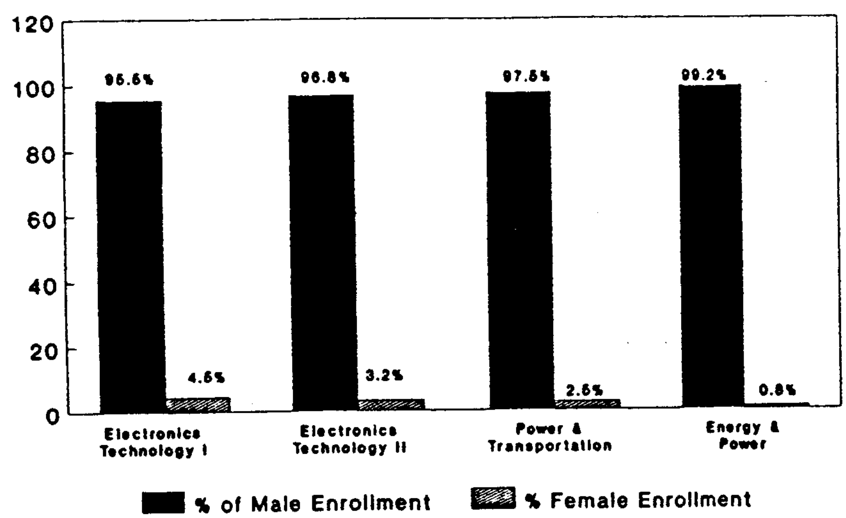

Figure 6: Comparison of Percentage of Enrollment of Male to Female Students within the Control Technology Sequence.

Production Technology Sequence

Of the total enrollment within the Production Technology Sequence, 5.9 percent were female and 94.1 percent were male. As shown in Figure 7, females represented 7.3 percent of the enrollment in the course Production Systems, while males represented 92.7 percent of the enrollment. In the course Materials and Processes, enrollment of females consisted of 6.8 percent compared to that of males at 93.2 percent. While female enrollment in the Construction course was 3.2 percent, male enrollment was that of 96.8 percent. In the last course of the sequence, Manufacturing, females comprised 7.6 percent of the enrollment, and male enrollment was that of 92.4 percent.

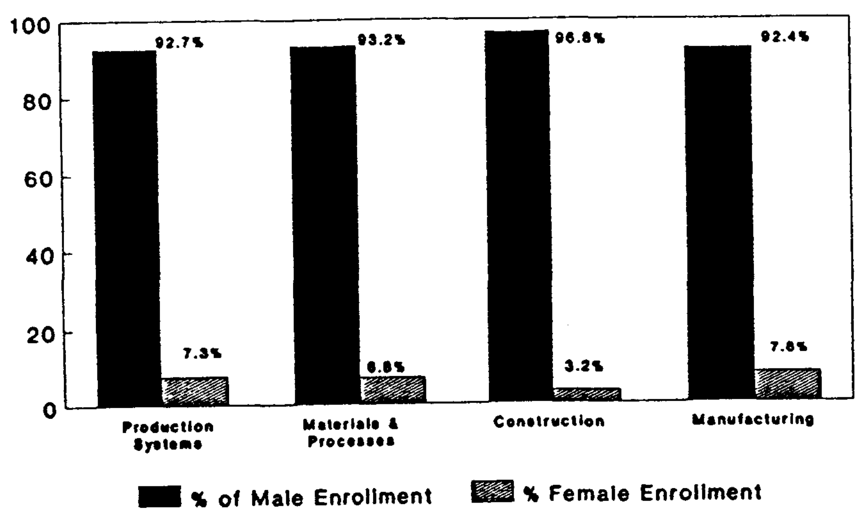

Figure 7: Comparison of Percentage of Enrollment of Male to Female Students within the Production Technology Sequence.

Technical Design and Illustration Sequence

Of the total enrollment within the Technical Design and Illustration Sequence, 11.3 percent were female and 88.7 percent were male. As shown in Figure 8, females represented 12.7 percent of the enrollment in the Basic Technical Drawing course, while males represented 87.3 percent of the enrollment. In the Engineering Drawing course, enrollment of females consisted of 6.7 percent compared to that of males at 93.3 percent. In the last course of the sequence, Architectural Drawing, females comprised 9.9 percent of the enrollment, and male enrollment was that of 90.1 percent.

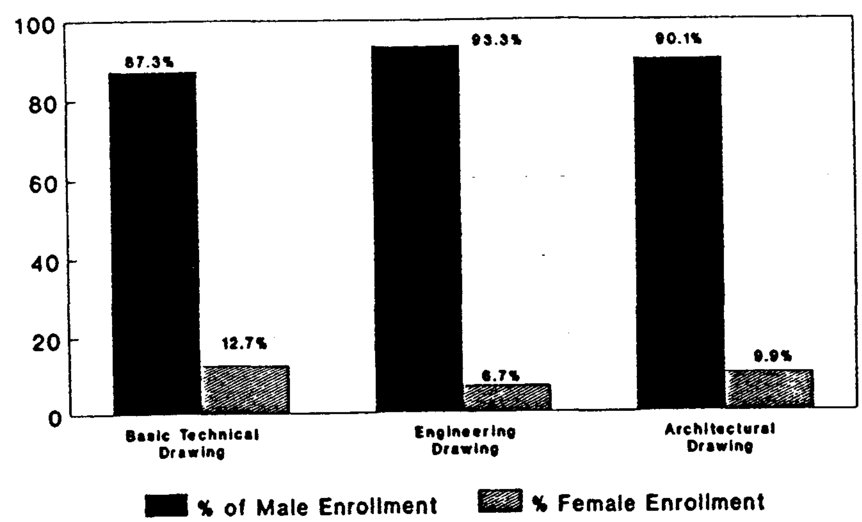

Figure 8: Comparison of Percentage of Enrollment of Male to Female Students within the Technical Design and Illustration Sequence.

Principles of Technology Sequence

Of the total enrollment within the Principles of Technology Sequence, 26.8 percent were female and 73.2 percent were male. As shown in Figure 9, females represented 27.5 percent of the enrollment in the Principles of Technology I course, while males represented 72.5 percent of the enrollment. In the second course, Principles of Technology II, enrollment of females consisted of 12.7 percent compared to that of males at 87.3 percent.

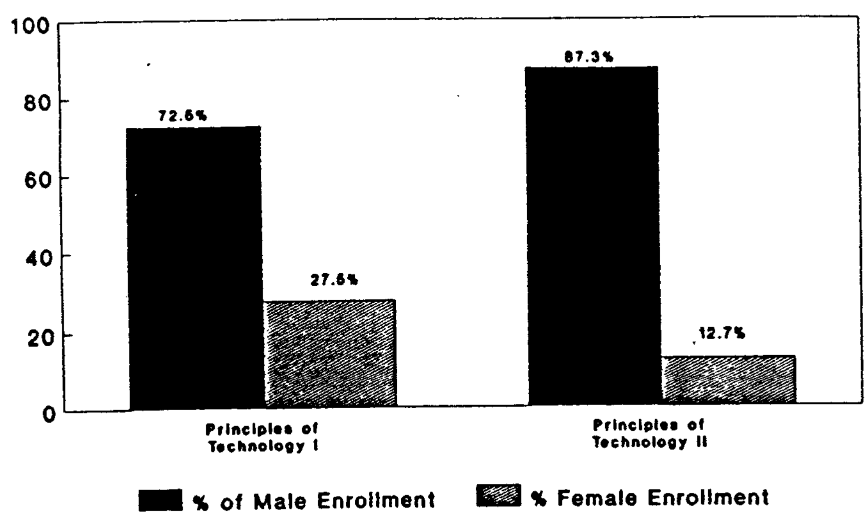

Figure 9: Comparison of Percentage of Enrollment of Male to Female Students within the Principles of Technology Sequence.

Summary

The problem of this study was to determine if a significant difference exists between male and female enrollment in the approved technology education courses offered as electives in Virginia for the 1993/1994 school year. The findings revealed that male students were enrolled in technology programs at percentages greater than females. The findings also identified the technology courses offered with the highest percentage of female enrollment.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter includes a summary, conclusions, and recommendations. The summary will contain an overview of the first four chapters. Conclusions will be drawn by answering the research goals using the data collected during the study. Recommendations for future research will be made based upon the results of the study.

Summary

The problem of this study was to determine if a significant difference exists between male and female enrollment in the approved technology education courses offered as electives in Virginia for the 1993/1994 school year. The study was guided by the following research goals.

1. To identify the statewide percentage of female enrollment in the approved, elective technology education programs offered in Virginia during the 1993/1994 school year.

2. To identify the percentage of female enrollment in each approved, elective technology education course offered in Virginia for the 1993/1994 school year.

As legislation is passed and organizations restructure their goals to attack the imbalance of male and female enrollment, schools are still generally unsuccessful in attracting females in technology education. A survey of the current literature describes a lack of female representation in all technical fields of study. To indicate if a problem exists, it is essential that an investigation in the area of female enrollment occur.

This research study was limited to Virginia public high school students enrolled in state approved technology education courses offered as electives during the 1993/1994 school year. Information concerning enrollment statistics in technology education was obtained through the Secondary Education Demographic Form (SEDF), which was administered by the Virginia Department of Education. An individual SEDF was completed by each instructor for every technology course taught in the state. The data was collected and reviewed and profiles of the enrollment statistics among male and female students were generated.

Conclusions

Based on the findings of this research, the following conclusions can be made.

Objective 1: To identify the statewide percentage of female enrollment in the approved, elective technology education programs offered in Virginia for the 1993/1994 school year.

The data indicated that when the enrollment percentage of female students were compared to those of male students, a significant difference exists. The data specifically showed that 87.3 percent of enrollment in high school technology education courses are composed of males, while only 12.7 percent of enrollment was female.

Objective 2: To identify the percentage of female enrollment in each approved, elective technology education course offered in Virginia for the 1993/1994 school year.

The data indicated that when the enrollment percentages among males and females were compared, female students were under-represented in every course. Table 1 provides percentage of female enrollment in each course. The top three courses with the highest enrollment percentages were: Communication Systems with 37.5 percent, Graphic Communications with 32.8 percent, and Principles of Technology with 27.5 percent. The three courses with the lowest enrollment percentages were: Energy and Power with 0.8 percent, Technology Assessment with 1.0 percent, and Power and Transportation with 2.5 percent.

Course	Percent
Communication Systems	37.5%
Graphic Communications	32.8%
Principles of Technology I	27.5%
Computing Systems	26.7%
Principles of Technology II	12.7%
Basic Technical Drawing	12.7%
Technology Foundations	12.4%
Research and Development	12.1%
Intro to Engineering	11.1%
Architectural Drawing	9.9%
Manufacturing	7.6%
Technology Transfer	7.5%
Production Systems	7.3%
Materials and Processes	6.8%
Engineering Drawing	6.7%
Electronics Technology I	4.5%
Electronics Technology II	3.2%
Construction	3.2%
Power and Transportation	2.5%
Technology Assessment	1.0%
Energy and Power	0.8%

Table 1: Percentage of Female Enrollment in Each Technology Education Course.

Recommendations

Based on the information gathered and the conclusions drawn, the researcher offers the following recommendations.

1. An investigation of the courses with the highest and lowest enrollment percentages, investigating the positive and negative attributes of each.

2. An investigation of the technology classroom environment to ensure an atmosphere conducive to female students, (e.g. posters and display cases).

3. An investigation of middle school students' awareness of opportunities in high school technology education.

4. A continual effort be given to look for ways to break down stereotypes about careers for females.

5. Provide in-service workshops and publications to teachers on breaking sex-role stereotyping and methods to recruit females into technology education programs.

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APPENDICES

Appendix A - The Technology Education Programs and Sequences of Courses

Technology Education Programs and Sequences of Courses

Programs and Courses	Course Code
Design and Technology Program	
Technology Foundations	8402/8403
Technology Transfer	8404/8405
Technology Assessment	8406/8407
Pre-Engineering Program	
Introduction to Engineering	8490
Research and Development	8491
Communication and Information Technology Sequence	
Computing Systems	8420/8421
Communication Systems	8418/8415
Graphic Communications	8458
Control Technology Sequence	
Electronics Technology I	8417/8416
Electronics Technology II	8412
Power and Transportation	8444/8445
Energy and Power	8448
Production Technology Sequence	
Production Systems	8446/8447
Materials and Processes	8478/8433
Construction	8432/8431
Manufacturing	8426/8425
Technical Design and Illustration Sequence	
Basic Technical Drawing	8434/8435
Engineering Drawing	8436
Architectural Drawing	8437
Principles of Technology Sequence	
Principles of Technology I	9811
Principles of Technology II	9812

Appendix B - The List of School Divisions Recognized by the Virginia Department of Education

APPENDIX B
DIVISION CODES

Counties

Accomack	001	Lancaster	051
Albemarle	002	Lee	052
Amelia	004	Loudoun	053
Amherst	005	Louisa	054
Appomattox	006	Lunenburg	055
Arlington	007	Madison	056
Augusta	008	Mathews	057
Bath	009	Mecklenburg	058
Bedford	010	Middlesex	059
Bland	011	Montgomery	060
Botetourt	012	Nelson	062
Brunswick	013	New Kent	063
Buchanan	014	Northampton	065
Buckingham	015	Northumberland	066
Campbell	016	Nottoway	067
Caroline	017	Orange	068
Carroll	018	Page	069
Charles City	019	Patrick	070
Charlotte	020	Pittsylvania	071
Chesterfield	021	Powhatan	072
Clarke	022	Prince Edward	073
Craig	023	Prince George	074
Culpeper	024	Prince William	075
Cumberland	025	Pulaski	077
Dickenson	026	Rappahannock	078
Dinwiddie	027	Richmond	079
Essex	028	Roanoke	080
Fairfax	029	Rockbridge	081
Fauquier	030	Rockingham	082
Floyd	031	Russell	083
Fluvanna	032	Scott	084
Franklin	033	Shenandoah	085
Frederick	034	Smyth	086
Giles	035	Southampton	087
Gloucester	036	Spotsylvania	088
Goochland	037	Stafford	089
Grayson	038	Surry	090
Greene	039	Sussex	091
Greensville	040	Tazewell	092
Halifax	041	Warren	093
Hanover	042	Washington	094
Henrico	043	Westmoreland	095
Henry	044	Wise	096
Highland	045	Wythe	097
Isle of Wight	046	York	098
James City Co.	047	Alleghany-Highlands	099
King George	048		
King & Queen	049		
King William	050		

Cities

Alexandria	101
Bedford	140
Bristol	102
Buena Vista	103
Charlottesville	104
Chesapeake	136
Colonial Heights	106
Covington	107
Danville	108
Fairfax	134
Falls Church	109
Franklin	135
Fredericksburg	110
Galax	111
Hampton	112
Harrisonburg	113
Hopewell	114
Lexington	137
Lynchburg	115
Manassas	143
Manassas Park	144
Martinsville	116
Newport News	117
Norfolk	118
Norton	119
Petersburg	120
Poquoson	142
Portsmouth	121
Radford	122
Richmond	123
Roanoke	124
Salem	139
South Boston	133
Staunton	126
Suffolk	127
Virginia Beach	128
Waynesboro	130
Williamsburg	131
Winchester	132

Towns

Cape Charles	201
Colonial Beach	202
West Point	207

Appendix C - The Secondary Education Demographic Form

VIRGINIA DEPARTMENT OF EDUCATION
VOCATIONAL EDUCATION

SECONDARY ENROLLMENT/DEMOGRAPHIC REPORT

- USE NO. 2 PENCIL.
- Do NOT use ink or ball point pen.
- Make heavy black marks that fill the circle completely.
- Erase completely any changes.
- Make no stray marks.
- Read complete instructions in User's Manual.
- DO NOT FOLD or STAPLE.

Examples of PROPER marks:

Examples of IMPROPER marks:

DO NOT WRITE HERE

1. School Name: ____________________

2. Course Title: ____________________

3. Teacher's Name: ____________________

4. Teacher's Social Security Number

5. Division Code

6. School Code

7. Course Code

8. Number of Periods in Class per Day

9. Length of Course in Weeks
- 36
- 18
- 9
- 6

10. Length of Each Period in Minutes

11. Total Native American Enrollment

12. Total Asian Enrollment

13. Total Black Enrollment

14. Total Hispanic Enrollment

15. Total White Enrollment

16. Total Females Enrolled

17. Number Enrolled in Co-op