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Female Perceptions of Technology Education at Old Dominion University

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FEMALE PERCEPTIONS OF TECHNOLOGY EDUCATION AT OLD DOMINION UNIVERSITY

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---Brian J. Reynolds---

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Chapter I

Introduction

The Smith-Lever Act of 1914 was one of the federal government's first vocational education initiatives that included females and it focused on farm life (Jones, 1997). The law provided opportunities for farm men through a focus on agriculture education, but it also outlined provisions in a fairly new occupation for farm women, the home economist. A degree in home economics focused on, amongst other things, cooking, cleaning, and sewing (Stage & Vincenti, 1997). This was one of many catalysts that opened the door for women to work outside the home.

World War I and World War II created huge male-dominated labor market deficits as men were called away to war. Many of these jobs were filled by women so America's war machine was not stopped. At the conclusion of each war men resumed their roles in the work force and women were expected to resume their prewar occupations (Economist, 1998). Many of these occupations centered on the home economist as a stay-at-home mother or a housewife.

In 1969 close to 50 percent of mothers with school-aged children were stay-at-home mothers (Kreider & Elliott, 2010). In 2010 that number has been cut by more than half and currently stands at 23 percent (Census Bureau, 2011). As time continues, the home maker mentality has diminished because more women entered the labor market. Gender roles have blurred and societal expectations are that women will be an active participant in the labor market. It is now expected that 99% of American women will enter the labor market (Economist, 1998). The point illustrated in the previous paragraphs outline how women in industry went from nonexistent, to an absolute need, to a

regression, and finally to a generalized expectation. There are many issues still amiss in this equation though.

Women make up approximately 51% of the US population (Census Bureau, 2009). In 1960 only 1% of engineering graduates were female. Now, nationally it is approximately 11% (Hill, Corbett, St. Rose, & AAUW, 2010). Women make up 80% of elementary school teachers (McCarthy & Berger, 2008; NEA, 2003). However, they only account for 7% of technology education teachers nationally (Gloeckner & Knowlton, 1997).

According to the latest census data, 28% of the American population has at least a bachelor's degree (Crissey, 2009). The United States Department of Education (2007) is projecting that females will significantly outpace males in the attainment of degrees at every level from an associate's degree all the way through to a doctorate level by 2011. Women are not focusing on STEM roles though. Males are twice as likely to have a STEM related major in college versus women (Hill, Corbett, St. Rose, & AAUW, 2010). With the societal stereotypes and lack of corrective education the degrees obtained will almost assuredly lead to predominately gender biased or gender stereotyped occupations.

Problem Statement

The problem of this study was to determine the perceptions of technology education among female Darden College of Education students at Old Dominion University and their willingness to switch career paths.

Research Objectives

The following are the objectives that directed this study:

RO_1: Determine student awareness of technology education as a school subject in female Darden College of Education students.

RO_2: Determine what attitudinal (societal) barriers to technology education are present, if any, in female Darden College of Education students.

RO_3: Determine attitudes to the possibility to adjusting career paths to technology education.

Background and Significance

The demand for technology education teachers has increased, yet most states report a shortage of new teachers (Moye, 2009; Shields & Harris, 2007; Akmal, Oaks, & Barkers, 2002) and without new recruits the existence of technology education will fade (Shields & Harris, 2007; Akmal, Oaks, & Barkers, 2002; Wright & Custer, 1998). Not only are women underrepresented in traditional STEM disciplines, they are underrepresented in technology education both professionally and as students in high school and college (McCarthy & Berger, 2008; Akmal, Oaks, & Barker, 2002; Braundy, 2004; Braundy, Petrina, Dalley, & Paxton, 2000; Zuga, 1996, 1999). The largest untapped resource for technology education teachers are females.

"Shop" class and what it has evolved, technology education, has stereotypically been viewed as a male endeavor and many have advocated to dispel that notion (McCarthy, 2009; Shields & Harris, 2007; Welty, 2007; Welty & Puck, 2001; Braundy, Petrina, Dalley, & Paxton, 2000; Zuga, 1999; Daugherty & Wicklein, 1992). Technology education in the public school setting revolves around technological literacy and combining multiple disciplines to solve complex problems. The skills developed in technology education class are not gender specific but they are universal to the

betterment of society regardless of gender. Dispelling myths is one thing educators need to do in order to make technology education more attractive to females.

The United States cannot remain competitive in the global economy without educated STEM professionals to innovate and lead the way (McCarthy, 2009; NSF, 2008, 2003a, 2003b). Many recruiting programs have been designed to attract females to STEM fields, but the historical stereotypes still prevail (McCarthy, 2009; NSF, 2002, 2003a, 2003b; Welty & Puck, 2001; Silverman & Pritchard, 1996). One of the crucial components of recruiting females to STEM professions is to have a positive role model (McCarthy, 2009; Welty & Puck, 2001). This is where the technology education teacher can make a contribution. America needs to develop her youth to become STEM professionals and the STEM professionals need positive role models in the form of technology educators before the process can materialize.

With all of this in mind, Old Dominion University is one of the select schools in the country that leads the way in technology teacher education programs. Even with the aforementioned knowledge, there should always be a goal to do better and should be looking for ways to do so. This study will attempt to identify places of improvement in recruiting to the technology teacher education programs. Schools and specifically the departments within them must be willing to make necessary changes to adapt policies, procedures, and practices for the betterment of the respective student body, the department, and in some cases the nation. This author believes that without eliciting change locally there is no hope to change nationally. Set the example and live by it.

Limitations

This research study was about perceptions of students in the College of Education at Old Dominion University. With this said the following limitations are anticipated:

1. The population of this study is confined to the female freshmen students with an intended education major.

2. The research will span only one semester.

Assumptions

There are two primary assumptions identified with this research project:

1. Females are underrepresented in the technology teacher education program at Old Dominion University.

2. If females are aware of the potential benefits, such as technology education being a critical shortage teaching area, some would be more willing to change to the technology education teaching subject.

Procedures

To reach the desired conclusions of this study, a Likert-scaled survey was developed. The survey was administered to the female population at Old Dominion University that had an education major. The survey will be administered through ODU email with follow-up through email and telephone contact.

Definition of Terms

Some terms used in this study were technical in nature or require definition. The following is a list of these terms:

Technology Teacher Education Programs (TTEP) - Educational programs at institutions of higher learning designed for earning licensure to obtain employment as a technology education teacher.

Science, Technology, Engineering, and Mathematics (STEM) - A group of disciplines with typically a significant gender disparity thought to be the key to national prosperity.

Technology Education - a discipline in grades 6-12 that focuses on how technology pervades virtually every facet of life and how to function in a technological world (ITEA, 2005).

Overview of Chapters

The purpose of this study was to determine what, if any, recruiting procedures or policies could be adjusted or changed to better facilitate the recruitment of female students into the technology teacher education program at Old Dominion University.

The following chapters will focus on relevant literature to include empirically based research on recruiting strategies in both technology education and other stereotypically male dominated disciplines and occupations. The methods of data collection will be defined and discussed in detail. The next chapter will focus on the findings of the research. Finally the knowledge gained will be summarized with conclusions drawn and recommendations for further study presented.

Chapter II

Review of Literature

The ever changing technological advances the world must conform to originated from curious children building upon accumulated knowledge from generation after generation. Today much of the accumulated knowledge is conveyed through education. This chapter will explore empirical research regarding awareness of attitudinal and societal barriers to technology education, technology education as a school subject, and recruitment strategies to increase female enrollment in technology teacher education programs.

Attitudinal and Societal Barriers

Could Lawrence Summers (2005), then president of Harvard University, be right when he said women lacked "intrinsic aptitude" in science and engineering? There are few academic aptitude gender disparities with science and mathematics in children and adolescents (Campbell, Hombo, & Mazzeo, 2000; Kurtz-Costes, Rowley, Harris-Britt, & Woods, 2008). The disparities that do exist are small. "Research on the cognitive abilities of males and females, from birth to maturity, does not support the claim that men have greater intrinsic aptitude for mathematics and science" (Spelke, 2005, p. 956). It is important to dispel mythical stereotypes with facts lest they be perpetuated.

Throughout life, from the very beginning through the formative years and well into adulthood, women face adversity from home, school, and eventually the workplace indoctrinating them to their "expected" gender role in society. As aforementioned, there is not a gender-based aptitude disparity. Although women now have the ability to enter male-dominated professions, and some do, there is still a significant disparity in the

number of women versus men that enter these professions (Frome, Alfeld, Eccles, & Barber, 2006; NCES, 2002).

Social fit, in this context, describes how females perceive themselves or how they feel society perceives them in a certain job. Gender stereotypes play a large role in these perceptions and directly impacts the choices young women make regarding occupations. Shanahan (2006) noted that gender stereotyping starts at an early age since parents "inadvertently... undermine both their daughters' confidence in their math and science abilities and their interest in pursuing careers in these fields" (p. 23). It is clear that this multifaceted problem starts in the home at an early age when, for example, girls are given dolls and boys are given more technologically oriented toys (Welty & Puck, 2001). During such impressionable years, girls are faced with the gender biased ideologies reinforced at home and at school.

Girls and young women have preconceived stereotypes of what a technology education class is. If the classroom climate is not gender friendly it reinforces the societal stereotype through a nonverbal message that females do not belong here (Welty & Puck, 2001). This coupled with the aforementioned gender-neutral teacher bias (Sadker & Zittleman, 2009), creates an unwelcoming environment. Hall and Sandler (1982) identified this gender biased environment as a chilly climate. They discussed how the climate could inhibit academic progression by "discouraging classroom participation, preventing students from seeking help outside the class, causing students to drop or avoid certain classes...minimizing collegial relationships, dampening career aspirations, and undermining confidence" (p. 3).

Even if school aged girls have an affinity for mathematics, science, and technology curriculum, they are less likely to take those classes (Sadker & Zittleman, 2009) because of the social norms instilled in early childhood and perpetuated throughout life (Kurtz-Costes, Rowley, Harris-Britt, & Woods, 2008). These sociogender disparities are perpetuated unconsciously by teachers of either gender (Sadker & Zittleman, 2009) and eventually extend into the workplace.

Recruitment Strategies

One of the biggest components of recruiting is advertising. Advertising comes in many forms from commercials, brochures, role models, posters, and especially word of mouth from other students. If posters on the wall are of males with fast cars and football, many females will be turned off to technology education before they had any exposure to it (McCarthy, 2009; Welty & Puck, 2001). Recruiting materials often use the generalized "he" exclusively (McCarthy, 2009). Posters, pictures, and videos typically display boys and/or men at the exclusion of girls and/or women (Marshall, 2007). Educators can inform their potential students who is and who is not welcome through their words and the material they present that reinforces the "females not welcome" stereotype.

Just as the educator would want to ensure the material they introduce to the class is gender inclusive, they can do the same for role models (McCarthy, 2009; Welty & Puck, 2001). Role models for STEM careers are typically gender specific, i.e., most nurses are female and most technology education teachers are male. There are some trail blazers that have broken traditional gender barriers through documented examples such as "Ann Tsukamoto...the co-patentee of a process to isolate the human stem cell" (Stanley, 1995, p. 61). "The absence of women in the ranks of people successful in

technology reinforces the misconception that the study of technology is a male endeavor" (Welty & Puck, 2001). There are little solutions that can make a profound difference with a little ingenuity, a little thought, and a great deal of caring.

Role models are not limited to industry or the school environment. Most women in STEM professions had a positive male role model that engaged them in active participation of stereotypical male endeavors and supported them in their occupational desires (McCarthy & Berger, 2008; Schlossberg et al., 1995). Part of the problem is that there are not enough of those role models because young women still choose occupations based on gender stereotypes in jobs that typically offer a lower pay scale compared to many STEM oriented jobs (Eccles, 1987; Gerstein et al., 1988; Powell & Mainiero, 1992).

The gender bias in our school system (Sadker et al., 1989) "perpetuates occupational inequities between women and men and must be perceived and addressed by school counselors" (Bartholomew & Schnorr, 1994, para. 8). Yet, counselors and counselor educators "lack a uniformly high level of technology competence" (Myers & Gibson, 1999, p. 11). Even with this disparity, grade school and college counselors are a significant recruiting tool for technology teacher education programs and higher education in general.

Another recruiting technique would be to focus on the benefits/packages offered through teaching technology education. High school teachers in their first year can expect a mean income of $34,000 (payscale.com, 2011). This is not to say that people should not follow their dreams and do what they find gratifying personally. This particular option has the ability to help the individual personally through intrinsic rewards and financially,

socially through innovation, economically through increased business, and nationally by helping the economy.

Awareness of Technology Education

One of the problems in technology education is the lack of clarity from a general public perspective. For the purpose of this paper general public refers to students, parents, technology and non-technology educators, and society in general. Technology education is often identified as "engineering, agriculture, computing/information technology, home economics, media arts, graphic arts, business, industrial arts, manual arts, design and technology" (Rasinen, 2003, p. 34). Some consider technology education a combination of all the aforementioned and some consider it as none of them (Rasinen, 2003). In regards to technology education, de Vries (2000) said it is "a relatively new school subject without a direct academic equivalent," which is why, "it is hardly surprising that the emergence of technology education causes a lot of fundamental discussions with respect to curriculum content, teaching strategies and ways of assessment, just to mention a few aspects" (p. 911). Even though de Vries arguments are 11 years old, they are just as significant today. The technology education educator would say it is centered on the concept of technological literacy, but this subject does not have a universal structured curriculum.

When someone thinks of McDonalds there are images of a Big Mac. The Maytag repairman does not have much work to do because its products are made to last. Technology education is a dirty place called "shop" for boys, subpar students that cannot succeed elsewhere, and those that are not college bound. Shields and Harris (2007, p. 61) explained:

> The likely answer to why the American public continues to stereotype TE is because TE lacks a unified name with a comprehensive curriculum, fails to recruit significant numbers of female and minority undergraduate students, and fails to educate non-TE teachers about the scope of TE. Until TE addresses the reasons why stereotypes persist, the American public will continue to misunderstand and misrepresent the TE curriculum.

Corporations spend millions of dollars to develop and protect their brand. Technology education has many negative attributes to its brand. This is why it is not difficult to discern why the general public does not understand what technology education is or what it is not.

With the confusion of what is or is not technology education and the lack of consensus in the technology education field, it is not surprising that students are in a quandary. These things coupled with a general lack of interest with young females (Ritz, 2006; Raat & De Vries, 1986) and society telling them they are not supposed to pursue male endeavors only amplifies why girls do not take, and in many cases are not aware of, technology classes available to them (Silverman & Pritchard, 1993).

Summary

It has been almost 30 years since the call for educational reform from a Nation at Risk: The Imperative for Educational Reform from the National Commission on Excellence in Education (Gardner, 1983). America has been facing economic and workforce degradation that is in part do to gender biases on a societal level. Ray McCarthy (2009) put it quite simply, "We cannot afford to have 51% of our population left out of the important decisions that affect us today and in the future" (p. 1). As

illustrated, this multifaceted bias may be a conscious or unconscious effort perpetrated by males and females or by parents and teachers. Unfortunately the reality is that technology education, and STEM in general, on a macro level are male endeavors as a direct result of a societal gender bias and a lack of universal corrective actions. Chapter III will focus on the methods and procedures of this study to include defining the population, instrument, and data collection strategies.

Chapter III

Methods and Procedures

This study is a descriptive study that seeks to determine the significance of three variables regarding female Darden College of Education students: awareness of technology education as a school subject, any attitudinal (societal) barriers to technology education, and possible adjustment to recruitment strategies that could yield an increased female student volume. Chapter III will identify the population addressed in this study, the type of instrument used to determine attitudes, and how the research data were obtained and analyzed.

Population

According to the enrollment records there were 63 undergraduate female Old Dominion University students with an elementary education major for the Summer semester of 2011. These 63 students represent the entire population and consequently the entire population was surveyed. Contact information was obtained through the Chair of STEM Education and Professional Studies at Old Dominion University.

Instrument

A Likert-scaled survey was developed for this study. The scale used was a five point scale from one to five with one being strongly disagree and five being strongly agree. For example, Question 1 on the survey was, “I do not know what technology education is.” The student then had the option of choosing the numbered response that correlated with her choice. All questions were based upon the research objectives which were developed from the literature review. See Appendix A for a copy of the survey.

Questions 1 through 4 were designed to discern student awareness of technology education as a school subject. Questions 5 through 9 measured attitudinal (societal) barriers to technology education. Finally Questions 10 and 11 evaluated student attitudes towards switching careers to technology education teaching. See Appendix A for a copy of the survey.

Methods of Data Collection

The surveys were sent to the student population via Old Dominion University email accounts. Students that did not respond via email were sent follow-up once a week for two weeks. If a response still was not received, then phone numbers were obtained and phone calls were made. A cover letter explaining the study is included in Appendix B.

Statistical Analysis

The completed surveys were compiled based on the number of responses, percentage, and mean according to the answers given. Please see Chapter IV for amplifying information.

Summary

This chapter discussed the details necessary to undertake this study. The defined population were all female elementary education majors in the Darden College of Education for Summer 2011 semester at Old Dominion University. Instrument design was explained. A description of how the surveys were administered and how data were collected and treated were included.

Chapter IV will report the outcomes of the student survey. The outcomes will be compiled and analyzed in this chapter.

Chapter IV

Findings

The problem of this study was to determine perceptions of technology education among female Darden College of Education students at Old Dominion University to ascertain potential changes in recruiting practices. This was undertaken to determine awareness of technology education as a school subject, any attitudinal (societal) barriers to technology education, and possible adjustment to recruitment strategies that could yield an increased female student volume. This chapter will cover the responses to the surveys.

Response Rate

The entire population entailed 63 students. Thirty-eight students completed the survey. Ten students responded to the survey through email and 28 responded when called. Those 38 students represent 60.3 percent of the population.

Report of Survey Findings

Research Objective 1

Each research objective has several corresponding questions. The following information is delineated in the research objective/survey question format.

Survey Questions 1 through 3 were designed to elicit responses that determine whether the population is aware of technology education as a school subject. The questions determine what, if any, exposure the population had to technology education.

Question 1, I have heard of technology education classes.

The first question was utilized to determine awareness of technology education. The mean score was 4.1 of 5 meaning that students agreed they were aware of technology education as a school subject. The result was 47.4 percent (18 students) strongly agreed,

34.2 percent (13 students) agreed, 7.9 percent (3 students) were neutral, and 10.5 percent of students that said no, they strongly disagreed. Just under 90% of the students surveyed were aware of technology education.

Question 2, Technology education classes were offered at my middle/high school.

Question 2 builds on Question 1 to determine not only if students knew what technology education was, but whether they had the option to take the class. There were 20 students that strongly agreed (52.6%) and 12 students (31.6%) that agreed with the question which indicated they had potential exposure to technology education coursework. There were three students (7.9%) that responded neutrally. Students that strongly disagreed equaled 2.6% which equates to one student. Finally two students (5.3%) disagreed with Question 2. The mean for Question 2 was 4.3 which indicated participants agreed that technology education classes were offered to the majority of students in the survey.

Question 3, I took a technology education class in middle/high school.

Question 3 determined whether, when given the opportunity, the student had enough interest to take a technology education class. There were three students (7.9%) that strongly disagreed with Question 3 and nine students (23.7%) that disagreed. Twelve students (31.6%) agreed and 14 (36.8%) strongly agreed. There were not any students that responded neutrally. The mean was 3.7 which indicated the participants agreed that the majority of them took a technology education class in middle or high school.

Research Question 2

Questions 4 through Question 9 were devised to ascertain any positive or negative preconceived notions or general feelings towards technology education. The majority of

questions in the survey well developed to assess RO_2 and further explain family dynamics, social beliefs, and personal beliefs.

Question 4, Technology education is a subject like mathematics and science.

Most students believed that technology education was an independent subject. Eleven students (28.9%) agreed with Question 4 and nine (23.7%) strongly agreed. There were also 11 (28.9%) students that responded neutrally. Four students (10.5%) disagreed and two (5.3%) strongly disagreed with Question 4. The mean response to Question 4 was 3.6 indicating the majority of students agreed that technology education is a subject like mathematics and science.

Question 5, Girls are just as good at mathematics and science as guys.

Question 5 had a mean response of 4.7 indicating the respondents agreed that girls are just as good as mathematics and science as males. A significant number of students (97.4%) do not believe that females are at a disadvantage academically regarding mathematics and science. Seventy-six percent of students (29 students) believed females are just as good as males in science and mathematics. Eight students (21.1%) agreed with Question 5. There were not any responses for neutral and one student (2.6%) disagreed.

Question 6, I am not sure there is a need for technology education in school.

Almost 87% of students surveyed responded that they found there to be a need for technology education in the curriculum. There were 13 students (34.2%) that strongly disagreed with the question. There were 20 students (52.4%) that strongly disagreed with the question. Four students (10.5%) responded neutrally and one (2.6%) students felt there was not a need for technology education in the curriculum. The mean score for

Question 6 was 1.8 which indicated that most students disagreed there is a need for technology education in the curriculum.

Question 7, Technology education classrooms are dirty and just not my style.

Question 7 is trying to ascertain whether technology education classrooms are conducive to the perceptions of a feminine lifestyle. Thirty-two students (84.2%) found technology education classrooms conducive to their sense of social acceptability. Five students (13.2%) responded neutrally. There were 21 students (55.3%) that disagreed with Question 7 and 28.9% (11 students) strongly disagreed. One student (2.6%) agreed with the question. The mean score was 1.9 and it indicated that most students disagreed that classrooms are dirty and not negatively predisposed.

Question 8, I understand and know how to use technology.

Eighty-four percent of students thought they had a good understanding of technology. Eleven students (28.9%) strongly agreed with Question 8 and 21 students (55.3%) agreed. Four students (10.5%) responded neutrally and two students (5.3%) thought that they did not really understand technology. The total mean score was 4.1 indicating that the majority of students agreed they understand and know how to use technology.

Question 9, I was encouraged to take on a typical female gender role as a child such as cooking and cleaning versus working on cars and mowing the lawn.

Question 9 was designed to determine if responding students had typical female gender roles during childhood. Fifty percent of students did not take on typical female gender roles in their childhood. Nine students (23.7%) strongly disagreed with Question 8 and 10 students (26.3%) disagreed. There were nine students (23.7%) that agreed and

four (10.5%) that strongly agreed. Five students (13.2%) responded neutrally and one responded not applicable. The mean score was 2.7 which indicated uncertainty that students did not feel they were encouraged to take on a typical female gender roles as a child.

Research Objective 3

Questions 10 and 11 were developed to determine if there were any potential interest in technology education by this female population. The interest was a gauge of potential to switch career paths to technology education.

Question 10, I would consider teaching technology education.

The mean for this question was 2.4. The mean indicated that those surveyed disagreed and would not consider teaching technology education. Seven students (18%) responded neutrally to Question 10. There were nine students (23.7%) that strongly disagreed and 12 (36.8%) that disagreed. Six students (15.8%) agreed with Question 10 and two (5.3%) strongly agreed. Seven students (18.4%) responded neutrally to teaching technology education.

Question 11, I would consider teaching technology education if certain incentives were offered.

Nine students (23.7%) strongly disagreed with Question 11 and nine (23.7%) disagreed. There were eight students (21.1%) that agreed and five (13.2%) stated they strongly agreed they would consider teaching technology education. Seven students (18.4%) responded neutrally. The total mean score of 2.8 indicated uncertainty that students would not consider teaching technology education if given certain incentives.

Summary

This chapter included a detailed description of student responses. It was determined that many stereotypes held by society did not influence the perceptions of the target student population. If certain incentives were offered around fifteen percent more of the target population would consider teaching in technology education. There were several disparities between the perceptions that technology education versus any corresponding action, or in this case inaction.

The majority of students were aware of technology education, took a technology education class, and viewed technology education favorably. There was a 15% drop between those that were aware of technology education and had the opportunity to attend a technology education class versus those that took a technology education class. Eighty-seven percent felt there was a need for technology education, but only 40% of these would consider teaching a technology education class. There was a disparity of almost 50%.

The final chapter of this research will include a summary of the research project. The researcher will draw conclusions and include opinions about the findings of this study. Recommendations for improving or duplicating the study will be given.

Chapter V

Summary, Conclusions, and Recommendations

This chapter will summarize the research project. There will be an overview of each component as well as the significance of what was found in the study. The researcher will draw conclusions and give his opinion of the findings as they relate to the aforementioned research objectives. Finally, recommendations for implementation of the findings and improvement to the study will be addressed.

Summary

The problem of this study was to determine the perceptions of technology education among female Darden College of Education students at Old Dominion University to ascertain potential departmental changes in recruiting practices. There were three research objectives used to guide the research:

- RO_1: Determine student awareness of technology education as a school subject in female Darden College of Education students.
- RO_2: Determine what attitudinal (societal) barriers to technology education are present, if any, in female Darden College of Education students.
- RO_3: Determine what, if any, possibilities exist to adjust recruitment strategies for technology education that could yield in increased female student volume.

The problem was identified because there is a significant lack of enrollment by female and minority populations in technology education. This study focused on females because they compose 51% of the population and encompass all minority populations.

There were several other components to this study. First, the primary assumption for this study was that females are underrepresented in the technology teacher education

program at Old Dominion University. An 11 item Likert-scaled survey was developed and given to every member in the target population via email. The target population consisted of 63 Darden College of Education females with an education major.

A review of relevant literature was utilized to determine what was already known about this area and conversely what was not known. There were three primary areas of focus: awareness of technology education, recruitment strategies, and attitudinal and societal barriers. It was determined that self-perception's were very high regarding typically negative stereotypes.

The data were collected using a survey sent via university email accounts. Students that did not respond to the initial email were emailed again. If there was still not a response then students were telephoned and asked to take the survey. Sixty-three students were surveyed, 60.3 percent (37) responded.

Conclusions

There were several conclusions drawn from this study. Conclusions have been clustered around the research objectives.

RO_1: Determine student awareness of technology education as a school subject in female Darden College of Education students.

Survey Questions 1, 2, and 3 addressed awareness of the target population. Both Questions 1 and 2 produced over an 80% positive response rate indicating that students were aware of the existence of technology education and had the ability to take a class in this school subject. Comparing the high awareness rates in Question 1 and 2 with Question 3, there was close to a 15% drop in the enrollment for students that took a

technology education class in middle school and high school. Even with a 15% drop, 68% of the responders took a technology education class in middle or high school.

Analysis of the three questions for Research Objective 1 has provided some clarity. First, the target population was aware of technology education. They had the opportunity to take technology education classes, and they had taken technology education classes while in middle or high school.

RO_2: Determine what attitudinal (societal) barriers to technology education are present, if any, in female Darden College of Education students.

There were several findings from the survey derived from RO_2 which were answered through Questions 4 through 9. Question 4 resulted in a mean of 3.6 and would indicate an agreement in the attitude towards technology education being a stand alone course. Further analysis would indicate otherwise. By removing noncommittal answers such as neutral, 53% of students agreed or strongly agreed that technology education should be a standalone course compared to 18.8% of students that disagreed or strongly disagreed.

There were disparities in some of the mean scores. With a mean of 1.8 most of the female population surveyed felt there was a need for technology education in the curriculum, but only 53% thought is should stand alone as a separate school subject. Question 7 centered on McCarthy's (2009) and Welty and Puck's (2001) research regarding technology education classes stereotypically creating an unwelcome environment for females. To the contrary, this question resulted in a mean of 1.9 or 84% of female students disagreeing or strongly disagreeing about the classroom climate being male-friendly. The target population does not believe there were any major disparities of

mathematics or science aptitude between males and females by an overwhelming 97% and a mean of 4.7. For this researcher it leads to more questions. Does the female population believe that technological literacy and problem solving are more important and should be taught separate from them teaching in technology education laboratories? Is this a case of the responders trying to give the right answer? Does the population know what the purpose of technology education is?

Survey Questions 4 through 9 resulted in some questions with very diverse answers and some that demonstrated solidarity. Question 4 asked if technology education was an independent subject and Question 9 asked about childhood gender roles. Both questions elicited a diverse range of answers that indicated their variance mirrors human nature in that societal and behavioral attitudes are as varied as the foundations they are built upon.

RO_3: Determine attitudes to the possibility to adjusting career paths to technology education.

Survey Questions 10 and 11 were used to determine if the population was interested in teaching technology education and if they could be persuaded to switch majors. Question 10 stated, "I would consider teaching technology education." Twenty-one percent of those surveyed agreed they would consider teaching technology education. However, when certain incentives were offered those surveyed agreed at an increased rate of almost 35%.

With the majority of respondents agreeing they understand and know how to use technology, are just as good at males in math and science, and that technology education is gender neutral, why would only 21% consider teaching technology education? What

were the barriers that prevented students from proceeding to switch majors? Is this a case that perceptions were high but deviate from reality? The answer for Questions 10 and 11seem to run contrary to the results of previous questions regarding high aptitude and high self esteem.

Recommendations

During the analysis of this research it became apparent that this study created more questions than answers it might have answered. Part of the problem was the study needed more questions to answer the research goals. Recommendations to make this study better include:

- Structure the questions of the survey to facilitate less subjectivity. Question 11 states, " I would consider teaching technology education if certain incentives were offered." What incentives? Is there a specific price point or are there perks that could be offered? The answer to that question is ambiguous at best. If this study were to be reconstructed the researcher would reword the question to be open-ended with a fill in the blank.
- Additional questions should have been added for clarity. Just because the student is an education major, does not mean they will be a teacher in public school. There should be a question that asks, "Do you plan on being a teacher?" For those that are confident and competent the researcher should ask them why there is such a negative perception of technology education. In general the survey should have been improved.

There are also recommendations for future research. Specifically these include:

- Obtain a larger target population. This study focused on one department of one school. Getting a larger pool of applicants from a more diverse geographical population could result in more accurate and potentially different results.
- More research should be done to determine why there are such disparities in perceptions versus action. There seems to be a positive change in perceptions of ability but this has not translated into action and females taking the technology education subjects. If the answers to the aforementioned disparities can be determined, an appropriate plan of action can be made to elicit the required changes.

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Appendix A

This survey is designed to determine female perceptions of technology education at Old Dominion University

Directions: Please answer all questions by indicating the degree to which each statement applies to you by marking: (1) Strongly Disagree (2) Disagree (3) Neither Disagree or Agree (4) Agree (5) Strongly Agree

1. I know what technology education is.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

2. Technology education classes were offered at my middle/high school.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

3. I took a technology education class in middle/high school.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

4. Technology education is a subject like mathematics and science.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

5. Girls are just as good at mathematics and science as guys.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

6. Technology education classrooms are dirty and just not my style.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

7. I understand and know how to use technology.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

8. Technology education is more geared for guys.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

9. I was encouraged to take on a typical female gender role as a child such as cooking and cleaning versus working on cars and mowing the lawn.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

10. I would consider teaching technology education.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

11. I would consider teaching technology education if certain incentives were offered.
○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

Appendix B

July 20, 2011

Brian Reynolds
Old Dominion University
Darden College of Education
Department of STEM Education and Professional Studies
Norfolk, VA 23529

To Whom It May Concern:

Hello. My name is Brian Reynolds and I am a graduate student at Old Dominion University. I am conducting research that will help explain why women do not go into teaching for technology education. Women make up 80% of elementary school teachers (McCarthy & Berger, 2008; NEA, 2003), and only 7% of technology education teachers (Gloeckner & Knowlton, 1997). With our world becoming more and more technologically advanced we need to recruit and retain more women into technology education. The only thing I need from you is a onetime response to the survey questions attached. There are eleven items that will require a response from Strongly disagree to Strongly agree.

Old Dominion University understands that many participants are concerned about confidentiality, which is why the University goes to great lengths to protect that confidentiality. There will be in no way, shape or form any mention of your name or any identifying information. Every effort and resource will be employed in order to maintain the confidentiality that you expect.

Thank you for your time and consideration. Your participation is greatly appreciated. If there are any questions or concerns I can be reached at breyno012@odu.edu.

Sincerely,

Brian Reynolds