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Why do Indiana Pre-Service Technology Education Majors Choose the Profession

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WHY DO INDIANA PRE-SERVICE TECHNOLOGY TEACHER EDUCATION MAJORS CHOOSE THE PROFESSION

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"Be strong and of good courage, do not fear nor be afraid…; for the LORD your God, He is the One who goes with you. He will not leave you nor forsake you", Deuteronomy 31:6. To my Lord, Jesus Christ I give you all that I am. I am grateful for the journey that you have led me through that has brought me to this point.

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ABSTRACT

Freeland, Traves L. M.S., Purdue University, August 2013. Why do Indiana Pre-Service Technology Education Majors Choose the Profession. Major Professor: George Rogers.

The purpose of this descriptive study was to look at the factors that influence pre-service technology education majors to choose to become teachers. The pre-service teachers of three Indiana technology education teacher preparatory programs were given an internet survey to collect demographic data and determine what factors influence current pre-service teachers. The results of this study were compared to the results from a study done by Harris (2007). The findings resulted in similar factors that were the most common identified as being influential. Those factors included personal interest or hobbies, high school or middle school teacher, and past experiences in technology education courses.

CHAPTER 1. INTRODUCTION

1.1 Introduction

The technology education profession may be on the edge of non-existence (Volk, 1993). In the 1970s, universities across the United States were producing approximately 8,000 technology education teachers a year (Volk). Volk observed a steady decline over a 20 year period and predicted that by the year 2005 the technology education profession would no longer exist. From 2004 to 2008, there has been an average of 306 technology education teachers produced per year (Moye, 2009). In 2011, 266 teachers were produced across the United States (Rogers, 2011). "Although the demise of the technology teacher preparation profession did not occur in 2005 as Volk (1997) predicted, the profession may be experiencing a 'slow death' as Ritz (1999, p.9) suggested" (Moye, 2009, p35).

While teacher supply is decreasing, there is also a decline in the amount of technology education teachers still in the teaching profession. In 1995 there were 37,968 secondary technology education teachers across the United States employed (Weston, 1997). In 2009 there were 28,310 secondary technology education teachers employed across the United States (Moye, 2009). That is a 9,658 (25.85%) less positions over a 14 year period. It has also been predicted by state supervisors that by 2014 there will be 3,410 technology education teacher job vacancies in the United States (Moye). The

largest group of teacher retirements in the last six decades will happen between 2010-2020 (Aaronson & Meckel, 2009).

Teacher shortages are not isolated to technology education; other subjects in secondary education are experiencing the same issues (Osbrone & Dyer, 2000; Begree & Demorest, 2003). Higher pay, reserved housing, student loan forgiveness, and alternative certifications have all been solution attempts to remedy teacher shortages (Hanushek, Kain, & Rivkin, 2001). Higher teacher salaries have not been found to play a major factor in the influences of becoming a teacher (Hanushek & Pace, 1995). Reserved housing has been an isolated sporadic successful solution which is mostly found in the private sector (Gow, 2003; Jorgenson, 2007; Moulthrop, 2005). The student loan forgiveness solution has been determined as a neutral incentive, since most people choose their profession regardless of the incentive of student loan forgiveness (Rome, 2003). Alternative teacher certification has become popular and many universities are providing this licensure route (Ndahi & Ritz, 2003). However alternative certification seems to be following the same trend as tradition teacher certification. In 2000, 275 alternative certificates were awarded (Volk, 2000). Ten years later, data showed that 26 certificates were awarded in 2010 and 20 certificates in 2011 (Rogers, 2010; Rogers, 2011). It is imperative that the technology education profession continue to look for ways to increase the teacher supply.

Another solution to increase teacher supply has been to increase marketing recruitment efforts. Starkweather (1998) expressing the concern of promoting students to become technology education educators stated:

> One of the biggest challenges being addressed by the association and the members of this field at this time is the promotion of technology education as a rewarding career choice. If not successfully addressed, we could witness the demise of technology teaching. (p. 46)

The promotion of technology education is done through recruiting and current recruitment "strategies are inadequate to meet the demand" (Scarcella, 2000, p.1). Improving recruitment strategies starts by establishing "clearly defined marketing and recruitment goals and objectives" (Scarcella, p.4).

Establishing these goals and objectives begins by identifying "effective recruitment techniques and factors that might influence students to enroll in undergraduate technology education programs" (Gray & Daugherty, 2004, p.5). Previous studies have given insight into the factors that influenced pre-service teachers to become technology education educators (Wright & Custer, 1998; Gray & Daugherty). These previous studies were done when the traditional age students were members Generation X (Wright & Custer; Gray & Daugherty). Girodani (2005) stated "Although today's college campus contains students that span a variety of generations, today's traditional-age student is a member of Generation Y"(p. 24). Before strategies can be examined, the factors that influenced teachers to become technology education educators should be reexamined to see if they have changed. It is relevant to determine who the current students in technology education educator programs are and what influenced them to join.

1.2 Statement of the Problem

In the United States, there is a short supply of technology education teachers which will not be able to alleviate the demand of technology education teacher vacancies

from 2011 through 2020 (Aaronson & Meckel, 2009; Moye, 2009). Custer commented "If this pipeline [teacher supply] issue cannot be addressed, the profession will starve from a lack of supply" (Karnes, 1998, p.16). If the vacancies are not filled, it may result in the closing of more technology education middle and high school programs across the United States (Moye, 2009; Hoepfl, 2001; Akmal, Oaks, & Barker, 2002). Marketing recruitment strategies must be formed and executed in the technology education profession, both on the secondary and collegiate level, to increase the supply of teachers. Although marketing recruitment strategies have been designed in the past, there is a new generation of incoming students. What motivates them to become technology education educators may be different from generations past and must be determined.

1.3 Purpose of the Study

This descriptive study added to the understanding of why Indiana pre-service teachers decide to join the technology education profession and what are the demographics of these pre-service teachers. This study was a status study to investigate the influences of why Indiana pre-service technology education teachers choose to teach and the demographics of those teachers. With this knowledge it was hoped that improved recruitment strategies in the technology education profession could be formed to increase the teacher supply.

1.4 Significance of the Problem

The technology education teachers and university department/heads have declared that the recruitment of students to become technology teachers is the number one critical issue that needs to be addressed (Wicklein, 2005). Wicklein stated, "The uniquenesses of

the issues and problems facing technology education at this time in its history may very well be at a point of no return, where solutions must be found if the field is to survive" (p. 9). Comparing the supply and demand of technology education teachers, Moye (2009) estimated that there would be a shortfall of 2,799 technology education teachers between 2009 to 2014 nationwide. If schools cannot find technology education teachers to fill the vacancies, school supervisors may just close their open positions. Hoepfl (2001) wrote about what one of the state school supervisors she surveyed said, "if you have four math teachers and lose one, the fraction becomes 3/4 and the administration moves quickly to fill the position. If you have four technology teachers and one leaves, the administration simply adjusts the fraction from 4/4 to 3/3 to fit" (p.37).

Another adverse effect of a lack of technology education teachers is the low number of graduate students. Volk (2000) stated "the failure to produce sufficient undergraduate numbers, which in turn reduces the number of university programs, which reduces the numbers of new faculty required, which causes doctoral programs to wane" (para, 19). In turn as doctoral programs wane, there become fewer programs to increase the teacher supply.

The need of technology education teachers can also be echoed in the concerns of The National Science Board. The National Science Board has expressed the concern to have Science, Technology, Engineering, and Math (STEM) education "for all American students, to nurture innovation, and to ensure the long-term economic prosperity of the Nation" "(Beering, 2009, p.1). Beering continued by stating "the urgency of this task is underscored by the need to ensure that the United States continues to excel in science and technology in the 21st century"(p.1). There are not enough students pursuing STEM

careers (American Electronics Association, 2007). The number of U.S. students entering engineering is declining (Augustine, 2007). The American Electronics Association indicated “Thousands of technology jobs continue to go unfilled because not enough Americans possess the requisite skills” (2007, p. 5). Technology education teaches students technological literacy which exposes them opportunities in STEM careers (ITEA, 2000, Rockland, Bloom, Carpinelli, Burr-Alexander, Hirsch & Kimmel, 2010). If there are no technology education courses offered to students, then students will be limited in opportunities to be exposed to STEM careers. If there are no technology education teachers, then there will be no technology education courses for students to take. If technology education teachers are not recruited, then the supply shortage of technology education teachers will still remain. Technology education teachers cannot be recruited unless there is an understanding of what factors influence teachers to teach.

A new generation of students is sitting in the seats of the middle schools, high schools, and universities of this nation (Elmore, 2010). Elmore (2010) described these students as the iY generation and they have never known a world without internet (the “i" in iY). Elmore stated “generation iY is also the most eclectic and diverse in our nation’s history, as well as the most protected and observed” (p.19). Elmore continued by stating “they are also the first generation that doesn’t need leaders to get information; they have electronic access to every piece of data you can imagine” (p. 19). It is also noted by Elmore that “in America, their (generation iY) numbers already rival that of the Baby Boomers…[and] their population may grow as large as a hundred million, nearly a third of our total population” (p.19).

Currently the iY generation and the generations before them do not understand the significance of technology and impact of the U.S. falling behind other countries in the area of STEM. In the forward of the Standards for Technological Literacy: Content for the Study of Technology (International Technology Education Association, 2000), Wolf stated:

> We are a nation increasingly dependent on technology. Yet, in spite of this dependence, U.S. society is largely ignorant of the history and fundamental nature of the technology that sustains it. The result is a public that is disengaged from the decisions that are helping shape its technological future. In a country founded on democratic principles, this is a dangerous situation. (p. v)

Augustine (2007) illustrated this point with the following example:

> Former Air Force Chief Scientist and Princeton engineering professor Cort Perkins tells of sailing into Woods Hole Harbor, where he was greeted by a friend whose boat was moored in the adjacent ship. The neighbor's fiberglass vessel was adorned with nylon lines, Dacron sails, a high-strength aluminum alloy mast capped with a radar antenna, and a bridge complete with the latest versions of GPS, depth finders, and radio equipment. Its owner, an attorney, was carrying a 10-megapixel digital camera with a stabilized lens and wearing photosensitive sunglasses. His clothing was made of synthetic fibers, and his shoes sported nonslip neoprene soles. In his pocket was a Blackberry. He cheerily greeted Professor Perkins, asking, "So have you technologists done anything for us lately?" (p. 5)

The U.S. needs more technology education teachers to help the next generation understand the significance of technology, to become more technologically literate (ITEA, 2000). Understanding what will recruit the next generation of teachers will play a critical role in helping fill that shortage.

1.5 Research Questions

This study answered the following research questions:

1a. What are the demographic data of Indiana technology education pre-service teachers?

1b. Has the demographic data of Indiana technology education pre-service teachers changed from 2007 to 2012?

2a. What are the factors that influenced career choice of pre-service Indiana technology education teachers?

2b. Have the factors that influenced career choice of pre-service Indiana technology education teachers changed from 2007 to 2012?

1.6 Definition of Terms

Pre-service Teacher - “Students in a teacher education program, at a college or university, preparing for professional-level teaching positions” (Education.com, n.d.)

Teacher Education - also known as teacher training which is “education and preparation of individuals enabling them to become professional teachers” (Teacher Training, n.d.)

Technology - "Technology is how people modify the natural world to suit their own purposes” (ITEA, 2000, p. 2)

Technology Education - “Problem-based learning utilizing math, science and technology principles” (ITEA website, 2013)

1.7 Assumptions of the Study

This study and its conclusions will be subject to the following assumptions

1. It was assumed that all respondents were pre-service teachers attending Ball State University, Indiana State University, or Purdue University.
2. It was assumed that all respondents had access to the internet and had email accounts.
3. It was assumed that all respondents answered all of the questions in good faith

1.8 Limitations of the Study

This study was conducted under the following limitations:

1. This study targeted pre-service technology education teachers in Indiana and may not be generalized to pre-service teachers in other parts of the country.
2. Only pre-service technology education teachers of Indiana participated in the survey.

1.9 Summary of the Chapter

If the technology education profession is to survive and thrive in the following decades, the teacher shortage must be resolved. Recruiting technology education teachers must remain as the profession's number one concern. In order to best recruit students into the technology education teacher programs, the factors that influence students to choose to become technology education teachers should be clarified. This study added to the knowledge of those influencing factors.

CHAPTER 2. REVIEW OF LITERATURE

2.1 Review of Related Literature

This chapter will first examine the problem of the teacher shortage of the profession. Examining the problem includes teacher supply, teacher demand, and how teacher shortage affects doctoral programs. This chapter will conclude by examining what has been suggested to resolve this problem of the teacher shortage of the profession. Resolving the problem includes salary compensation reserved housing, student loan forgiveness, alternative teacher certification, teacher recruitment, generational differences, and career choice.

2.2 Procedures for the Review of Literature

A search of related literature and research studies was conducted between August 2007 and November 2011. Literature dated between Spring of 1993 through Fall of 2011 were examined. The search was conducted at Purdue University's Hicks undergraduate Library utilizing the computerized ERIC and dla data bases. The primary descriptors used in the literature search included; enrollment influences, teacher recruitment, student recruitment, teacher supply and demand, teacher attitudes, teacher characteristics, career choice, generation differences, and music education. Music education was chosen as a primary descriptor because of its similar characteristics to technology education. Those

characteristics include that both are non-core curriculum courses, electives in high school, have significant equipment expenses, and use the sense of touch in course work.

2.3 Technology Education Teacher Numbers

In 1995 there were 17,552 middle school and 20,416 high school technology education teachers which sums to 37,968 teachers employed nationwide (Weston, 1997). Six years later in 2001 there were 16,774 middle school and 19,487 high school technology education teachers for a total of 36,261(Ndahi & Ritz, 2003). By 2009 there were 12,146 middle school and 16,164 high school technology education teachers which meant that there were 28,310 technology education teachers employed across United States (Moye, 2009). That is a 30.8% decrease of middle school and 20.9% decrease of high school technology education teacher positions in the U.S. over 14 years (Moye, 2009).

2.4 Technology Education Teacher Supply Decreasing

In 1993 a teacher supply shortage in industrial arts/technology education was predicted by Volk (1993). He looked at the industrial arts/technology education teacher graduation rates in United States universities using the Industrial Teacher Education Directory in five year intervals from 1970 to 1990 (Dennis, 1975; Dennis, 1980; Dennis, 1985, Wall, 1970; Volk). In 1970 there were 8,218 degrees awarded, and by 1990 2,490 degrees were awarded (Volk). Volk observed at decrease of 69.7% industrial arts/technology education degrees awarded (Volk). Using the observed trends he predicted that “the demise of the profession will occur near the year 2005” (Volk, p 55). In 1997, Volk did a five year follow-up study finding less than 1300 technology

education teacher degrees awarded (Volk, 1997). Ritz (1999) referenced the Industrial Teacher Education Directory observing the years 1996 through 1998. The number of degrees awarded respectively was 815, 635, and 732 (Ritz). Ndahi and Ritz (2003) referred to the 2002 Industrial Teacher Education Directory (Bell, 2002) and found 672 degrees were awarded. Moye (2009) using the 2005-2008 Industrial Teacher Education Directories (Schmidt & Custer, 2005; Schmidt & Custer, 2006; Schmidt & Custer, 2007; Waugh, 2008), reported an average of 306 degrees were awarded each year. In 2011 the Industrial Teacher Education Directories (Rogers) reported that 266 degrees were awarded.

It is also noted that while teacher supply is decreasing, that the amount of university programs that supply teachers has decreased as well (Wicklein, 1993; Volk, 1997; Rogers, 2002; Baltzer, Lazaros, & Flowers, 2007). In 1970, 203 university programs existed and by 1990 there were 174 (Wall, 1970; Volk, 1993). In 2007, 29 university programs existed and in 2008 there were 27 (Schmidt & Custer, 2007; Waugh, 2008; Moye, 2009). At least three states do not have technology education preparatory programs and depend on other states for the production of teachers (Litowitz, 1998, Akmla et al, 2002).

2.5 Technology Education Teacher Shortage Affects Doctoral Programs

Reed (2002) found a “disturbing trend” (p.68) in graduate research of theses and dissertations. Reed observed that from 1985 to 2000 there has been a steady reduction in graduate research. According to Reed “this indicates that either there were fewer graduate programs requiring research and/or there were fewer graduate students pursuing

advanced degrees" (p. 68). Volk stated "greater declines in graduate numbers can be expected in the future as the pool of teachers requiring advanced degrees diminishes" (para, 16). With the closing of more university programs that supplied technology education teachers also comes the reduction in the supply of professors (Wicklein, 1993; Volk, 1997; Volk, 2000; Rogers, 2002; Baltzer, et al, 2007). Volk (2000) stated "the failure to produce sufficient undergraduate numbers, which in turn reduces the number of university programs, which reduces the numbers of new faculty required, which causes doctoral programs to wane" (para, 19). Baltzer et al stated "a lack of qualified professors at bachelor's-granting institutions leads to a lack of qualified secondary school technology teachers" (p. 38).

2.6 Technology Education Teacher Demand Increasing

The demand for technology education teachers is on the rise for a series of reasons. The first reason is more teachers in all subject areas "will retire between 2010 to 2020 than in any other decade since the end of World War II."(Aaronson & Meckel, 2009, p.2). It has been estimated by state supervisors that there would be 1, 152 technology education teacher vacancies in 2012 and 1,435 vacancies in 2014 in the U.S. (Moye, 2009). Combining these vacancies with a predicted 5.9% decline in new teacher supply, there would be an estimated shortfall of 2,799 technology education teachers between 2009 to 2014 nationwide (Moye).

Another reason for an increased technology education teacher demand is teacher attrition (teachers who quit the occupation). This attrition has been referred to as the "revolving door" (Steinke & Putman, 2011, p. 41). Studies have shown that up to 50% of

teachers will leave the teaching field within the first five years of employment (Huling-Austin, 1990; Fulton, 2003; Ingersoll & Smith, 2003, 2004; Murnane, Singer, Willett, Kemple, & Olsen, 1991).

The final reason for an increased technology education teacher demand is that some states are now adding technology education as a required subject for all students as the result of the No Child Left Behind Act of 2001 putting emphasis of technological literacy within schools (Meade & Dugger, 2004, Steinke & Putnam, 2008).

2.7 Solutions and Incentives to Deal with the Teacher Shortage

The next section will look at different methods of how schools and universities have tried to resolve the teacher shortage. Salary compensation, reserved housing, student loan forgiveness, alternative certification, and technology education marketing recruitment will be examined.

2.7.1 Salary Compensation and Reserved Housing

Gow (2003), in an article about independent schools, discussed what some private schools are doing to attract and retain teachers. The incentives range from 10,000 dollar annum bonuses to providing housing units at submarket rates. One school reported that "faculty attrition has dropped [and]…we're suddenly very attractive to a lot of candidates" (p. 31). Jorgenson (2007) explained in an article how their private school in Hawaii is providing cottages for teachers. Jorgenson stated "I was able to hire eight 'first choices' instead of losing qualified candidates who couldn't afford to live in my community" (p. 44). Jorgenson continued "I was also able to accommodate teaching couples and those

with families" (p. 44). Although these are examples of success it is acknowledged that every school system may have limitations restricting them from following suit (Moulthrop, 2005).

2.7.2 Student Loan Forgiveness

Steinke and Putnam (2008) researched three state websites; Wisconsin State Department of Public institution, Missouri State Department of Elementary and Secondary Education, and Iowa State Department of Education. They found:

> Each state offers loan deferment or forgiveness to teachers in areas of critical need. Loan deferment programs allow full-time teachers in areas of designated need to postpone the repayment of student loans that were borrowed between 1987 to the present. Loan forgiveness is only offered to teachers who initiated the loan after 1998….Each of these three states offering loan deferment of forgiveness has designated technology education as an area of critical teacher shortage. (p. 75)

Rome (2003) surveyed a group of individuals who the U.S. Congress pass legislation to cancel their debts if they became "(1) full time employees of a family and child service agency in a low income community, or (2) provide early intervention services to infants or toddlers with disabilities" (p. 805). When Rome asked them "whether the loan cancelation opportunity influenced their choice of employment, 87% said 'no' and 12% said 'yes'" (p.814).

2.7.3 Alternative Teacher Certification

To compensate for the diminishing number of technology education teachers, states have adopted alternative teacher certification (Litowitz, 1998). Hoepfl (2000) surveyed all 50 state technology education supervisors with 36 six of them responding.

She found that “over 95% of the responding states either had, or were considering alternative routes to licensure in technology education” (Hoepfl, 2001, p.38). In 2003, Ndahi and Ritz did a similar study that surveyed all 50 states. They found that “39 states (78%) indicated that they were employing alternative routes to licensing technology education teachers; 11 (22%) were not” (Ndahi & Ritz, 2003, p. 28).

In 2000, Volk determined across the U.S. “that approximately 275 technology education teaching certificates were awarded through [alternative certification]” (para 10). In 2001, Hoepfl found “the average for the 27 responding states that recognized alternative models was 65 teachers, although about one half of the states reported fewer than 50 alternative certified teachers” (p. 39). Referencing the Industrial Teacher Education Directories (Schmidt & Custer, 2005, 2006, 2007; Waugh, 2008, 2009) for distinguishing the number of alternative certifications awarded versus traditional certificates has been difficult and vague. This is because the directories typically do not make a clear distinction between alternative certificates and traditional certificates. The 2010 and 2011 Engineering & Technology Teacher Education Directories did however make the distinction (Rogers, 2010; Rogers, 2011). In 2010 and 2011, 26 and 20 certificates were awarded nationwide respectively (Rogers).

2.7.4 Technology Education Teacher Recruitment

Some of the current strategies for technology education teacher recruitment have been career lesson plans, recruitment brochures, and web activities (Childress, 2000). The current strategies for recruitment have been inadequate to compensate the need (Scarcella, 2000). Scarcella wrote the following:

> The immediate (and simplest) solutions have been sending posting fliers, word of mouth, emergency approaches, etc. While well-designed flyers or telling other about astronomical number of teacher vacancies needed to be filled are admirable, such methods are inadequate. In truth, such methods don't increase enrollments. They increase efforts and waste time for all parties concerned. (p. 2)

2.8 Understanding Influencing Factors to Improve Recruitment Strategies

With current recruitment strategies inadequate the following section will examine generational differences. Once generations are defined former generations will be observed examining the factors that influenced career choice and teaching careers.

2.8.1 Generational Differences and Generation Y

Each generation has been referred to by many names, but for the purposes of this study they will be refer to as the Baby Boomers (born approximately between 1943 and 1960), Generation X (born approximately between 1960 and 1980), and Generation Y or iY (born approximately between 1980 and 2000) (Clausing, Kurtz, Prendeville, & Walt, 2003; Elmore, 2010).

Baby Boomers "place high value on youth, health, personal gratification, and material wealth…. [and] are optimistic and believe their generation changed the world" (Clausing et al.,2003, p. 373). Generation X members "welcome diversity, are motivated by money, believe in balance in their lives, are self-reliant, and value free time and having fun" (Clausing et al., p. 373). Generation Y are self-reliant, family-oriented, connected with relationships 24/7, look at life as a cafeteria, view authority figures as a choice, and are optimistic (Clausing et al.; Elmore, 2010). Generation Y "includes more

than 81 million people, approximately 30% of the current population…. [and] are greater in number than the Baby Boom generation" (Clausing et al., p. 373).

2.8.2 Factors of Influence in Career Choice of Generation

Studies have looked at many different factors that may influence career choice such as, earning potential, parents, cost of education, job satisfaction, teachers, and peers (Paolillo & Estes, 1982; Reschke & Knierim, 1987; Dick & Rallis, 1991; Kniveton, 2004). In some of these studies parents have been found to be the most influential in career choice, followed by teachers (Reschke & Knierim,; Dick & Rallis; Kniveton). When the studies were focused more on factors that influence teacher careers of non-core subjects, the results were similar with teachers and parents switching back and forth as leader of the most influential factor (Stroot & Williamson, 1993; Su (1993); Mimbs, Stewart, & Heath-Camp, 1998). Studies that looked at the influence of career choice for music teachers found music teachers, private music teachers, and parents being most influential (Madsen & Kelly, 2002; Begree & Demorest, 2003; Isbell, 2008; Rickels, Councill, Fredrickson, Hairston, Porter, & Schmidt, 2009).

2.8.3 Generation X Technology Education Pre-service Teachers

Pre-service technology education teachers of generation X were predominately males, with females making up approximately 10% of the population (Wright & Custer, 1998; Gray & Daugherty, 2004). In the nationwide study Wright and Custer found personal interests, technology education classes, and technology education teachers to be the most frequently cited influential factors for choosing to be a technology education teacher. When pre-service teachers were asked to indicate which items were most

influential, encouragement from a technology education teacher and encouragement from university professor were cited (Wright & Custer). At the Technology Education Collegiate Association Midwest Regional Conference in 2001, a study that Gray and Daugherty did found that high school technology education teachers were cited as the most influential for students choosing to be a technology education teacher.

2.8.4 Generation Y Technology Education Pre-service Teachers

In 2007, five years into Generation Y being the traditional age student of college campuses, Harris (2009) did a national wide study. Personal interests, technology education teachers, technology education courses, and parents were the most influential factors in choosing to be a technology education teacher (Harris). Harris found of those surveyed were predominately male with 10% being female.

2.8.5 Indiana Technology Education Pre-service Teachers

Wicklein (2005) did a national study asking teachers, professors and supervisors of technology education to rank what they viewed as the most critical issues of a list of 15 future problems of technology education. Wicklein found that "recruitment of students/teachers into teacher education programs was identified as the highest rated critical issue" (p. 7). A similar study by Lazaros and Rogers (2006) was done surveying high school and middle school teachers of Indiana. Lazaros and Rogers study indicated that "insufficient quantities of TE [technology education] teachers and the elimination of teacher education programs in TE" (p. 46) was ranked eight out of 15 future problems of technology education.

Indiana technology education teacher employment numbers have not fluctuated much from 1995 to 2009 unlike other states (Moye, 2009). There has been an increase of 240 middle school technology education teachers from 1995 to 2009 (Moye). Indiana has three technology education teacher educating programs. The programs are Ball State University, Indiana State University, and Purdue University (Rogers, 2011). Indiana technology education educating programs have supplied an average of 35 new teachers from 2004 to 2010 (Schmidt & Custer, 2005, 2006, 2007; Waugh, 2008, 2009; Rogers, 2010, 2011). It should be noted that the most recent 2010 and 2011 Industrial Teacher Education Directories have incomplete data which may be lowering the calculated average (Rogers, 2010; Rogers, 2011). When some states still have considerable shortages of technology education teachers and depend on other states for the production of teachers, Indiana's technology education preparatory programs seem to be fulfilling the state's needs (Litowitz, 1998; Akmla et al, 2002; Moye, 2009).

In 2007, Harris did a study of all three Indiana technology education teacher preparatory programs. Harris found that of those surveyed 87% were male and 13% were female. Personal interests, technology education teachers, technology education courses, and parents were the most influential factors in choosing to be a technology education teacher (Harris). These results complimented the national study Harris did in 2009. Having a better understanding of the influential factors of Indiana pre-service technology education teachers will contribute to improving recruitment strategies nationwide.

2.9 Summary of the Chapter

The amount technology education teachers across the U.S. have been decreasing over the past 15 years. The supply of technology education teachers across the U.S. has been decreasing over the past four decades. The supply shortage of technology teachers is also affecting the supply of doctoral degrees granted in a negative way. Due to low retention rates and baby boomers going in retirement the demand for technology teachers is on the rise. Incentives to increase teacher supply such as, increasing compensation, providing housing, student loan forgiveness, and alternative certification have only modestly at best been effective. Current marketing recruitment strategies have been inadequate.

When determining the influencing factors of students choosing careers of Generation X, it appears that parents, teachers, and friends seem to be influential. When looking at the influencing factors of Generation X students choosing to be a technology education teacher as a career it appears that personal interest, technology education teachers, technology education courses, and parents become more prominent. With Generation Y it appears that influential factors are similar as those of Generation X. Indiana technology teacher education programs seem to be fulfilling the needs of the state technology education teacher demands. Indiana pre-service technology education teacher influential factors of choosing teaching seem to be following nationwide trends. Investigating more into Indiana pre-service technology education teacher influential factors of choosing teaching will bring better understanding for improving recruitment strategies that can be applied nationwide.

CHAPTER 3. METHODOLOGY

In Chapter 1 the purpose of this study was presented. In Chapter 2 a review of literature was provided to support the purpose and need of this study. In this Chapter the design of the study, population, sample, and data collection will be presented:

3.1 Design of the Study

This study is descriptive in nature. Best and Kahn (2006) stated that "descriptive research seeks to find answers to questions through the analysis of variable relationships" (p.133). While most educational research puts value on cause-and-effect relationships research, without having a clear understanding of the current status, research can be off target (Gall, Gall, and Borg, 2003). Descriptive research provides a firm basis of the current status for future research (Gall, Gall, and Borg). "Some of the most influential calls for reform of the educational system have used the findings of descriptive research, typically based on compelling observational data, to make their case" (Gall, Gall, and Borg, p.290). This study serves as a base for future research in regards to motivations of what influences this generation of technology education teachers to choose the profession. Descriptive studies are performed by either direct observation or by asking people questions such as in an interview or survey (Crowl, 1993). Since this study is looking at perceptions/attitudes and that the sample size will be relatively large, a survey has been

chosen (Crowl, 1993). In 2007, Harris surveyed pre-service technology education teachers in Indiana. Harris's survey instrument was designed based off similar models developed by Wright and Custer (1998) and Gray & Daugherty (2004). This study used the survey instrument that was designed by Harris (2007). The survey instrument asked questions in regards to demographics and factors that influenced career choice of pre-service technology education teachers in Indiana. This study compared the results of the survey administered in 2012 against the Harris's results of a survey administered in 2007.

3.2 Content and Construct Validity

Content validity is making sure that the content of a survey instrument is adequately sized to reflect a full review of the topic (Devillis, 1991; Bernard, 2000). This can be done by using a group of experts who have worked extensively on a subject to review the survey instrument and look at the content's relevancy (Devillis). This survey instrument was reviewed by university faculty in the field of technology education at Purdue University, Indiana State University, Ball State University, and Central Missouri University (n=5) (K.S. Harris, personal communication, May 6, 2013). Each faculty member had over 30 years of experience in teaching in public schools and in the university setting combined (K.S. Harris, personal communication, May 6, 2013). A faculty member of Central Missouri University was chosen intentionally to give a perspective outside of Indiana that has experience in this content (K.S. Harris, personal communication, May 6, 2013). This survey instrument was also all reviewed by experienced classroom teachers in Indiana (n=5), other professionals in technology education (n=3), and university students at Purdue University (n=34) in order to make

sure a well-rounded perspective of content was considered (K.S. Harris, personal communication, May 6, 2013).

Construct validity is the ability of a survey instrument to accurately measure the desired construct it is supposed to (Devillis, 1991; Bernard, 2000). Ideally high construct validity can be determined by doing a factor analysis of the survey instrument (Mason & Bramble, 1978; Bernard). The survey instrument used for this study did not undergo a factor analysis (K.S. Harris, personal communication, May 6, 2013). It should be noted however that the survey instrument used in this study is similar to survey instruments used in other studies (Wright & Custer, 1998; Gray & Daugherty, 2004).

3.3 Population and Sample

The target population was pre-service technology education teachers in Indiana. Repeating the same survey Harris did in 2007, three higher education institutions were contacted. Those institutions were Ball State University, Indiana State University, and Purdue University. These three institutions have technology education teacher programs. Combining these technology education teacher programs produced a total population of 100 possible respondents

Since this is a descriptive study, it is suggested the sample size to be 10% to 20% of the total population (Charles & Mertler, 2002). This previous statement is typical of populations of 1500 or more (Krejcie & Morgan, 1970). According to the National Education Association, a population of 100 needs a sample size of at least 80 respondents (Krejcie & Morgan). As a result the survey instrument was given to total population of 100 pre-service teachers. The survey had a 25% (n=25) return rate. Since the rate was

lower than what was needed according to the National Education Association, the conclusions of this survey can only be correlated to the respondents that took the survey (Krejcie & Morgan, 1970).

3.4 Data Collection

A survey was given to all students majoring in technology education at Ball State University, Indiana State University, and Purdue University. The survey was given online through www.surveymonkey.com. An online version of the survey was chosen because of its low cost, as well as its instant distribution and easy access to respondents (Göritz, 2004; Hung & Law, 2011; Schleyer & Forrest, 2000). Research has shown that online surveys methods can produce results equivalent to that of offline research (Braunsberger, Wybenga, & Gates, 2007; Deutskens, Ruyter, & Wetzels, 2006; Epstein, Klinkenburg, Wiley, & McKinley, 2011; Hung & Law, 2011; Knapp & Kirk, 2003). On October 22, 2012 an email with cover letter (Appendix A) was sent to a faculty member of Ball State University, Indiana State University, and Purdue University asking them to forward the email to their pre-service technology education teachers. The email asked the pre-service technology education teachers to participate in the survey. After the initial request was sent, it is recommended that a follow up letter be sent two weeks later to increase responses (Babbie, 1979; Bernard, 2000). Therefore, two weeks later a follow-up email with cover letter (Appendix B) went out asking those who had not completed the survey to do so. The follow-up email had a different tone than the original in order to increase responses (Gall, Gall, & Borg, 2003). The follow up email asked for

responses by November 9, 2012 and was closed a week after when no new more responses were observed.

The survey instrument (Appendix C) was the same survey instrument Harris administered in 2007. Since this study is descriptive research the only data collected was from nonmanipulated variables (Best & Kahn, 2006). The first section of the survey collected information about the demographics of the pre-service technology education teachers. The data included class standing, age, gender, ethnicity, and primary occupation of parents. This section also asked about first major choice in college, participation in extra-curricular activities in middle/high school, and if specific Project Lead The Way courses or technology education course were taken in high school. The second section collected the perceived influence of what factors influenced career choice of pre-service technology education teachers. A four point Likert-type scale was used to measure the perceived influence of those factors. A four point scale omits a neutral point and forced the pre-service technology education teachers to make a choice (Brace, 2004; Iarossi, 2006). A copy of the IRB approval for the current survey instrument can be found in Appendix D.

3.5 Summary of the Chapter

In this chapter a descriptive study was described. The independent variables are the demographic data of pre-service technology education teachers. The dependent variables are the perceived influence of what factors influenced career choice of pre-service technology education teachers. A survey will be given to pre-service technology education teachers of Ball State University, Indiana State University, and Purdue

University. This study will help determine if there is a significant change between the basic demographic data and factors that influenced Indiana technology pre-service teachers from 2007 to 2011.

CHAPTER 4. FINDINGS

In this Chapter the findings of the data collection will be presented. The first section will cover the demographics of pre-service technology education teachers. The final section will cover the perceived influence of what factors influenced career choice of pre-service technology education teachers. These findings will also be compared to the work of Harris (2007).

4.1 The Design of the Study

The design of this study was to answer the following research questions:

1. (a) What are the demographic data of Indiana technology education pre-service teachers and (b) has the demographic data changed from 2007 to 2012?
2. (a) What are the factors that influenced career choice of pre-service Indiana technology education teachers and (b) have those factors changed from 2007 to 2012?

The findings of this study have been organized and presented in the following paragraphs by these research questions.

4.2 Demographic Data

The demographic information on the survey instrument was divided into eleven categories. Those categories included class standing, age, gender, ethnicity, primary

occupation of father or male guardian, and primary occupation of mother or female guardian. Those categories also included whether or not Technology Education was the respondent's first major, what technology education courses they have taken, and what extra-curricular activities they have been involved. In this next section the findings of Harris (2007) will also be shared in order to answer the research question.

4.2.1 Class Standing

Respondents of the survey were asked to indicate their current class standing. In 2012, the largest group were seniors at 44% (f = 11), followed by juniors at 32% (f = 8) and then sophomores at 12% (f = 3). Compared to 2007 respondents, seniors were also the largest respondents at 35% (f = 26) however juniors (f =17, 23%) and sophomores (f = 18, 24%) were nearly even. Freshmen respondents in 2007 represented the population at 14% (f = 10) and were larger than the graduate students at 4% (f = 3). Comparatively in 2012 freshmen at 4% (f =1) respondents were the smallest group represented. A complete list of class standing representation is in Table 4.1.

4.2.2 Age of Respondents

In 2012, the largest age group that responded was those between the ages of 21-23 years (f = 14, 56%). The second largest group were those between the ages of 18-20 years (f = 6, 24%). Comparatively in 2007, the largest group was those between the ages of 18-20 years (f = 32, 44%) followed by those in the age group of 21-23 (f = 29, 39%). The complete list of age group breakdown is in Table 4.2.

Table 4.1

Comparison of Class Standing

	2012 (n = 25)		2007 (n = 74)[a]	
Class	*f*	%	*f*	%
Freshmen	1	4%	10	14%
Sophomore	3	12%	18	24%
Junior	8	32%	17	23%
Senior	11	44%	26	35%
Graduate	2	8%	3	4%

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

4.2.3 Gender of Respondents

When asked about gender in 2007, the respondents indicated that 78% (f = 63) of them were male and 13% (f = 9) were female. In 2012, the male population was still larger at 64% (f = 16) however 36% (f = 9) were female seeing a 23% increase over 5 years. Table 4.3 reflects these results.

4.2.4 Ethnicity of Respondents

In 2007 ethnicity of respondents was undisclosed. Therefore the only data that can be reported is from 2012. In 2012 ethnicity of respondents was limited to African American and Caucasian. Caucasian (f = 25, 92%) was the largest group represented in 2012. A full breakdown of ethnicity can be found in Table 4.4.

Table 4.2

Comparison of Age of Pre-Service Teachers

	2012 (n = 25)		2007 (n = 74)[a]	
Age	*f*	%	*f*	%
18-20	6	24%	32	44%
21-23	14	56%	29	39%
24-26	1	4%	6	8%
Over 26	4	6%	7	9%

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

Table 4.3

Comparison of Gender of Pre-Service Teachers

	2012 (n = 25)		2007 (n = 74)[a]	
Gender	*f*	%	*f*	%
Male	16	64%	65	87%
Female	9	36%	9	13%

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

4.2.5 Primary Occupation of Father or Male Guardian

When asked about the primary occupation of father or male guardian, respondents were given an open ended question. Groupings of like occupations were categorized by Harris (2007). For comparing results the 2012 results followed the same groupings. In

2007 there was varied representation among many occupations, with technology (f = 27, 36%), service (f = 18, 24%), education (f = 8, 11%), legal/law/gov (f = 7, 9%), business (f = 7, 9%), and factory (f = 7, 9%) occupations with the highest totals. In 2012, there was again varied representation among many occupations, with technology (f = 8, 32%), service (f = 6, 24%), education (f = 3, 12%), and health care (f = 3, 12%) occupations with the highest totals. A categorized list of occupations and a complete list of result can be found in Table 4.5.

Table 4.4

Ethnicity of Pre-Service Teachers

	2012 (n = 25)	
Ethnicity	*f*	%
African American	1	4%
Asian American	0	0%
Caucasian	23	92%
Hispanic American	0	0%
Native American	0	0
Other	1	4%

4.2.6 Primary Occupation of Mother or Female Guardian

When asked about the primary occupation of mother or female guardian, respondents were given an open ended question. Groupings of like occupations were

categorized by Harris (2007). For comparing results the 2012 results followed the same groupings. In 2007 there was varied representation among many occupations, with education (f = 19, 26%), health care (f = 16, 22%), sales (f = 8, 11%), legal/law/gov (f = 7, 9%), business (f = 7, 9%), and architect (f = 7, 9%) occupations with the highest totals. In 2012, there was again varied representation among many occupations, with education (f = 5, 20%) and health care (f = 4, 16%) occupations with the highest totals. A categorized list of occupations and a complete list of result can be found in Table 4.6.

Table 4.5

Primary Occupation of Father or Male Guardian

	2012 (n = 25)		2007 (n = 74)[a]	
Occupation	*f*	%	*f*	%
Technology	8	32%	27	36%
Service	6	24%	18	24%
Education	3	12%	8	11%
Legal/Law/Government	1	4%	7	9%
Business	3	8%	7	9%
Factory	0	0%	7	9%
Health Care	3	12%	N/A	N/A
Farmer/Rancher	1	4%	N/A	N/A
Other	1	4%	N/A	N/A

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

Table 4.6

Primary Occupation of Mother or Female Guardian

	2012 (n = 25)		2007 (n = 74)[a]	
Occupation	*f*	%	*f*	%
Education	5	20%	19	26%
Health Care	4	16%	16	22%
Sales	2	8%	8	11%
Legal/Law/Government	0	0%	7	9%
Business	3	12%	7	9%
Architect	0	0%	7	9%
Service	3	12%	3	4%
Administrative Assistant	0	0%	3	4%
Factory	0	0%	1	4%
Homemaker	2	8%	1	1%
Other	3	12%	2	3%
Management	3	12%	N/A	N/A

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

4.2.7 First Major Choice

In 2012, when asked if technology education was their first major 15 (60%) of the 25 respondents said no. In 2007 when asked the same question 44 (59%) of the 74 respondents said no. There was a 1% percent difference in those that said no in 2007 to 2012. See Table 4.7. Respondents that said no were then asked what majors they attempted. Respondents were permitted to provide multiple majors. In 2012 there was varied representation among many majors with engineering (f = 5, 33%), technology (f = 5, 33%), and undergraduate studies (f = 3, 20%) being the most common. In 2007 there was varied representation among many majors with engineering (f = 15, 34%) and technology (f = 11, 25%) being the most common. See Table 4.8 for a complete list of majors and responses.

Table 4.7

Technology Education First Major in College

	2012 (n = 25)		2007 (n = 74)[a]	
First Major	*f*	%	*f*	%
No	15	60%	44	59%
Yes	10	40%	30	41%

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

Table 4.8

List of Other Majors Attempted

	2012 (n = 15)		2007 (n = 44)[a]	
Majors	*f*	%	*f*	%
Engineering	5	33%	15	34%
Technology	5	33%	11	25%
Education	1	7%	5	11%
Computer Science	1	7%	4	9%
Sports Administration	1	7%	2	5%
Business	1	7%	1	2%
Undergraduate Studies	3	20%	1	2%
Science	1	7%	1	2%
Communications	0	0%	1	2%
Theater/Dance	0	0%	1	2%
Other	2	13%	2	3%

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

4.2.8 Technology Education Courses Taken in High School

In 2007 when asked what technology education courses they had taken in high school, there were 60 (41%) responses for Communications, followed by Construction at

26 (18%), Pre-Engineering at 22 (15%), and Manufacturing at 21 (14%). In 2012 the most taken technology education course was Pre-Engineering which had a frequency of 35 (41%) and Communication had 23 (27%) responses. See Table 4.9 for all of the responses in regards to Technology Education courses taken in high school.

4.2.9 Extra-Curricular Activities Involvement

Respondents were asked to identify as many extra-curricular activities they were involved in either middle or high school. In 2007, there were 63 (41%) responses for those said they were in sports. The second largest group of response was 22 (14%) that identified with 4-H. There were 14 (9%) responses for scouting which includes boy scouts, Eagle Scouts, or girl scouts. In 2012, sports were also the most often identified at 20 (40%) responses. Scouting which includes boy scouts, eagle scouts, or girl scouts was next with eight (16%) responses and robotics was identified with five (10%) responses. Other extra-curricular involvement can be found in Table 4.10.

Table 4.9

Technology Education Courses Taken in High School

	2012 (n = 85)		2007 (n = 147)[a]	
Course Taken	*f*	%	*f*	%
Communications	23	27%	60	41%
Construction	9	11%	26	18%
Pre-Engineering	35	41%	22	15%
Manufacturing	10	12%	21	14%
Transportation/Power and Energy	8	9%	17	12%
Bio-Related	0	0%	0	0%
None	4	N/A	21	N/A

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author.

Table 4.10

Extra-Curricular Activities Involvement

	2012 (n = 50)		2007 (n = 154)[a]	
Extra- Curricular Activity	*f*	%	*f*	%
Sports	20	40%	63	41%
Robotics	5	10%	5	3%
Super High Mileage Challenge/Solar Vehicle Challenge	2	4%	7	5%
Boys Club/Girls Club/YMCA/YWCA	4	8%	6	4%
4-H	4	8%	22	14%
Scouting (Boy Scouts, Eagle Scouts, or Girl Scouts)	8	16%	14	9%
Future Farmer of America (FFA)	0	0%	6	4%
Skills USA	0	0%	5	3%
Academic Teams (BETA Club, Spell Bowl, Quiz Bowl)	3	6%	9	6%
Theater	0	0%	1	< 1%
Other	2	4%	14	9%
None	2	N/A	25	N/A

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author

4.3 Factors that Influenced Career Choice

Respondents were asked which factors influenced them to pursue Technology Education as a major. They were given a list of options and asked to rate them on a four

point likert-scale. The options were absolutely no influence (= 1), somewhat influenced (= 2), influenced (= 3), strongly influenced (= 4).

In 2007, personal interest and hobbies had the highest level of influence (M = 2.93, SD = 1.077) followed by past experiences in technology education courses (M = 2.70, SD = 1.167). High school or middle school teacher was also of influence (M = 2.67, SD = 1.236). Parents/guardians (M = 2.18, SD = 1.122) and university faculty (M = 2.14, SD = 1.099) were the final factors above 2.00 on a 4.00 scale. High School guidance counselor (M = 1.22, SD = 0.583) and high school principal (M =1.16, SD = 0.620) had the least amount of influence.

In 2012, high school or middle school teacher had the highest level of influence (M = 3.20, SD = 1.131) followed by personal interest and hobbies (M = 3.04, SD = 1.076). Past experiences in technology education courses were also of influence (M = 3.00, SD = 0.980). University faculty (M = 2.76, SD = 1.069), parents/guardians (M = 2.68, SD = 1.048), and information about the major from a student who was majoring in engineering/technology teacher education (M = 2.08, SD = 1.129) were the final factors above 2.00 on a 4.00 scale. High school principal (M =1.36, SD = 0.686) and high school guidance counselor (M = 1.24, SD = 0.585) had the least amount of influence. Refer to Table 4.11 for a complete list of factors of influence.

Table 4.11

Factors of Influence in Choosing Technology Education

	2012 (n = 25)		2007 (n = 74)[a]	
Factor	M	SD	M	SD
Visit to my high school from the university	1.52	0.943	1.27	0.653
University faculty	2.76	1.069	2.14	1.099
Mass media (recruitment videos, flyers, and/or pamphlets)	1.48	0.700	1.37	0.636
University Engineering/Technology Teacher Education web site	1.96	0.824	1.54	0.815
Information about the major from a student who was majoring in engineering/technology teacher education	2.08	1.129	1.86	1.059
Past experiences in technology education courses	3.00	0.980	2.70	1.167
Past experiences in technology education extra-curricular or co-curricular activities. TSA, FIRST Robotics, LEGO League, etc.	1.80	1.131	1.54	0.962
High school or middle school teacher	3.20	1.131	2.67	1.236
High school principal	1.36	0.686	1.16	0.620
High school guidance counselor	1.24	0.585	1.22	0.583
Athletic coach	1.44	0.697	1.40	0.806
High school friend	1.48	0.854	1.42	0.759
College friend	1.84	0.967	1.58	0.939
Parents/Guardians	2.68	1.048	2.18	1.122
Brother or Sister	1.60	0.800	1.44	0.896
Relatives who are not my parents or sibling	1.64	0.889	1.53	0.923
Personal interests or hobbies	3.04	1.076	2.93	1.077

Note. [a]From "Recruiting Middle and High School Engineering/Technology Teachers," by K. S. Harris, 2007. Adapted with permission of the author

4.4 Summary of the Chapter

In this chapter an explanation of when the data was collected and how many respondents took the survey tool were covered. The findings of demographic data and factors influencing major choice were presented highlighting points of interest which will be explored in the next chapter.

CHAPTER 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

In this chapter a summary of the problem and research questions will be revisited. Limitations of this study will be acknowledged. A summary of the results will be explained. Conclusions of the survey results will be shared and a discussion of future research will be proposed.

5.2 Summary of the Study

There has been a steady decline of technology education teachers being produced from universities and colleges starting from the 1970s until 2011 (Volk, 1993; Volk, 1997; Ritz 1999; Moye, 2009; Rogers, 2011). While technology education teacher supply is decreasing, there is an increased demand for technology education teachers with an estimated shortfall of 2,799 by 2014 nationwide (Moye). There is a need to design new strategies for recruiting technology education, since the current strategies are not able to meet demand (Scaracella, 2000). In order to establish new strategies, goals and objectives must be clearly defined (Scaracella). Part of establishing goals and objectives begins by understanding the factors that influence students to become technology education teachers (Gray & Daugherty, 2004). Previous studies have been done examining the factors that have influenced former generational students to become technology education teachers (Wright & Custer, 1998; Gray & Daugherty). The current student is a member of generation Y and the factors that influence these students to become technology education teachers may have changed (Girodani, 2005). A survey

tool similar to those designed by Wright & Custer (1998) and Daugherty (2004) was developed by Harris (2007) to survey the current Y generation students in 2007. The same survey tool used by Harris (2007) was used for this current descriptive study. Ideally this study would have surveyed the current students in technology education teacher programs nationwide, however due to financial and time limitations this study has been limited only to students in Indiana. This study surveyed in 2012 the 100 students of Indiana that were currently in technology education teacher programs. There were three technology education programs that produced teachers in the state of Indiana. Those programs were Ball State University, Indiana State University and Purdue University. This study was done to answer the following research questions.

1a. What are the demographic data of Indiana technology education pre-service teachers?

1b. Has the demographic data of Indiana technology education pre-service teachers changed from 2007 to 2012?

2a. What are the factors that influenced career choice of pre-service Indiana technology education teachers?

2b. Have the factors that influenced career choice of pre-service Indiana technology education teachers changed from 2007 to 2012?

5.3 Limitations

According to Krejcie & Morgan (1970) method of calculation, a sample size of 80 was needed for the given population of 100. The survey had a 25% (n=25) response rate. Since the rate was lower than what was needed the conclusions of this survey cannot be generalized to the given population and can only be correlated to the respondents that

took the survey. It should be noted that Harris (2007) had a total population of 107 with a total 74 respondents to the survey tool. According to Krejcie & Morgan (1970) method of calculation a sample size of approximately 84 was needed for the given population of 107. Therefore conclusions to Harris's (2007) study were also limited to the respondents of the survey. It should be noted that national study Harris (2009) did acquired the need sample size in order to make generalizations to the given population and that results of this survey and Harris (2007) have similar findings which are reflective of the given population. However, statistical significance was not achieved and as a result conclusions of this survey can only be generalized to the respondents.

5.4 Summary of the Results

The summary of the results are grouped by the research questions. The first section will summarize the question of (1a) what are the demographic data of Indiana technology education pre-service teachers and (1b) did the data changed from 2007 to 2012? The second section will summarize the question of (2a) what are the factors that influenced career choice of pre-service Indiana technology education teachers and (2b) have those factors changed from 2007 to 2012?

5.4.1 Demographic Data Summary

When comparing the results of 2007 (Harris) study to the 2012 results it is quite noticeable that the 2007 study had n = 74 responses compared to n = 25 of 2013. However when comparing percentages, there were many similarities and differences.

When looking at gender, in 2007 (Harris), 13% of respondents were female. By 2012, 36% of the responses were female. This was a 23% increase.

When looking at occupations, for fathers/male guardians technology occupations (36% in 2007 and 32% in 2012) were the most common. Service occupations followed with 24% in both 2007 and 2012. For the mothers/female guardians education occupations (26% in 2007 and 20% on 2012) were the most common. Followed by health care occupations (22% in 2007 and 16% in 2012)

When looking at responses to the question of technology education being students' first major, 59% said no in 2007 (Harris) and 60% said no in 2012. Of those respondents who said no, two majors were consistently the most common both in 2007(Harris) and 2012. Those two were engineering (34% in 2007 and 33% in 2012) and technology (25% in 2007 and 33% in 2012). There was also a large increase in the amount of undergraduate studies majors going from 2% in 2007 to 20% in 2012.

When looking at technology education courses taken in high school, in 2007 (Harris) communication courses (41%) were the most common and by 2012 these same courses (27%) were the second most common. In 2007 (Harris), 15% had taken a pre-engineering in high school. In 2012, 41% had taken pre-engineering courses which made these courses the most common.

In regards to extra-curricular activities involvement both in 2007 (Harris) and 2012 sports were the most common. In 2007 (Harris), 41% of responses were sports in middle or high school. In 2012, 40% of all responses were sports.

5.4.2 Factors that Influenced Career Choice Summary

When looking at the factors that influenced pre-service technology education teachers to choose the major, it appears that three factors are consistent in being the most influential in both 2007(Harris) and 2012. In 2007 (Harris), those three factors in order of most influential were “personal interest or hobbies” (M = 2.93, SD = 1.077), “high school or middle school teacher” (M = 2.67, SD 1.236), and “past experiences in technology education courses” (M = 2.70, SD 1.167). In 2012 the three factors in order of most influential were “high school or middle school teacher” (M = 3.20, SD 1.131), “personal interest or hobbies” (M = 3.04, SD = 1.076), and “past experiences in technology education courses” (M = 3.00, SD 0.980).

The influential factor of “university faculty” (M = 2.14, SD = 1.099) and “parents/guardians” (M = 2.18, SD = 1.122) were another two leading factors in 2007 (Harris). “University faculty” (M = 2.76, SD = 1.069) and “parents/guardians” (M = 2.68, SD = 1.048) were also leading factors in 2012.

5.5 Conclusions

In conclusion of the question of did demographic data of Indiana technology education pre-service teachers change from 2007(Harris) to 2012, there were notable changes. The data shows a 23% increase in the amount of females in technology education, which may have a positive influence on more females in STEM careers. Female students seeing female technology education teachers may be more likely to consider a career in the STEM fields.

Another notable change is in the amount of students whose first major was not technology education who instead started in undergraduate studies programs. There was an 18% increase from 2007(Harris) to 2012 in the amount of students starting in undergraduate studies. Undergraduate studies programs are known to be for those students who come to college with an undecided major. This increase in undergraduate studies may be a reflection of an increase in the amount of students coming to college not knowing what they wanted to be.

A final notable change was an increase in pre-engineering courses taken in high school. From 2007(Harris) to 2012 there was a 26% increase in students taking pre-engineering course. This may be contributed to the rise of Project Lead The Way programs starting up across the state of Indiana.

Other notable demographic data is in regard to parents/guardians' occupation. With the introduction of Indiana Senate Bill No.1 and Senate Bill No. 575 in 2011, it has been thought that this is unpopular with current teachers in the state of Indiana. Furthermore it may suggest that current teachers may discourage their children from becoming teachers. The data shows that in 2007 (Harris) that education occupations represented 11% of the father/male guardians and that 2012 education occupations represented 12%. This shows a 1% increase. For mothers/female guardians 26% of them were in education in 2007 and 20% in 2012. This shows a 5% decrease. The data is inconclusive and may be a result of that fact that these senate bills were just passed in 2011. The majority of respondents from the 2012 survey were juniors (32%) and seniors (44%). The influence parents/guardians would have made on the respondents would

have happen prior to 2011 when the senate bills passed. The effects of these senate bills cannot be observed at this time.

In conclusion of the factors that influenced career choice of pre-service Indiana technology education teachers. The top five factors for both 2007(Harris) and 2012 were "personal interest or hobbies", "high school or middle school teacher", "past experiences in technology education courses", "university faculty", and "parents/guardians". Although "personal interest or hobbies" and "high school or middle school teacher" flipped for being the most influential, all top five remained as the top five both in 2007 and 2012. There appears to be no notable differences in the results of the 2007 and the results of 2012. It should be noted that the results of this study are limited to respondents and cannot be generalize to the population. With that said, this study was consistent with previous studies results (Wright & Custer, 1998; Gray & Daugherty, 2004; Harris, 2009). By observing the results of this study and comparing them to the 2007 (Harris) study it appears that this generation is no different in influential factors than that of the previous generation. It may be suggested that this continues to confirm what Scarcella (2000) proposed which was that the current recruiting strategies are not working. With the current pre-service teacher enrollment in technology education continuing to decrease (Moye, 2009), it is hoped that this study helped in finding more effective recruiting strategies.

5.6 Recommendations

The design of this descriptive study was to help determine how current pre-service technology education teachers were influenced in choosing a teaching career.

This study found that current pre-service teachers had similar factors of influence to the previous generations before them. The following are recommendations based on the leading factors of influence.

In regards to “personal interest or hobbies”, it is recommended that the profession target some of the most common extra-curricular activities. Sports were the most common with 41% in 2007(Harris) and 40% in 2012. One way to promote technology education as a teaching career is highlight all of the benefits of being a school teacher to those interested in being coaches. Another recommendation at the university level is to provide coaching endorsements as a part of the technology education curriculum. Other extra-curricular activities that were more common were scouting (16% in 2012), robotics (10% in 2012), and 4-H(8% in 2012). If local teachers can become involved in their communities through scouting and 4-H, this may a great opportunity to promote and education the community on what technology is about and target students for recruitment. Robotics programs are typically already connected with local technology education school teachers, so this is an easy way to have intentional efforts of recruiting made by teachers.

In regards to influence of the “high school or middle school teacher, it was consistent in both 2007(Harris) and 2012 as a leading factor. It was also the second most influential factor for the research of Wright and Custer (1998) and the national study of Harris (2009). This suggests that the “high school or middle school teacher” still plays a critical role in students choosing technology education as a career. It may further suggest that current high school or middle school teachers are not capitalizing on their influence since enrollment numbers continue to decline (Moye, 2009). If every technology

education teacher nationwide influenced just one student into the field this next year the technology education teacher shortage would be solved (Ndahi & Ritz, 2003).

The influential factor of “past experiences in technology education courses” was the third most influential factor in both 2007 (Harris) and 2012. This factor was also a leading influential factor for the research of Wright & Custer (1998) and the national study of Harris (2009). This may suggest that technology education courses have been a consistent influential factor that should be capitalized. Technology education courses should include some type of promotion for a career in teaching to increase teacher enrollment. This responsibility falls on those teaching as well as those who build the curriculum. Pre-engineering courses (41% in 2012) and communication courses (27% in 2012) were the most often taken, which may suggest that recruiting efforts in these courses would be the best use of resources, time, and energy.

Another leading influencing factor was “university faculty”. This should be encouraging to university faculty that the precious time they invest in recruiting does have an impact. Of those 60% of students in 2012 that said technology education was not their first major, 33% of were in engineering. Another 33% of them were in technology and 20% were in undergraduate studies. Technology education faculty should capitalize their time and resources on focusing on students currently enrolled in these programs.

As for influential factor of “parent/guardians” the results suggest that parents do indeed play a role in students choosing technology education as a career choice. This comes to no surprise since research supports the role parents play is impactful (Reschke & Knierim, 1987; Dick & Rallis, 1991; Stroot & Williamson, 1993; Su, 1993; Mimbs, Stewart, & Heath-Camp, 1998; Kniveton, 2004). The local technology education school

teacher has the best opportunity to educate parents about a teaching career in technology education. It is recommended that the teachers can get parents more involved by inviting them to help in extra-curricular technology programs such as robotics.

The final recommendation is based on the limitations of the design of this study. This study was first originally designed by Wright and Custer in 1998 in which some of the current media such as Facebook and YouTube were not in existence. Although the factors of influence have been consistent across multiple generations, the way this current generation communicates is different than previous generations (Elmore, 2010). It is recommended that more time and energy should be invested in finding ways to capitalized on social media to promoted technology education as a teaching career.

The results of this study also produced new questions that need answered if the profession is going to successfully recruit new teachers into the field of technology education. As a result the following are recommendation that should be considered for further research:

a. Conduct similar descriptive research using the same population of Indiana pre-service teachers of Purdue University, Indiana State University, and Ball State University. More emphasis should be given to obtaining the needed amount of respondents so conclusions can be generalized to the given population and not limited only to the respondents. Since Indiana still has three technology education teacher programs the knowledge gained from such a study would provide university faculty with a better understanding what is influencing students to come into the program. With some states not even having one technology

education teacher program (Litowitz, 1998; Akmla et al, 2002), it is important to keep the programs that are still open full.

b. Conduct similar descriptive research on a nationwide scale. This would give a better understanding of current status of pre-service technology education teachers nationwide. This would give the technology education profession a resource to work from when designing new recruiting strategies.

c. Conduct descriptive research to understand which middle and high school teachers are being influential in helping students to become technology education teachers. Target these teachers and find out what they are doing that makes them influential.

d. Conduct descriptive research to understand which technology education courses are being influential in helping students become technology education teachers. Conduct research to see how much intentional recruiting is placed in technology course curriculum.

e. Conduct descriptive research to understand current perceptions of parents in regards to technology education courses. Understanding parents' perception will provide insight on how to better educate parents in the value of technology education and will provide insight on how to make better recruiting strategies to encourage parents to influence their student towards a career as a technology education teacher.

f. Conduct descriptive research to understand what current student and university faculty perceptions are in regards to effective recruiting techniques. A similar

study was done; however it was limited to a small population of students (Gray & Daughtery, 2004). A nationwide study should be done.

LIST OF REFERENCES

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Aaronson, D., & Meckel, K. (2009). How will baby boomer retirements affect teacher labor markets?. *Economic Perspectives*, 33(4), 2-15. Retrieved from EBSCOhost.

Akmal, T., Oaks, M. M., & Barker, R. (2002). The Status of Technology Education: A National Report on the State of the Profession. *Journal of Industrial Teacher Education*, 39(4). Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JITE/v39n4/akmal.html.

American Electronics Association. (2007). We are Still Losing the Competitive Advantage Now is the Time to Act. March 2007, Washington, D.C. Retrieved on October 27, 2011, from http://www.techamerica.org/content/wpcontent/uploads/2009/07/aea_competitiveness_2007.pdf

Ary, D., Jacobs, L. C., & Razavieh, A. (2002). *Introduction to research in education*. 6th ed. Belmont, Calif.: Thomson/Wadsworth.

Augustine, N. R. (2007). Is America Falling off the Flat Earth? *National Academy of Sciences, National Academy of Engineering, and Institute of Medicine of the National Academies.* Washington, D.C. Retrieved on October 27, 2011, from http://www.nap.edu/catalog/12021.html

Babbie, E. R. (1979). *The Practice of Social Research*. Belmont, Calif.: Wadsworth Pub. Co.

Baltzer, H., Lazaros. E., & Flowers, J. C. (2007). Review of Doctoral Programs in Technical Education. *Journal of Industrial Teacher Education,* (44)2, 37-59. Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JITE/v44n2/pdf/baltzer.pdf

Beering, S. (2009). Letter to President Elect-Obama. SUBJECT: Actions to Improve Science, Technology, Engineering, and Mathematics (STEM) Education for all American Students. *National Science Board*. Retrieved on October 27, 2011, from http://www.nsf.gov/nsb/publications/2009/01_10_stem_rec_obama.pdf

Bell, T. (Ed.). (2002). *Industrial teacher education directory*. CTTE and NAITTE (40th ed). Department of Industry and Technology, Millersville University of Pennsylvania, Millersville, PA.

Bernard, H.R. (2000). *Social Research Methods: Qualitative and Quantitative Approaches*. Thousand Oaks, Calif. : Sage Publications.

Bergee, M. J. & Demorest, S. M. (2003). Developing Tomorrow's Music Teachers Today. *Music Educators Journal*, 89(4), 17-20. Retrieved on November 1, 2011, from http://www.jstor.org/stable/3399899

Best, J. W., & Kahn, J. V. (2006). *Research in education*. 10th ed. Boston: Pearson/Allyn and Bacon.

Brace, I. (2004). *Questionnaire design: how to plan, structure, and write survey material for effective market research*. London: Kogan Page.

Braunsberger, K., Wybenga, H., & Gates, R. (2007). A comparison of reliability between telephone and web-based surveys. *Journal of Business Research*. 60. 758–764.

Charles, C. M., & Mertler, C. A. (2002). *Introduction to Educational Research*. 4th Ed. Boston: Pearson/Allyn & Bacon.

Childress, V. W. (2000). Teaching Your Students about Technology Education as a Career. *The Technology Teacher*, 59(8), 29-33.

Clausing S. L., Kurtz D. L., Prendeville J., & Walt J.L. (2003). Generational Diversity-The Nexters. *AORN Journal*, 78(3), 373-379. Retrieved on November 6, 2011, from http://www.sciencedirect.com/science/article/pii/S0001209206607497

Crowl, T. K. (1993). *Fundamentals of Educational Research*. Madison, Wis. : Brown & Benchmark.

Dick, T. P., & Rallis S. F. (1991). Factors and Influences of High School Students' Careers Choices. *Journal for Research in Mathematics Education*, 22(4), 281-292.

Dennis, E. A. (Compiler). (1975). *Industrial teacher education directory*. (14th ed). South Holland, IL: Goodheart-Wilcox.

Dennis, E. A. (Compiler). (1980). *Industrial teacher education directory*. (19th ed). South Holland, IL: Goodheart-Wilcox.

Dennis, E. A. (Ed.). (1985). *Industrial teacher education directory*. (24th ed). South Holland, IL: Goodheart-Wilcox.

Dennis, E. A. (Ed.). (1990). *Industrial teacher education directory*. (29th ed). South Holland, IL: Goodheart-Wilcox.

Dennis, E. A. (Ed.). (1995). *Industrial teacher education directory*. (34th ed). South Holland, IL: Goodheart-Wilcox.

Deutskens, E., Ruyter, K.D., & Wetzels, M. (2006). An assessment of equivalence between online and mail surveys in service research. *Journal of Service Research*. 8(4). 346–355.

Devillis, R. F. (1991). *Scale Development : Theory and Applications*. Newbury Park, Calif. : Sage.

Education.com. (n.d.). Retrieved on Sept 1, 2012 from http://www.education.com/definition/preservice-teachers/

Elmore, T. (2010). *Generation iY*. Atlanta, Georgia: Poet Gardener Publishing in association with Growing Leaders, Inc.

Epstein, J., Klinkenberg, W. D., Wiley, D., & McKinley, L. (2001). Insuring sample equivalence across Internet and paper-and-pencil assessments. *Computers in Human Behavior*. 17(3). 339–346.

Fulton, K. P. (2003). Redesigning schools to meet 21st century learning needs. *T.H.E. Journal*, 30(9), 30-32, 34, 36. Retrieved on November 15, 2011 from http://vnweb.hwwilsonweb.com/hww/results/getResults.jhtml?_DARGS=/hww/results/results_common.jhtml.35

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: an introduction*. 7th ed. Boston: Pearson/Allyn & Bacon.

Giordani, P. (2005). "Y" Recruiting: New Generation Inspires New Methods. *National Association of Colleges and Employers Journal*. 65(4). 23-25.

Göritz, A. S. (2004). The impact of material incentives on response quantity, response quality, sample composition, survey outcome, and cost in online access panels. *International Journal of Market Research*. 46(3). 411–425.

Gow, P. (2003). CREATIVE COMPENSATION. *Independent School*, 62(3), 28. Retrieved October 11, 2011, from EBSCOhost.

Gray, M. & Daugherty, M. (2004). Factors that Influence Students to Enroll in Technology Education Programs. *Journal of Technology Education*, 15(2), 5-19.

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2004). Why Public Schools Lose Teachers. *Journal of Human Resources*, 39(2), 326-354. Retrieved October 11, 2011, from EBSCOhost.

Hanushek, E. A. & Pace, R. R. (1995). Who Chooses to Teach (and Why)? *Economics of Education Review*, 14(2), 101-117.

Harris, K. S. (2007, March). Recruiting Middle and High School Engineering/ Technology Teachers. *Symposium conducted at the Association for Career and Technical Education*, Las Vegas, NV.

Harris, K. S. (2009, March). Recruiting the Next Generation of Technology Education Teachers. *Symposium conducted at the Technology Education Collegiate Association Conference*, Louisville, KY.

Hoepfl, M. (2001). Alternative Routes to Certification of Technology Education Teachers. *The Journal of Technology Studies*. 27(2). 35-44. Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JOTS/Summer-Fall-2001/pdf/hoepfl.pdf

Huling-Austin, L. (1990). Teacher induction programs and internships. In W. R. Houston (Ed.), *Handbook of research on teacher education* (pp. 535-548). Reston, VA: Association of Teacher Educators.

Hung, K., & Law, R. (2011). An overview of Internet-based surveys in hospitality and tourism journals. *Tourism Management*. 32. 717-724.

Iarossi, G. (2006). *The power of survey design: a user's guide for managing surveys, interpreting results, and influencing respondents.* Washington, DC: World Bank.

Ingersoll, R., & Smith, T. (2003). The wrong solution to the teacher shortage. *Educational Leadership*, 60(8), 30-33. Retrieved November 15, 2011, from http://vnweb.hwwilsonweb.com/hww/Journals/getIssues.jhtml?sid=HWW%3AOMNIFT&issn=0013-1784

Ingersoll, R. M., & Smith, T. M. (2004). Do teacher induction and mentoring matter? *National Association of Secondary School Principals. NASSP Bulletin*, 88(638), 28-28-40. Retrieved October 25, 2011, from http://search.proquest.com/docview/216032536?accountid=13360

Isbell, D. S. (2008). Musicians and Teachers: The Socialization and Occupational Identity of Preservice Music Teachers. *Journal of Research in Music Education*, 56(2), 162-178. Retrieved on November 1, 2011, from http://jrm.sagepub.com/content/56/2/162

International Technology Education Association, (2000). *Standards for technological literacy: Content for the study of technology*. Reston, VA.

International Technology Education Association, (2013, June 4). *What is Technology and Engineering Education?* Retrieved from http://www.iteea.org/AboutITEEA/about.htm.

Jorgenson, O. (2007). Teacher Retention: A Different Perspective. *Principal* 87(1) p. 44

Karnes, M. R. (Ed.) (1998). Technology Education in Prospect: Perceptions, Change, and the Survival of the Profession. [Special Section] *The Journal of Technology Studies*. 25(1), 11-35. Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JOTS/Winter-Spring1999/PDF/ karnes.pdf

Knapp, H. & Kirk, S.A. (2003). Using pencil and paper, Internet and touch-tone phones for self-administered surveys: does methodology matter? *Computers in Human Behavior*. 19(1). 117–134.

Kniveton, B. H. (2004). The Influences and Motivations on which Students Based Their Choice of Career. *Research in Education*. 72, 47-57.

Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*. 30(3), 607-610.

Lazaros, E. J. & Rogers, G. E. (2006). Critical Problems Facing Technology Education: Perceptions of Indiana Teachers. *Journal of Industrial Teachers Education*, 43(2), 45-69. Retrieved on November 1, 2011 from http://scholar.lib.vt.edu/ejournals/JITE/v43n2/pdf/lazaros.pdf

Litowitz, L. S. (1998). Technology education teacher demand and alternative route licensure. *The Technology Teacher*, 57(5), 23-28.

Madsen, C. K. & Kelly, S. N. (2002). First Remembrances of Wanting to become a Music Teacher. *Journal of Research in Music Education*, 50(4), 323-332. Retrieved on November 1, 2011 from http://jrm.sagepub.com/content /50/ 4/323.

Mason, E. J. & Bramble, W. J. (1978). *Understanding and Conducting Research: Applications in Education and the Behavioral Sciences*. New York: McGraw-Hill.

Meade, S. & Dugger, W. (2004). Reporting the status of technology education in the U.S. *The Technology Teacher*, 64(2), 29-36. Retrieved on November 15, 2011 from http://vnweb.hwwilsonweb.com/hww/results/getResults.jhtml?_DARGS=/hww/results/results_common.jhtml.35

Mimbs, C. A., Stewart, D. L., & Heath-Camp, B. (1998). Career Choice Decisions of Family and Consumer Sciences Education Recent Graduates: Recruitment Implications. *Journal of Family and Consumer Sciences Education*, 16(2), 45-59.

Moye, J. J. (2009). Technology Education Teacher Supply and Demand – A Critical Situation. *The Technology Teacher*, 69(2), 30-36.

Murnane, R., Singer, J., Willett, J., Kemple, J., & Olsen, R. (Eds.). (1991). *Who will teach?: Policies that matter.* Cambridge, MA: Harvard University Press.

Ndahi,, H. B. & Ritz, J. M. (2003). Technology education teacher demand, 2002-2005. *The Technology Teacher*, 62(7), 27-31.

Osbrone, E. W., & Dyer, J. E. (2000). Attitudes of Illinois Agriscience Students and Their Parents Toward Agriculture and Agricultural Education Programs. *Journal of Agricultural Education*, 41(3), 50-59.

Paolillo, J. G. P. & Estes, R. W. (1982). An Empirical Analysis of Career Choice Factors among Accountants, Attorneys, Engineers, and Physicians. *The Accounting Review*, 57(4) 785-793.

Reed, P. A. (2002). Research in Technology Education: Back to the Future. *Journal of Technology Education*, 13(2), 68-72. Retrieved on November 9, 2011 from http://scholar.lib.vt.edu/ejournals/JTE/v13n2/pdf/reed.pdf

Reschke, W., & Knierim, K.H. (1987) How Parents Influence Career Choice. *Journal of Career Planning and Employment*, 47, 54-60.

Rickels, D. A., Councill, K. H., Fredrickson, W. E., Hairston, M. J., Porter, A. M., & Schmidt, M. (2009). Influences on Career Choice Among Music Education Audition Candidates: A Pilot Study. *Journal of Research in Music Education*, 57(4), 292-307. Retrieved on November 5, 2011 from http://jrm.sagepub.com/content/57/4/292

Ritz, J. M. (1999). Addressing the shortage of technology education teaching professionals: Everyone's business. *The Technology Teacher*, 59(1), 8-12

Rockland, R., Bloom, D. S., Carpinelli, J., Burr-Alexander, L., Hirsch L.S., & Kimmel, H. (2010). Advancing the "E" in K-12 STEM Education. *The Journal of Technology Studies*, 36(1). Retrieved on November 20, 2011 from http://scholar.lib.vt.edu/ejournals/JOTS/v36/v36n1/rockland.html

Rogers, G. E. (2002). Technology Education Doctoral Programs: Key Factors Influencing participation. *The Technology Teachers* – e. Retrieved November, 10, 2011, from http://www.iteaconnect.org/Publications/TTT articleindex5.htm

Rogers, G. E. (Editor). (2010). *Engineering & Technology Teacher Education Directory*. CTTE and ASTE (48th ed.). Retrieved October 11, 2011, from http://www.astemte.org/web/ETTE-Directory-2009-2010.pdf

Rogers, G. E. (Editor). (2011). *Engineering & Technology Teacher Education Directory*. CTTE and ASTE (49th ed.). Retrieved October 11, 2011, from http://www.astemte.org/web/ETTE-Directory-2010-2011.pdf

Rome S. H., (2003). Serving High-Risk Children: Recruiting Through Student Loan Forgiveness, *Children and Youth Services Review*. (25)10, 805-821. Retrieved October 25, 2011, from http://www.sciencedirect.com/science/article/pii/S019074090300080X

Scarcella, J. A. (2000, November). Perspective: Technology Education Marketing and Recruiting Strategies. *The Technology Teacher*. Retrieved October 2, 2011, from http://coe.csusb.edu/faculty/scarcella/marketing.pdf

Schleyer, T. K. L., & Forrest, J. L. (2000). Methods for the design and administration of web-based surveys. *Journal of the American Medical Informatics Association*. 7(4), 416–425.

Schmidt, K., & Custer R. L. (Eds.). (2005). *Industrial teacher education directory*. CTTE and NAITTE (43rd ed.). Normal, IL: Department of Technology, Illinois State University. Retrieved on October 1, 2011 from http://www.astemte.org/publications/directory/pastEditions.cfm

Schmidt, K., & Custer R. L. (Eds.). (2006). *Industrial teacher education directory*. CTTE and NAITTE (44th ed.). Normal, IL: Department of Technology, Illinois State University. Retrieved on October 1, 2011 from http://www.astemte.org/publications/directory/pastEditions.cfm

Schmidt, K., & Custer R. L. (Eds.). (2007). *Industrial teacher education directory*. CTTE and NAITTE (45th ed.). Normal, IL: Department of Technology, Illinois State University. Retrieved on October 1, 2011 from http://www.astemte.org/publications/directory/pastEditions.cfm

Starkweather, K. (1998). The International Technology Education Association (ITEA): A prominent voice for technology education. *The Journal of Technology Studies*, 24(2), 44-47. Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JOTS/Summer-Fall-1998/PDF/starkweather.pdf

Steinke, L. J., & Putnam, A. R. (2011). Mentoring Teachers in Technology Education: Analyzing the Need. *The Journal of Technology Studies*, (37)1 41-49. Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JOTS/v37/v37n1/pdf/steinke.pdf

Steinke, L. J., & Putnam, A. R. (2008). Influencing Technology Education Teachers to Accept Teaching Positions. *Journal of Industrial Teacher Education*, 45(2), 71-90. Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JITE/v45n2/pdf/steinke.pdf

Stroot, S. A., & Williamson, K. M. (1993). Issues and Themes of Socialization Into Physical Education. *Journal of Teaching in Physical Education*, 12, 337-343.

Su, J. Z. X. (1993). The study of the education of educators: A profile of teacher education students. *The Journal of Research and Development in Education*. 26(3), 125-132.

Teacher Training. (n.d.) *Funk & Wagnalls New World Encyclopedia*. Retrieved on July 4, 2012 from EBSCOhost

Volk, K. S. (1993). Enrollment Trends in Industrial Arts/Technology Teacher Education from 1970-1990. *Journal of Technology Education*, 4(2), 46-59.

Volk, K. S. (1997). Going, Going, Gone? Recent Trends in Technology Teacher Education Programs. *Journal of Technology Education*, 8(2), 66-70. Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JTE/v8n2/pdf/volk.pdf

Volk, K. S. (2000). Trends in U.S. Technology Teacher Education Programs Home Thoughts From Abroad. *Journal of Industrial Education*, 37(3), Retrieved October 11, 2011, from http://scholar.lib.vt.edu/ejournals/JITE/v37n3/volk.html

Wall, G.S. (Compiler). (1970). *Industrial teacher education directory*. (9th ed.). South Holland, IL: Goodheart-Wilcox.

Waugh, C.K. (Ed.). (2008). *Industrial teacher education directory*. CTTE and NAITTE (46th ed.). Carbondale, IL: Southern Illinois University. Retrieved on October 1, 2011 from http://www.astemte.org/publications/directory/pastEditions.cfm

Waugh, C. K. (Ed.). (2009). *Industrial teacher education directory*. CTTE and NAITTE (47th ed.). Carbondale, IL: Southern Illinois University. Retrieved on October 1, 2011 from http://www.astemte.org/publications/directory/pastEditions.cfm

Weston, S. (1997). Teacher Shortage-Supply and Demand. *The Technology Teacher*, 57(1), 6-9.

Wicklein, R. C. (1993). Identifying critical issues and problems in technology education using a modified-delphi technique. *Journal of Technology Education*, 5(1), 54-70.

Wicklein, R. C. (2004). Critical Issues and Problems in Technology Education. *Technology Teacher*, 64(4), 6-9. Retrieved on October 11, 2011 from EBSCOhost.

Wright, M. D., & Custer, R. L. (1998). Why They Want to Teach: Factors Influencing Students to Become Technology Education Teachers. *Journal of Technology Education*, 10(1), 58-70.

APPENDICES

Appendix A Request for Participation Letter

Date: September __, 2012

Dear Engineering/Technology Teacher Education Major:

I am requesting your assistance in completing my thesis research though Purdue University. Attached to this email is a web link to a 28 question survey related to experiences/perceptions in relation to recruitment of engineering/technology teachers in Indiana. The survey should take you no more than 10 minutes to complete.

Here is the link: https://www.surveymonkey.com/_____

This survey contains a series of questions about experiences/perceptions in relation to recruitment engineering/technology teachers, plus a short demographic section. Please complete the survey by _____. All response will be anonymous.

If you have any questions about this research project, you can contact me at traves@purdue.edu or Dr. George Rogers at (765) 494-1092 or rogersg@purdue.edu. If you have concerns about the treatment of research participants, you can contact the Committee on the Use of Human Research Subjects at Purdue University, 155 South Grant Street, Ernest C. Young Hall, Room 1032, West Lafayette, IN 47907-2114. The phone number for the Committee's secretary is (765) 494-5942. The email address is irb@purdue.edu.

Thank you in advance for assisting with this research project and for the professional growth of the teaching profession in Indiana.

Sincerely,

Traves Freeland
Graduate Student

George E. Rogers, Ed.D., DTE
Professor/Primary Investigator

Appendix B Request for Participation Two Week Follow-up

Date: September __, 2012

Dear Engineering/Technology Teacher Education Major:

I am requesting your assistance in completing my thesis research though Purdue University. If you have already completed this survey, thank you for taking the time to do so. For those who have not yet completed this survey, I would ask that you please consider setting 10 minutes aside right now to complete the survey. From one professional to another it would be very much appreciated for you to participate in furthering the research in our profession.

Attached to this email is a web link to a 28 question survey related to experiences/perceptions in relation to recruitment of engineering/technology teachers in Indiana. The survey should take you no more than 10 minutes to complete.

Here is the link: https://www.surveymonkey.com/_____

This survey contains a series of questions about experiences/perceptions in relation to recruitment engineering/technology teachers, plus a short demographic section. Please complete the survey by _____. All response will be anonymous.

If you have any questions about this research project, you can contact me at traves@purdue.edu or Dr. George Rogers at (765) 494-1092 or rogersg@purdue.edu. If you have concerns about the treatment of research participants, you can contact the Committee on the Use of Human Research Subjects at Purdue University, 155 South Grant Street, Ernest C. Young Hall, Room 1032, West Lafayette, IN 47907-2114. The phone number for the Committee's secretary is (765) 494-5942. The email address is irb@purdue.edu.

Thank you in advance for assisting with this research project and for the professional growth of the teaching profession in Indiana.

Sincerely,

Traves Freeland
Graduate Student

George E. Rogers, Ed.D., DTE
Professor/Primary Investigator

Appendix C Survey Tool

Engineering/Technology Teacher Education Recruitment Survey

Exit this survey

1. Section I - Demographic Information

Please indicate which of the following best describes your demographic information.

*** 1. What is your current class standing?**

- Freshman
- Sophomore
- Junior
- Senior
- Graduate Student

*** 2. What is your current age?**

- 18 - 20
- 21 - 23
- 24 - 26
- over 26

*** 3. What is your gender?**

- Male
- Female

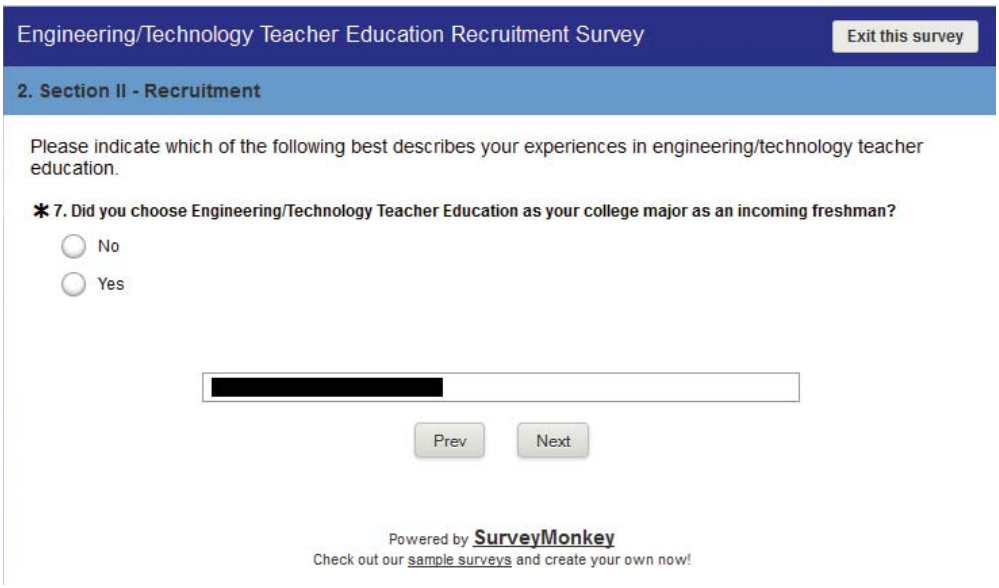
*** 4. How do you define your ethnicity?**

- African American
- Asian American
- Caucasian
- Hispanic American
- Other (please specify)

*** 5. Please list the primary occupation of your father or male guardian on the line below.**

*** 6. Please list the occupation of your mother or female guardian on the line below.**

Next



Engineering/Technology Teacher Education Recruitment Survey

Exit this survey

2. Section II - Recruitment

Please indicate which of the following best describes your experiences in engineering/technology teacher education.

* 7. Did you choose Engineering/Technology Teacher Education as your college major as an incoming freshman?

- No
- Yes

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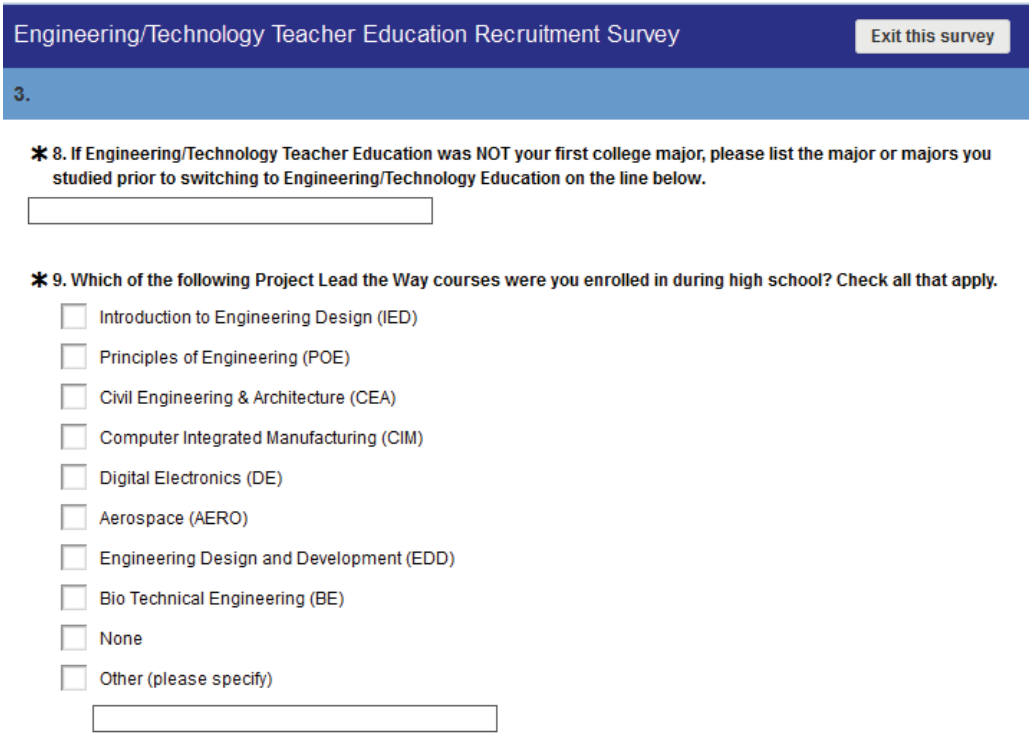

Engineering/Technology Teacher Education Recruitment Survey

Exit this survey

3.

* 8. If Engineering/Technology Teacher Education was NOT your first college major, please list the major or majors you studied prior to switching to Engineering/Technology Education on the line below.

* 9. Which of the following Project Lead the Way courses were you enrolled in during high school? Check all that apply.

- Introduction to Engineering Design (IED)
- Principles of Engineering (POE)
- Civil Engineering & Architecture (CEA)
- Computer Integrated Manufacturing (CIM)
- Digital Electronics (DE)
- Aerospace (AERO)
- Engineering Design and Development (EDD)
- Bio Technical Engineering (BE)
- None
- Other (please specify)

✱ **10. Which of the following Technology Education courses were you enrolled in during high school? Check all that apply.**

- [ ] Communications
- [ ] Manufacturing
- [ ] Construction
- [ ] Transportation/Power and Energy
- [ ] Bio Technology
- [ ] Engineering
- [ ] Drafting/CAD
- [ ] None
- [ ] Other (please specify)

✱ **11. Which of the following extra-curricular or course related activities did you participate in during middle school and/or high school? Please check all that apply.**

- [ ] Sports
- [ ] FIRST Robotics
- [ ] LEGO League
- [ ] Super High Mileage Challenge/Solar Vehicle Challenge
- [ ] Boys Club/Girls Club/YMCA/YWCA
- [ ] 4-H
- [ ] Scouting (Boy Scouts, Eagle Scouts, or Girl Scouts)
- [ ] Technology Student Assocation (TSA)
- [ ] Future Farmer of America (FFA)
- [ ] Skills USA
- [ ] Academic Teams (BETA Club, Spell Bowl, Quiz Bowl)
- [ ] None
- [ ] Other (please specify)

Prev Next

Engineering/Technology Teacher Education Recruitment Survey

Exit this survey

4.

Please indicate, by checking the appropriate box below, to what degree each of the following items influenced your decision to become an Engineering/Technology Education Teacher.

*** 12. Which factors influenced you to pursue this major?**

	Absolutely No Influence	Somewhat Influenced	Influenced	Strongly Influenced
Visit to my high school from the university	○	○	○	○
University faculty	○	○	○	○
Mass media (recruitment videos, flyers, and/or pamphlets)	○	○	○	○
University Engineering/Technology Teacher Education web site	○	○	○	○
Information about the major from a student who was majoring in engineering/technology teacher education	○	○	○	○
Past experiences in technology education courses	○	○	○	○
Past experiences in technology education extra-curricular or co-curricular activities. TSA, FIRST Robotics, LEGO League, Skills USA, etc.	○	○	○	○
High school or middle school teacher	○	○	○	○
High school principal	○	○	○	○
High school guidance counselor	○	○	○	○
Athletic coach	○	○	○	○
High school friend	○	○	○	○
College friend	○	○	○	○
Parents/Guardians	○	○	○	○
Brother or Sister	○	○	○	○
Relatives who are not my parents or sibling	○	○	○	○
Personal interests or hobbies	○	○	○	○

Other (please specify)

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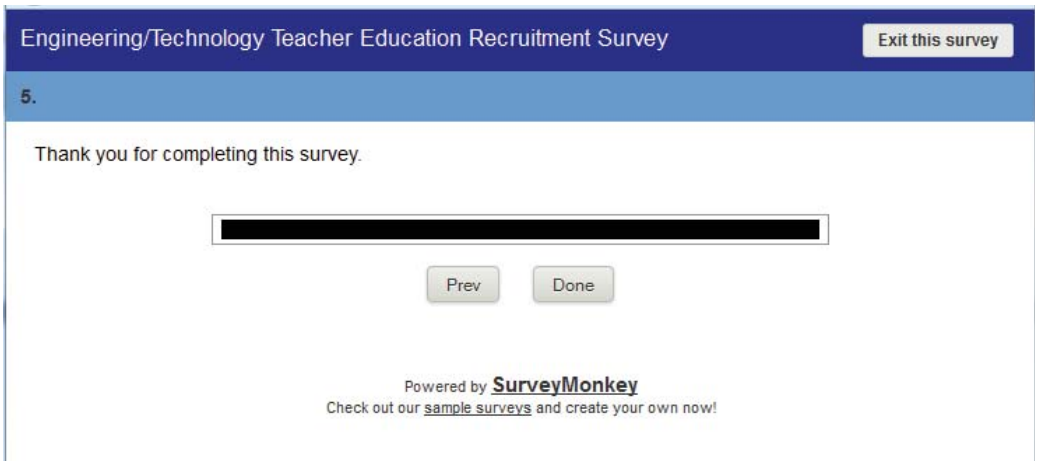
Engineering/Technology Teacher Education Recruitment Survey
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5.
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Appendix D IRB Approval

PURDUE
UNIVERSITY

HUMAN RESEARCH PROTECTION PROGRAM
INSTITUTIONAL REVIEW BOARDS

To:	GEORGE ROGERS KNOY 367
From:	JEANNIE DICLEMENTI, Chair Social Science IRB
Date:	10/19/2012
Committee Action:	Exemption Granted
IRB Action Date:	10/18/2012
IRB Protocol #:	1210012755
Study Title:	WHY DO INDIANA PRE-SERVICE TECHNOLOGY TEACHER EDUCATION MAJORS CHOOSE T

The Institutional Review Board (IRB) has reviewed the above-referenced study application and has determined that it meets the criteria for exemption under 45 CFR 46.101(b)(2) .

If you wish to make changes to this study, please refer to our guidance "Minor Changes Not Requiring Review" located on our website at http://www.irb.purdue.edu/policies.php. For changes requiring IRB review, please submit an Amendment to Approved Study form or Personnel Amendment to Study form, whichever is applicable, located on the forms page of our website www.irb.purdue.edu/forms.php. Please contact our office if you have any questions.

Below is a list of best practices that we request you use when conducting your research. The list contains both general items as well as those specific to the different exemption categories.

General

- To recruit from Purdue University classrooms, the instructor and all others associated with conduct of the course (e.g., teaching assistants) must not be present during announcement of the research opportunity or any recruitment activity. This may be accomplished by announcing, in advance, that class will either start later than usual or end earlier than usual so this activity may occur. It should be emphasized that attendance at the announcement and recruitment are voluntary and the student's attendance and enrollment decision will not be shared with those administering the course.
- If students earn extra credit towards their course grade through participation in a research project conducted by someone other than the course instructor(s), such as in the example above, the students participation should only be shared with the course instructor(s) at the end of the semester. Additionally, instructors who allow extra credit to be earned through participation in research must also provide an opportunity for students to earn comparable extra credit through a non-research activity requiring an amount of time and effort comparable to the research option.
- When conducting human subjects research at a non-Purdue college/university, investigators are urged to contact that institution's IRB to determine requirements for conducting research at that institution.
- When human subjects research will be conducted in schools or places of business, investigators must obtain written permission from an appropriate authority within the organization. If the written permission was not submitted with the study application at the time of IRB review (e.g., the school would not issue the letter without

proof of IRB approval, etc.), the investigator must submit the written permission to the IRB prior to engaging in the research activities (e.g., recruitment, study procedures, etc.). This is an institutional requirement.

Category 1

- When human subjects research will be conducted in schools or places of business, investigators must obtain written permission from an appropriate authority within the organization. If the written permission was not submitted with the study application at the time of IRB review (e.g., the school would not issue the letter without proof of IRB approval, etc.), the investigator must submit the written permission to the IRB prior to engaging in the research activities (e.g., recruitment, study procedures, etc.). This is an institutional requirement.

Categories 2 and 3

- Surveys and questionnaires should indicate
  - only participants 18 years of age and over are eligible to participate in the research; and
  - that participation is voluntary; and
  - that any questions may be skipped; and
  - include the investigator's name and contact information.
- Investigators should explain to participants the amount of time required to participate. Additionally, they should explain to participants how confidentiality will be maintained or if it will not be maintained.
- When conducting focus group research, investigators cannot guarantee that all participants in the focus group will maintain the confidentiality of other group participants. The investigator should make participants aware of this potential for breach of confidentiality.
- When human subjects research will be conducted in schools or places of business, investigators must obtain written permission from an appropriate authority within the organization. If the written permission was not submitted with the study application at the time of IRB review (e.g., the school would not issue the letter without proof of IRB approval, etc.), the investigator must submit the written permission to the IRB prior to engaging in the research activities (e.g., recruitment, study procedures, etc.). This is an institutional requirement.

Category 6

- Surveys and data collection instruments should note that participation is voluntary.
- Surveys and data collection instruments should note that participants may skip any questions.
- When taste testing foods which are highly allergenic (e.g., peanuts, milk, etc.) investigators should disclose the possibility of a reaction to potential subjects.

Ernest C. Young Hall, 10th Floor - 155 S. Grant St. - West Lafayette, IN 47907-2114 - (765) 494-5942 - Fax: (765) 494-9911