An investigation of alumni perceptions of the Industrial Technology undergraduate program at Mississippi State University and its transferability to industry

Heshium Lawrence

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AN INVESTIGATION OF ALUMNI PERCEPTIONS OF THE INDUSTRIAL TECHNOLOGY UNDERGRADUATE PROGRAM AT MISSISSIPPI STATE UNIVERSITY AND ITS TRANSFERABILITY TO INDUSTRY

By
Heshium Lawrence

A Dissertation
Submitted to the Faculty of
of Mississippi State University
in Partial Fulfillment of Requirements
for the Degree of Doctor of Philosophy
in Education
in the Department of Instructional Systems and Workforce Development

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AN INVESTIGATION OF ALUMNI PERCEPTIONS OF THE INDUSTRIAL
TECHNOLOGY UNDERGRADUATE PROGRAM AT MISSISSIPPI
STATE UNIVERSITY AND ITS TRANSFERABILITY
TO INDUSTRY

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Industries have changed over the years and the necessary skills required for a person to obtain a position in industry have become more challenging. This study examined alumni perceptions regarding the Industrial Technology program at Mississippi State University and expanded on the literature that is currently available as there is limited information and literature regarding the perception of how alumni view the transferability of knowledge and skills gained in Industrial Technology programs to industry. Information on alumni perception’s of their skills and knowledge gained would add pertinent facts to the limited research that is currently being published. There were 35 alumni participants, ranging in age from 23 to 41.

The study used several questions to guide the study of alumni perceptions of the Industrial Technology program at Mississippi State University. What are the alumni perceptions of the transferability of the skills acquired from their Industrial Technology program to industry? What are alumni perceptions of the support services provided in the
Industrial Technology program? Does a relationship exist between alumni perceptions of the Industrial Technology program and various demographic characteristics? Do differences exist between alumni who have gained employment in the field of Industrial Technology and those who did not gain employment in Industrial Technology related jobs? The research design was a survey that was a questionnaire adapted from Latif and Sutton’s (2001) questionnaire as well as Zargari and Hayes’ (2001) questionnaires. Descriptive statistics, inferential statistics, simple frequency distribution and percentages were used to analyze data and to interpret the perceptions of the alumni.

Overall, the alumni perceptions of the program were positive and their perceptions also showed that the program met their need to obtain and maintain employment. Over 80% of the alumni perceived that the support services met their needs through advisement, instruction and facilities. Based on the results of this research, alumni have been very useful in identifying the perceptions of the Industrial Technology program at Mississippi State University.
DEDICATION

I would like to dedicate this research to my twin brother, Hekemia, who has influenced me in more ways than one with his endurance, persistence and unconventional words of wisdom. I would also like to dedicate this endeavor to my grandmothers, Rose Ann Young and Nadine Lawrence, who did not live long enough to see me complete this process. Their influential teachings about God and faith have allowed me to walk by faith while completing this dissertation. To my mother, Janice Lawrence, who always told me to “burn the midnight oil” and “put God first”, she has encouraged me and guided me through her life experiences. To my father, Edward Lawrence, who has always told me that you “have to get through Monday before you get to Tuesday”, you have truly been a blessing to me and a man that I hope one day to become. I would also like to dedicate this dissertation to my older brother, Anthony and my “lil” sister, Kywaii. I guess now I can tell you both that I have always looked up to you all for guidance and just the right words to get me thinking. To all of my cousins that I have pulled to the side and gave words of wisdom and encouragement to, this goes to show you that just because someone says that you cannot succeed at something does not mean that they are correct. You have to want it. This dissertation is dedicated to the Boulder family. Their diligent words of wisdom and countless hours of dealing with me while in school will always stay
with me and I look forward to several more conversations and meetings. To my wife, my soul mate, my rock and my confidant, your gentleness has cushioned me several times during this process. You are inspirational in more ways than you could ever imagine and I hope to one day return that inspiration. To Marita, my daughter, your laughter has brightened up my day every time I got down and your ability to make me smile is priceless.
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CHAPTER I
INTRODUCTION

According to Foster (1995), Lois Coffey Mossman and Frederic Gordon Bonser had the “greatest influence on the origins of what is now known as technology education” (para. 2) in the United States and presumed Technology education to have been founded in the early 20th Century as Industrial Arts.

However, historic roots date Industrial Technology back much further and according to Pullias (1992), “blinders are going to have to be removed and educators are going to have to accept the fact that technology education is something totally new. Technology education is not a remake of industrial arts…” (pg. 4).

The beginnings of Industrial Arts evolved from the term manual training. Calvin Woodward (Miller & Smalley, 1963) established the St. Louis Manual Training School in 1870 (Coates, 1923) to be a place where students could benefit from practical experience as a part of their education. Manual training had a threefold purpose, which according to Gerbracht & Babcock (1969) included “keeping boys in school,” “providing vocational skills,” and “developing leisure-time interests” (p. 8) and later evolved to include instruction in the fundamental principles, processes, and materials of industry.

However, despite the pragmatic need for manual training, these early programs received criticism from practitioners. Bonser and Mossman (1923) criticized manual
training for not providing students with academic support, not addressing learning styles, not providing the necessary skills applicable to the work place, and discouraging initiative and creativity and instead focusing on the end product that the student was producing regardless of whether the student actually understood the course content.

After observing these characteristics of manual training Bonser and Mossman developed an in-depth system of industrial education in the early 20th Century which was implemented on a very small scale; however, this system later became the “foundation for industrial education in the United States and has been the theoretical basis for over 70 years” (Foster, 1994, 1995, 1997).

Some of the problems that faced industrial education in the early 20th Century resulted from internal disagreement as to whether industrial education should adhered to a more general educational curriculum or a vocational educational curriculum. A general education curriculum refers to the process or art of communicating knowledge, skill, and judgment, in which education is defined as “the study of knowledge organized and classified into subject-matter disciplines” (Levine & Ornstein, 2006, p.101). These subject-matter disciplines include but are not limited to academics such as reading, writing, arithmetic, history or science. In contrast, a vocational educational curriculum was designed for learners looking for careers that were traditionally non-academic in nature. Educators, such as Butts (1955) and Dewey expressed disagreement that education was lacking in its duties if it did not give students a practical training for a real life job and for a way to earn a living. It was only after Bonser and Mossman’s work began to be widely published in pamphlets that interest in manual training began to
transcend to a new educational trend, Industrial Arts, which encouraged students to be more engaged in their work.

The Progressive Education Association in 1918 led to an increase in a “learning by doing approach” (Butts, 1955, p. 574), specifically in Industrial Arts. Progressive education involved two essential elements: 1) respect for each individual’s own abilities and 2) the development of socially engaged intelligence. John Dewey and with other educators such as Francis W. Parker and Ella Flagg Young shared these ideas that helped form The Progressive Education Association. This association opposed a movement attempting to detach academic education for the minority and constricted vocational training. The Progressive Education Association’s teaching philosophy entailed students having a practical approach to learning and experiencing learning naturally as opposed to the normal structured classroom. In addition, teachers used a constructivist approach, which involves process-oriented practical learning and enabling students to socially interact (Levine and Ornstein, 2006).

Industrial Arts may seem to be a progeny of manual training, but that was not the case; it was actually a reaction against manual training. Industrial Arts focused on the idea that students needed to learn about technologies of the home and of commercial industry to understand the increasingly technological world, while manual training focused on the idea that students needed to only understand the end result, which was the product. In the late 20th Century, educationalists like Foster (1995) and Butts (1955) saw the need for students to be practical with their hands and stressed the importance of including hands-on learning activities in school courses. In addition to combining the
school’s practical work with the traditional curriculum, the Industrial Arts curriculum was modified so that students would have to design their own projects in classrooms that required them to complete projects as part of the coursework (Foster, 1995).

In 1908, Coffey (1909) created the first “general shop” which promoted students gaining work experiences in shop work, drawing, and home economics. The combination of manual training, drawing, and home economics led to the development of “Industrial Arts,” a term that began to be used in the early 20th Century. The concept of “general shop” had great success and sparked interest throughout the educational field. Due to this recognition, a definition was initiated: “Industrial Arts is a study of the changes made by men in the forms of material to increase their values, and of the problems of life related to these changes” (Bonser & Mossman, 1923, p. 5). This definition allowed educators to understand the concept of Industrial Arts and asserted that this definition was widely used in the history of Industrial Arts (Brown 1977). Unlike vocational schools, Industrial Arts programs were inclusive, covering a broad range of skills rather than a specific vocational activity. In essence, Industrial Arts became an educational agenda, focusing on the fabrication of objects or useful equipment by wood and/or metal using an assortment of hand, power, or machine tools, allowing Industrial Arts programs to become varied and widespread.

During the 20th Century industrial education programs were designed to prepare secondary school Industrial Arts teachers to take on real world jobs. However, the Industrial Arts program did not provide these teachers needed knowledge such as management skills, to succeed in managerial positions. This was the beginning of what is
now known as Industrial Technology. The shifting of industrial jobs toward a more managerial background dictated a need for a shift in programs and while Industrial Arts programs concentrated on technology and psychology, Industrial Technology programs united technology and management.

Over the past 50 years Industrial Technology has developed from programs in Industrial Arts and vocational trade teacher education to programs in Industrial Technology (Strong, Kassapoglou, Dugger, & Rudisill, 1999). In 1967, the National Association of Industrial Technology (NAIT) was created, and received approval from the United States Department of Education (USDE) to be the accrediting agency for Industrial Technology (Minty, 2004), later to become known as the Association of Technology, Management and Applied Engineering (ATMAE) in 2009. It was formed to guide the continuing development of a new field that prepares graduates for positions in industrial settings and to encourage the improvement of Industrial Technology curricula in institutions of higher education by providing guidance, development and leadership. This specialized attention to the development of content, faculty, and facilities has led to the founding of an official definition that identifies Industrial Technology as “a field of study designed to prepare technical and/or management oriented professionals for employment in business, industry, education, and government” (NAIT, 1997, p. 1). The Industrial Technology curriculum is designed for students “who want to prepare for employment leading to supervisory and management positions in the production or logistics areas of industry” (Mississippi State University, 2009).
The Impact of Industrial Technology

The impact that technology had on industrial productivity and the sudden growth of the use of technology became apparent during the post World War II period. “The demand for professional industrial personnel with higher education, technical application skills, and leadership qualities increased as engineering programs offered less laboratory application courses” (Keith & Talbott, 1991, Historical Development section, para. 1). With technology and engineering programs offering fewer “real world” courses, Industrial Technology began to define itself even more. With the success of the first Industrial Technology four-year baccalaureate programs, curriculum standards were developed and these standards applied through an accreditation program. In 1965, the objectives of Industrial Technology were discussed at the first national meeting, which was chaired by Dr. Charles W. Keith, coordinator of the Industrial Technology program at Kent State University. This meeting set the stage for the enduring development of the discipline of Industrial Technology.

Statement of the Problem

In order to ensure that students in Industrial Technology programs meet industry standards when they apply for various jobs skills of alumni entering the workforce must be determined. As educational policies and standards of accountability change for alumni entering the workforce, Industrial Technology programs must be able to provide their alumni with the required skills and knowledge needed to gain as well as maintain employment. The problem is that there is limited information and literature regarding the
perception of how alumni view the transferability of knowledge and skills gained in Industrial Technology programs to industry. Information on alumni perception of the skills and knowledge gained add pertinent facts to the limited literature in this area.

**Purpose of the Study**

The purpose of the study was to determine how alumni of a 4-year college in Industrial Technology perceived the curriculum program and how they assessed the transferability of the skills acquired into the workplace. Specifically, the study examined the perceptions of alumni in the Industrial Technology program at Mississippi State University and their perceptions of the adequacy of the connection to workplace industrial requirements. Research has concentrated on the quality of the Industrial Technology programs and perceptions of the faculty and not on the perceptions of the alumnus.

**Research Questions**

The following research questions were developed to guide the study:

1. What are the alumni perceptions of the transferability of the skills acquired from their Industrial Technology program to industry?
2. What are alumni perceptions of the support services provided in the Industrial Technology program?
3. Does a relationship exist between alumni perceptions of the Industrial Technology program and various demographic characteristics?
4. Do differences exist between alumnus who have gained employment in the field of Industrial Technology and those who did not gain employment in Industrial Technology related jobs?

**Significance of the Study**

The significance of this study was to gain a better understanding of the curriculum of Industrial Technology at Mississippi State University and how the knowledge gained from the curriculum transfers to those alumnus obtaining and maintaining a job. This study may also assist current and future faculty in establishing the Industrial Technology (INDT) program at Mississippi State University in the quest to become a NAIT accredited program. This assistance is needed because the National Association of Industrial Technology’s accreditation guidelines require systematic studies be conducted on the performance of Industrial Technology graduates. According to the Industrial Technology Accreditation Handbook (2009), “The advancement of Industrial Technology graduates within organizations shall be tracked to ensure advancement to positions of increasing responsibility . . . Follow-up studies of graduates should be conducted every two to five years” (pgs. 18-19). Furthermore, the study contributed information in determining if the program meets NAIT standards and provided data for program improvement.
Delimitations of the Study

The study was bounded by the 35 participants that were undergraduates in the Industrial Technology program between the years 2000-2007 and the data was obtained in the fall of 2008.

Limitations of the Study

The study was limited by the following:

1. The participants were volunteer participants in the research.
2. The findings of this study were generalized to the 35 participants.
3. The findings of this study were limited to the validity and reliability of the questionnaire.
4. The participant volunteers were not uniform across concentration areas.
5. The findings of this study were limited to the thoroughness and sincerity of the participants completing the questionnaire.

Definition of Terms

The following definitions are technical in nature to this study, and are subject to multiple interpretations. They are defined below:

- Alumni- is “a person who has attended or has graduated from a particular school, college, or university” (Merriam-Webster’s Collegiate Dictionary, 2005)
- Curriculum- the planned learning experiences provide through pedagogy of subjects taught at an educational institution, or the elements taught in a particular subject (Levine & Ornstein, 2006)
- Perception- defined as “the process people use to attach meaning to stimuli” (Eggen & Kauchak, 2004, p. 250).

- Industrial arts- a study of the changes made by man in the forms of material to increase their values, and of the problems of life related to these changes” (Bonser & Mossman, 1923, p. 5)

- Industrial technology- “a field of study designed to prepare technical and/or management oriented professionals for employment in business, industry, education, and government” (NAIT, 1997, p. 1). Industrial Technology “is primarily involved with the management, operation, and maintenance of complex technological systems” (Michigan Tech, School of Technology, n.d.).

- Support systems- “a network of personal or professional contacts, as well as equipment available to a person or organization for practical or moral support when needed” (The American Heritage Dictionary of the English Language, 2000).
CHAPTER II
REVIEW OF LITERATURE

Introduction

This chapter contains a review of literature relevant to this study. However, due to there being a lack of literature directly related to the researcher’s research questions, the review of literature covered an array of other literature relating to the perception of Industrial Technology and its impact on its transferability to industry. The researcher used this study to narrow that literature gap pertaining to the field of Industrial Technology. The chapter was organized into 8 sections including: historical perspective of Industrial Technology, research in Industrial Technology, The National Association of Industrial Technology (NAIT), Industrial Technology in other countries, quality of Industrial Technology programs, curriculum factors in regards to Industrial Technology, gender issues in Industrial Technology, and finally a summary of all these areas.

Historical Perspective of Industrial Technology

"The function of the historian is neither to love the past nor to emancipate himself from the past, but to master and understand it as the key to the understanding of the present." (Carr, n.d.). Carr’s quotation is the ideal definition of how education has played its role in the development of technology education. If one does not understand where
one came from, or, where a certain concept came from then one can not fully understand or appreciate the future. The advent of technology education was traced back to Lois Coffey Mossman and Frederic Gordon Bonser who had the “greatest influence on the origins of what is now known as technology education” (Foster, 1995). Technology was defined in the Merriam-Webster dictionary as “…the study, development, and application of devices, machines, and techniques for manufacturing and productive processes” (Merriam-Webster’s Collegiate Dictionary, 2005). DeVore (1980) defined technology as “…the study of the creation and utilization of adaptive systems including tools, machines, materials, techniques, and technical means and the relation of the behavior of these elements and systems to human beings, society, and the civilization process” (p. 4).

Technology education in the United States was presumed to have been founded in the early twentieth century as *industrial arts* but there are historic roots that date the field back much further than that.

According to Cunningham (1969), the first “recognizable technical education programs did not appear until the last decade of the nineteenth century” and there were only two schools that had the programs, “Pratt Institute in 1895 and Bradley Polytechnic Institute in 1897” (pp.27-28). The curriculum of technology education was “designed to meet the needs of mature students who planned to enter industrial employment after graduation” (Cunningham, 1969, p. 28). It is interesting to note that during the period of mechanization, which was during the late 1800’s to the mid 1950’s, technology programs existed in only six institutions of higher education which were Bradley University,

The concept of Industrial Arts was conceived from technology education and evolved from the term manual training which was not “introduced into this country until 1880” (Sotzin, 1961, p. 3). Calvin Woodward, the “father of manual training” (Miller & Smalley, 1963, p. 20), established the famous St. Louis Manual Training School (Coates, 1923). Prior to Woodward establishing the St. Louis Manual Training School, he opened the country’s first manual training high school in 1880. It was known as “The Manual Training School of Washington University” (Olson, 1963, p. 2-3). Manual training was fairly new to the country so Woodward gave this description of what manual training is and is not in 1886:

The object of the introduction of manual training is not to make mechanics. I have said that many times, and I find continued need of repeating the statement. We teach banking, not because we expect our pupils to become bankers; and we teach drawing, not because we expect trained architects or artists or engineers; and we teach the use of tools, the properties of materials, and the methods of the arts, not because we expect our boys to become artisans. We teach them the United States Constitution and some of the Acts of Congress not because we expect them all to become congressmen. But we do expect that our boys will at least have something to do with bankers, and architects, and artists, and engineers, and artisans; and we expect all to become good citizens. Our great object is educational: other objects are secondary. That industrial results will surely
follow, I have not the least doubt; but they will take care of themselves. Just as a love for the beautiful follows a love for the true and as the high arts cannot thrive except on the firm foundation of the low ones, so a higher and finer development of all industrial standards is sure to follow a rational study of the underlying principles and methods. Every object of attention put into the schoolroom should be put there for two reasons—one educational, the other economic. Training, culture, skill come first; knowledge about persons, things, places, customs, tools, methods comes second. It is only by securing both objects that the pupil gains the great prize, which is power to deal successfully with the men, things, and activities which surround him (p. 229).

Woodward believed that the skills the students acquired would help them deal with people, places, and things. Manual training had a threefold purpose in the nineteenth century, its objectives included “keeping boys in school”, “provide vocational skills,” and “develop leisure-time interests” (Gerbracht & Babcock, 1969, p. 8). Manual training later evolved to include objectives which incorporated instruction in the fundamental principles, processes and materials of industry. Over the years Americans began to take a “learning by doing approach” (Butts, 1955, p. 574) and manual training began to take some criticism. It was stated that manual training was too official, too unyielding, and not truly liberal because it “confined the pupil to exercises in narrow fields and ignored relationships with the sciences” (Olson, 1963, p. 3). Bonser and Mossman (1923) listed several components of manual training which they criticized by
investigating the courses proposed and taught in their schools. The following shows these prominent inadequacies in manual training (Bonser & Mossman, 1923, p.479):

- Want of relationship of the work to life. The sequence of the models was in terms of tool processes.
- Failure to provide for the individuality of the child. Each must conform to the system.
- Lack of motivation. The work was all prescribed in a fixed course.
- Placing the emphasis upon the product as the objective, rather than upon the growth of the child.

The list looked at the fact that manual training did not provide support for the work that the students were being asked to do. There was no relevance to what they were doing. There was no structure for the child to express themselves on an individual basis and not only did manual training discourage initiative but it also focused on the product that the child was producing instead of whether the child actually understood what he/she was doing. In addition, the students only developed skills, got graded for their work and then tossed it away. Manual training, in essence, only taught tool use only. Their observation of manual training initiated them to develop a detailed system of industrial education which, at that time was only implemented on a smaller scale. Their detailed system became the “foundation for industrial education in the United States and has been the theoretical basis for over 70 years” (Foster, 1994, 1995, 1997). Manual training phased out to manual arts, which “indicates the content of several subjects which are included in a division of the school dealing with industrial work” (Crawshaw & Varnum,
1918, p. 5). The concept of manual arts influenced the development of other forms of industrial education but was short lived; Industrial Arts was the third influence of technology education. In 1934, Collicott and Skinner wrote:

Industrial Arts has had its greatest development on secondary schools levels. Here it has passed through two somewhat well-defined periods of professional growth and is now in the midst of a third. The first was “manual training,” where the emphasis was on hand skill, chiefly in woodworking. The second was “manual arts,” where the emphasis while still on skill, was extended to include the making of both useful and well-designed articles. The third is now “Industrial Arts,” where the intent is to include all of the old that was good, but to broaden out from the limitation of an emphasis upon manual skill alone to an enriched conception where more of the child’s interests and environment, and certainly many of the other school subjects, are involved. (State Committee on Coordination and Development, 1934, p. 5)

Industrial Arts was a product of the progressive movement, which echoed the learning by doing approach. The progressive education movement revealed weaknesses in the existing public school program. The emphasis that was placed on the subject matter in Industrial Arts was so evident that the student was not considered an individual and was given no consideration. According to Luetkemeyer (1968), he [student] was thought qualified to attend public school only if he were capable of fitting a rigid, formalized set of educational standards (p. 19). This emphasized the focus of subject matter and not the student. Subject-matter disciplines include but are not limited to
academics such as reading, writing, arithmetic, history or science. John Dewey, William Kilpatrick and Francis Parker along with other educators, wanted students to have a more practical approach to learning. Dewey and other educators, who were against traditional schooling, formed The Progressive Education Association in the early twentieth century to change the normal structured classroom and divert from the subject matter curriculum to a curriculum that used activities, experiences, problem solving, and projects to stimulate the mind (Levine and Ornstein, 2006, p. 114).

Industrial Arts having been influenced by manual training and the progressive movement focused its content on both the student and the subject matter. Industrial Arts is “an aspect of general education concerned with satisfying man’s innate desire to construct projects with tools and materials.” (Sotzin, 1961, p. 4). General education refers to the process or art of communicating knowledge, skill and judgment. The term and concept of Industrial Arts did not get is recognition until Frederick Bonser, in 1909 issued a pamphlet entitled Industrial Education, which outlined the “social-industry theory” of Industrial Arts. “Industrial arts is a study of the changes made by man in the forms of material to increase their values, and of the problems of life related to these changes (Bonser & Mossman, 1923, p. 5)”. Industrial Arts programs covered a broad range of skills rather than a specific activity. In essence, Industrial Arts was an educational agenda which focused on the fabrication of objects or useful equipment by wood and/or metal using an assortment of hand, power, or machine tools. This agenda was very useful and Industrial Arts programs became very abundant. The aim and purposes of Industrial Arts according to Sotzin (1961) was that the pupil should:
1. Gain knowledge of industry and industrial processes through which man changes material to improve his daily living, his health, and increase his wealth, comfort and enjoyment.

2. Grow an appreciation of the influence of industrial products and industrialization upon social and economic life. The pupil grows an appreciation of good design and good workmanship in construction of industrial products.

3. Increase his ability in using tools, machines, and materials to construct objects which enrich personal and group living.

4. Develop attitudes and appreciations which lead to sound safety practices in the school, in the home, and in everyday living.

The aims and purposes of Industrial Arts was for the student to acquire an understanding of the industrial field in which man uses those materials to improve his/her daily life. In acquiring that understanding, the student would appreciate the influence that industry has on his/her life. Since Industrial Arts is a hands-on curriculum area, the student would learn how to use those tools that would help and aid in constructing objects that improve his/her living conditions as well as build up an understanding about safety that can be applied to social development.

In the fall of 1957 America took a blow to its national pride, when Russia launched its first Sputnik into orbit. This blow not only impacted top government agencies but affected the school systems. It was the fact that the Russians were the first to accomplish such a task that lead to “an outcry that our schools were lagging behind
those in Russia, as they had produced better scientists.” (Sotzin, 1961, p. 8). American educators began to look at its educational policies and standards. This was evident by the subsequent list of objectives developed by a national committee to improve standards in Industrial Arts instruction: (A guide to Improving Instruction in Industrial Arts, 1953)

1. Interest in industry-to develop in each pupil an active interest in industrial life and in the methods and problems of production and exchange.

2. Appreciation and use-to develop in each pupil the appreciation of good design and workmanship and the ability to select, care for, and use industrial products wisely.

3. Self-realization and Initiative-to develop in each pupil the habits of self-reliance and resourcefulness in meeting practical situations.

4. Cooperative Attitudes-to develop in each pupil a readiness to assist others and to join happily in group undertakings.

5. Health and Safety-to develop in each pupil desirable attitudes and practices with respect to health and safety.

6. Interest in Achievement-to develop in each pupil a feeling of pride in his ability to do useful things and to develop worth-while leisure-time interests.

7. Orderly Performance-to develop in each pupil the habit of an orderly, complete, and efficient performance of any task.

8. Drawing and Design-to develop in each pupil an understanding of drawings and the ability to express ideas by means of drawing.
9. Shop skill and Knowledge-to develop in each pupil a measure of skill in the use of common tools and machines and an understanding of the problems involved in common types of construction and repair. (p.18).

Although these objectives aided in the improvement of the standards in Industrial Arts instruction, there were several problems which encumbered the realization of these objectives. These problems ranged from “the rapid development of new scientific principles, their application to industry, their implication and translation into shop and laboratory experiences” and “the unusual stress being placed on academic subject matter at the expense of manipulative activities” to “the need for improved methods of recruitment, in order to attract to the profession more young men with mechanical aptitude, technical interest and superior academic ability” and “the need for a periodic review of the college undergraduate programs in Industrial Arts teacher education and a clarification and improvement of the graduate program.” (Sotzin, 1961, pp. 11-12). The problems mentioned above affected the standards of Industrial Arts teacher education as well as incorrect notions that were being discussed about Industrial Arts. These notions, according to Perry (1961) were:

1. Recommending the work for boys alone, while the girls of the school engage in something more ladylike.

2. If you fail in academic areas, go to the shop, it’s an easy subject where you use your hands rather than your head.

3. The shop is a production department rather than one of the centers contributing to the general education of all.
4. Slow learners will do good work in the shop.

5. Expert ability with tools and materials can be acquired in a very short time.

6. The making of a “project” is the sole function of the department. (p. 18)

These notions portrayed the idea that the concept of practical or applied area of study is inferior to the theoretical or basic area of study. It was because of some of these notions together with the problems that Industrial Arts began to slowly die out. The educational system in America had gone through thirty-four years of evolving technology education, each system having its own unique strengths and influences. Table 2.1 depicts the three systems of technology education over the course of those thirty-four years (Olson, 1963, p. 12).

Table 2.1  Systems of Technology Education

<table>
<thead>
<tr>
<th>Manual Training</th>
<th>Manual Arts</th>
<th>Industrial Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inception</strong>:</td>
<td>1876</td>
<td>1896</td>
</tr>
<tr>
<td><strong>Influences</strong>:</td>
<td>Della Voss, Runkle, Woodward</td>
<td>Bennett, Salomon, Griffith</td>
</tr>
<tr>
<td><strong>Skills</strong>: Artisan basis, tool mastery</td>
<td>Craft basis, “Technics”</td>
<td>Individual basis, “Development”</td>
</tr>
<tr>
<td><strong>Methods</strong>: Dictated exercises</td>
<td>Assignment of useful artistic projects</td>
<td>Projects and individual creativity</td>
</tr>
<tr>
<td><strong>Content largely involved</strong>: Work in wood; Mechanical drawing</td>
<td>Arts: Graphic, plastic, textile, mechanical, bookmaking</td>
<td>Any representation of modern industry conditioned by stated objectives</td>
</tr>
<tr>
<td><strong>End functioning</strong>: In itself</td>
<td>Avocational, nice to have done, development of appreciation for the crafts</td>
<td>Exploration, development of personal-social traits, guidance, consumer education</td>
</tr>
<tr>
<td><strong>Basis of truth</strong>: Authority Centers in teacher Unit-shop</td>
<td>Authority and custom Centers in project Unit or general shop</td>
<td>Scientific evidence and criteria Centers in pupil Laboratory of industries or Unit-shop</td>
</tr>
</tbody>
</table>
Industrial Arts becomes distinctly exclusive by comparison. It shows maturity in the area of technology education and displays the concept of professionalism. “Industrial Arts emphasizes in addition the all-round arts of industry rather than just manipulative or “manual” aspects of artistic construction implied in the term Manual Arts (The Terminological Investigation, 1933, 88, p. 27). Industrial Arts was displacing the historical but narrower term Manual Training yet in the same content area, has the same significance as the term Manual Arts. Over several years change began to take place and Americans began to look at a way to redefine the area of technology education; partly due to the bad rapport that Industrial Arts was starting to take because of the changing industries as well as the need for those graduating in Industrial Arts to have some sort of management knowledge. It was stated by Warner et al. (1965) that:

Functionally, industrial arts as a general and fundamental school subject in a free society is concerned with providing experiences that will help persons of all ages and both sexes to profit by the technology, because all are involved as consumers, many as producers, and there are countless recreational opportunities for all (p.41).

This was obviously not the case any more due to a changing society. Industrialization required not only practical experience and knowledge but an understanding of structure, organization, and managerial knowledge. The impact that technology had on industrial productivity and the sudden growth of the use of technology became apparent during the post World War II period. “The demand for professional industrial personnel with higher education, technical application skills, and leadership
qualities increased as engineering programs offered less laboratory application courses (Keith & Talbott, 1991).” Furthermore Keith (1986) states that:

Such academic programs had been provided at a number of schools for several decades prior to 1965, especially after World War II, to meet the demands of industry for technical and managerial manpower. Many of these programs had evolved from industrial education curricula as universities realized that their industrial arts graduates were often going into industry rather than into teaching. (p.1)

Industrial education/arts focused on the idea that children needed to learn about technologies for personal and commercial use to prepare them for a technology-driven society. This led to an increase in graduates taking on industrial management jobs.

However, it became evident that possessing knowledge in Industrial Arts was not sufficient in helping to be successful in the workplace; this signified the beginning of what is now referred to as Industrial Technology. While Industrial Arts programs concentrated on technology and psychology, Industrial Technology programs united the facets of technology and management.

The field of Industrial Technology originated and was influenced by the increase in demand for technology in businesses and the lack of knowledge graduates had to perform business oriented tasks. It was during the 1950’s that these graduates began taking on industrial management jobs. Zargari & Coddington (1999) said that:

Technological developments in industries created new occupations that required a balance between management knowledge and technical skills. This has become
the technical-management profession – “management” jobs with a decidedly
“technical” nature. The discipline of Industrial Technology was established to
meet the needs of business and industry for employees who could use the
complex tools of production and at the same time were able to manage personnel
and facilities. (p. 2).

The knowledge that graduates had of Industrial Arts was not sufficient enough for
them to maintain proper work ethics and aid in the development of business or industry.
Industrial Technology prepared students for management oriented positions in
technology, operation of technological systems, and the maintenance of those systems.
Industrial Technology pedagogy is a vast field which includes a variety of courses such
as electronics, safety, maintenance, and management.

Industrial Technology is defined as “a field of study designed to prepare technical
and/or management oriented professionals for employment in business, industry,
education, and government” (NAIT, 1997, p. 1). Industrial Technology integrated the
features of Industrial Arts but married the technological and managerial skills to
accommodate the needs of industry. Moreover, “Industrial Technology is primarily
involved with the management, operation, and maintenance of complex technological
systems” (Michigan Tech, School of Technology, n.d.). Accordingly, the focus of
Industrial Technology pedagogy is to prepare individuals to be managers who are
equipped with technological skills to operate and maintain complex machinery.

Industrial Technology was a field of study designed to prepare technical and
management professionals for employment in manufacturing and distribution industries,
education, and government. Industrial Technology is primarily involved with the management, operation, and maintenance of complex technological systems, including:

- Materials
- Manufacturing Processes
- Management
- Economics
- Human Relations
- Quality Control
- Computer Applications/CAD/CAM
- Electronics and Automation (M. Giordano, personal communication, January 10, 2007)

Industrial Technology combines the areas of “design and refinement, production and manufacture, field service and product utilization, distribution and sales and education and training” (Cunningham, 1969, p.34). The work of design and refinement starts after the engineer’s concept of a product is devised. The industrial technologist takes that concept and makes it saleable, serviceable, and producible. This area also looks at the functional qualities of the product. The area of production and manufacture takes into account the step-by-step analysis of operations and processes which must be done in order to make the product. In addition, unique tools, jigs, fixtures, gauges, and machines are made to produce the product. Manufacturing facilities are altered to accommodate the assembly lines and the schedule for the routing of materials is developed. However, due to a changing society, that is not so true today partly due to the
strategy of concurrent engineering. This strategy eliminates the traditional product development process by focusing on the optimization and allotment of companies’ resources in the design and development process to guarantee successful and proficient product development process (Cunningham, 1969).

The next area, field service and product utilization, focuses on whether or not the customer receives the service that is built into the product. The product undergoes field service which includes diagnosis, correction, and testing. In the corrective procedure, the product may need a simple adjustment or a complete disassembly. Testing is then done to determine whether it operates properly.

The third area addresses distribution and sales. This area can work in conjunction with the field service area. For example, “the field service representative frequently has an opportunity to suggest to a dealer ways and means for increasing sales of the product” (Cunningham, 1969, p.35).

The last area is education and training. With the abundant amount of technological changes that occur yearly in modern industry, this area is an essential part of the industrial process. The purposes of education and training is to prepare recruits to step in where needed, provide new knowledge to current employees in their present positions, and allows others to acquire knowledge that will help them in getting promoted. Education and training in this age of technology is crucial. Students need to understand technology and need to be technology literate. It is important not only in the US but other countries as well. The education and training for Industrial Technology is not an easy task to do but the association formerly known as the National Association of
Industrial Technology (NAIT), now the Association of Technology, Management and Applied Engineering (ATMAE) has been extremely beneficial in implementing education and training standards for Industrial Technology programs.

**Research in Industrial Technology**

Related literature in the field of Industrial Technology has provided the researcher with the following studies. The first study was undertaken by Latif and Sutton (2001), the second one by Zargari and Hayes (1999), the third one by Zargari and Coddington (1999), the fourth one by Zargari and Hayes (2001), the fifth one by Zargari and Patrick (2002 & 2005), the sixth one by Zargari and Wangsaputra (2004), and the seventh one by Higgins (2008). Latif and Sutton’s questionnaire was mailed in the spring of 2001 to 678 alumni who graduated between 1986 and 1997. Of the 678 alumni, 148 (22%) Industrial Technology graduates responded to the survey. The aim of their survey was to determine academic and non-academic procedures that were currently expected of Industrial Technology graduates by industry and businesses (Latif and Sutton, 2001). Participants were asked what year they graduated, the primary role of their organization, location of the organization, and salary information.

The studies conducted by Zargari and Hayes (1999), Zargari and Coddington (1999), Zargari and Hayes (2001), Zargari and Patrick (2002 & 2005), and Zargari and Wangsaputra (2004) assessed the quality of the Industrial Technology program through the eyes of the alumni. One particular study, Zargari & Hayes (1999), was administered to alumni of Moorhead State University who graduated during the years of 1989 to 1994,
which produced a total of 220 participants. From this total, samples of 100 participants were randomly selected. There were forty-one (41%) completed and returned questionnaires. In comparison to the aforementioned studies not done by Zargari, his studies asked the participants their age and gender, highest degree obtained, including job description as it relates to their program of study and perception of the Industrial Technology program.

The rationale for Higgins (2008) study was “to investigate graduate and employer perceptions in regard to the job preparedness level of graduates from a design technology program… (p.1)”. The design technology program was a program in the Technological Studies Department (formerly Industrial Technology). Higgins (2008) had fifty-nine (27.4%) program graduates from 2001-2006 completed and returned the 19-item survey out of 215 Bemidji State University students, while twenty-seven (67.5%) employers of program graduates completed and returned the 15-item survey. This study showed that there were strengths in job preparedness skills such as the “ability to work in teams and the ability to follow a project to completion” (Higgins, 2008, p.2). The three studies relate to how the participants viewed their educational experience and how that experience enhanced their ability to transfer what they had learned to industry.

The outcome of the surveys indicated that the majority of IT graduates have gained employment in their respective field of study and are pleased with their occupations. In addition, the feedback from the surveys allowed faculty to change their curriculum in order to provide a better quality program and to make the curriculum relevant to the needs of business and industry. As society changes, educational policies
and practices also change and Industrial Technology is no exception. Therefore, it is necessary for technology programs to be assessed to determine if the program meets workplace demands as specified by NAIT standards.

The National Association of Industrial Technology

To assist in putting Industrial Technology into practice and establishing a guide for Industrial Technology programs to follow, NAIT has stated the following objectives in its constitution (NAIT, 1988 p.1-2):

A. To promote the establishment of curricula of Industrial Technology.

B. To promote the establishment and maintenance of curricular standards designed to serve the best interests of industry and the profession.

C. To provide opportunities for the study and discussion of all questions, issues, and problems related to curricula of Industrial Technology.

D. To promote and sustain worthwhile research endeavors related to the curricula of Industrial Technology.

E. To provide opportunities for collecting, developing, and disseminating information concerning Industrial Technology education among its members, industrial personnel, fellow educators, administrators, counselors, students, and laymen.

F. To promote the goals and interests of the association by cooperating with other national, regional, and local special interest organizations having related interests and goals.
G. To develop and maintain a common understanding among its members, industrial personnel, fellow educators, and the general public of the unique and essential role of Industrial Technology education as a function of the total public educational system.

H. To provide through an accreditation process for recognition of the attainment of appropriate standards for Industrial Technology programs.

**Industrial Technology in Other Countries**

Technology education is widely spread and because of that, “many countries are striving to establish technology in their school curricula as a subject in its own right” (Layton, 1994 & Lewis, 1991). Japan for instance, introduced “life environmental studies” in 1989 as a new integrated subject instead of science and social studies (Yamazaki, 1996). Few international attempts have been made in reporting contemporary technology/Industrial Arts education in Japan. Murata and Stern (1993) described the curriculum in transition and the current tendency of technology/Industrial Arts and vocational technical education at the secondary and postsecondary levels. The current course of study does not have technology/Industrial Arts education related subjects in elementary schools but there are technology education related subjects in vocational or comprehensive upper secondary school courses. Of these courses, Industrial Arts and homemaking subjects encompass 11 areas. There are six areas of Industrial Arts which are woodworking, electricity, metalworking, machine, cultivation, and fundamentals of information.
Japan is not the only country that is implementing technology education, “a new national curriculum in England and Wales was introduced in 1995” (Department for Education, 1995). The curriculum supported the necessity for students to learn life skills and problem solving using the designing and making approach. There have been some positive discussions about this approach. “This approach is based on the theory that children learn best through “doing”, and through the application of practical project work, they enhance their technological understanding by applying theoretical principles to “real life” situations” (Shield, 1996). England includes design and technology as well as information technology in its curriculum and continues that throughout its school systems.

In another part of the globe, “the curriculum in Northern Ireland is organized into six areas of study: English, mathematics, science and technology, environment and society, creative and expressive studies and language studies” (Northern Ireland Curriculum Council, 1990). The science and technology area includes technology and design, which is a compulsory subject for all students ranging from the age of 5 to 16. In British Columbia, Canada, the area of technology actually “belongs to curriculum organizers of science, math, and technology” (Province of British Columbia, Ministry of Education, 1994).

Technology education, similar to the practical arts of the 1970’s in the United States, was first introduced in September 1996 and “there is an increased emphasis on providing students with opportunities to design and make products and systems using a variety of materials, tools, and technologies” (Savage & Yamazaki, 1998, p. 35). Since
its introduction many countries have systematically introduced technology education as a
subject or part of an integrated science, technology, and society education program from
kindergarten to senior high school. The introduction of technology education is
occurring world wide.

Technology education in Finland puts the “main emphasis on the idea-to-product
process with the pupil fully involved in design” (Alamaki, 2000, p. 19). This is
encouraged through a student-centered instructional strategy that follows a national
curriculum in which the students concentrate on problem-centered design projects. The
Finnish curriculum provided compulsory basic education for students between the ages of
7 and 16. The subsequent list exemplified different approaches to technology education
in several countries according to Black (1998):

- Finland uses a technical skills approach, seeking emphasis on craft skills in
treating resistant materials, foods, and textiles, or in electronics and automatic
control;
- Sweden uses the traditional “sloyd” (handicraft) approach, in which the cultural
and personal value of the combination of manual skill, aesthetic sensibility, and
traditional design is to be preserved;
- Eastern Europe uses a technical production approach, seeking emphasis on skills
appropriate to modern mass production and its control and organization
- The French use a “modern technology” approach, which looks to the nature of
“work” in the next century and focuses strongly on information technology
- Denmark uses a “science and technology” approach in which it is assumed that these two subjects are, or ought to be, studied in close association with each other.

- Northern Ireland concentrates on design, which is seen by some as a central concept in the study and practice of technology.

- Scotland and the United States uses a problem-solving emphasis approach, focusing on an understanding of the nature of social needs in the definition of “problems” and of the need for a cross-disciplinary approach to tackling issues (pp. 24-25).

Although some of these approaches are closely matched to an emphasis on technology as a part of general education for all, there are others that are associated with an emphasis on vocational preparation. Because of the wide range of differences in these approaches, it becomes difficult to communicate in discussion between and among countries. This is a concern that has gained some recognition. However, there is a brighter side, “there is some convergence between the different examples in that most reflect recent changes that have broadened the scope and educational ambition of technology” (Black, 1998, p. 28).

A country that had to radically change its approach to its educational system is Korea. This was mainly due to the fact that “there is a lack of public understanding of the importance of technology education (TE) in the field of education. The major problems of Korean TE stem from the fact that it was rapidly introduced into the school program as a separate subject without sufficient preparation such as research curriculum and instruction, and education of technology teachers” (Kim & Land, 1994; Lux & Lee,
Korea’s approach to technology is an issue in its own understanding, they have two approaches. Approach one is “to lay emphasis on understanding of industrial society and modern technology in a macroscopic manner” and approach two is “to lay emphasis on an understanding of the relationship between daily and home life and technology in a microscopic approach” (Lee, 1986, p. 44). These approaches began to be offered to all secondary students in 1970. Korea uses a curriculum system that describes what the students should learn and it is currently using its sixth revision of that system. This sixth system helps the students to (a) understand basic information and talents of technology and industry, (b) comprehend a world of livelihood in regards to technology and industry, and (c) increase their knowledge and approaches that can be changed to a highly technological, advanced industrialized society (Lee, 1986).

Technology education is becoming a major concern for not only the schools that are trying to stay abreast of technological change but for accreditation agencies that are trying to provide quality for the content and course areas.

**Quality of Industrial Technology Programs**

With the advent of technological advances such as podcasting, wireless capabilities, new and improved computers, colleges around the world have had to rethink their strategies for those graduating. Is the curriculum that they currently use appropriate for today’s students? Zargari & Hayes (1999) stated the following:

In recent years, because of a national concern over the content and quality of education that college students are receiving, there has been an increasing
emphasis in performance assessment of university programs in order to determine the relevance and quality of the education being provided. (p.2)

Education and the pedagogy of topics in schools have become a concern for the public. The standards created at the national level in the 1980’s for education are being questioned and scrutinized by educational policy makers. According to Weistroffer & Gasen (1995), “Calls for outcome standards and performance assessment have been made at national and state levels to address the quality of education being provided in colleges and universities today.” (p. 258).

There are 49 states that have created and put into practice some form of standards in several subject areas. Many of the standards are alterations or direct adoptions of nationally developed standards. Some critics were questioning university mission statements that focus only on the student’s scholarly progress but according to Whitehead (1957), “In the modern complex social organism, the adventure of life cannot be disjointed from intellectual adventure.” (pp. 94-95). It was understood by critics and supporters that the most important purpose of education was to prepare knowledgeable and prolific citizens. Maintaining an up-to-date curriculum and evaluating its quality is the key to the preparation of productive and informed citizens.

The subject of Industrial Technology is no exception to maintaining the quality and standards of its curriculum. Many of the state standards in technology education go back to the 1970’s standards with Industrial Arts education. The nationally developed standards are considered content standards. These standards “focus on basic concepts and big ideas, deliberately leaving curricular decisions to state and local agencies”
The standards provided an outlook for what is needed to allow all students to become knowledgeable in a given subject.

Technology education standards have evolved over the past 25 years starting with the Standards for Industrial Arts Programs (1978-1981) to the Standards for Technology Education Programs (1985) to the International Technology Education Association’s (ITEA) Technology for all Americans Project (1994-2003). The progression of these standards over time have aided in the National Association of Industrial Technology (NAIT) to create an Outcomes Assessment Accreditation Model for Industrial Technology Programs. This model was mandated by the Council for Higher Education Accreditation (CHEA) (Rudisill, 2006). This organization evaluates institutions that have plans in place for assessing educational programs. “These plans must show evidence that the results of these assessments have led to the improvement of teaching and learning processes and improved preparation of program graduates to enter professional positions upon graduation” (Rudisill, 2006, p.1). The model was separated into seven program inputs, seven outcome measures, one program operation, and one program improvement. The program inputs included the program mission and general outcomes, identification of competency measures and administrative support and faculty qualifications. The outcome measures included the initial employment of graduates, job advancement of graduates, and advisory council approval of programs. The program operation looked into the motivation of students, scheduling of instruction, and placement of graduates. The program improvement looked at the outcome measures used to
improve the program. The following figure 2.1 depicts the structure of the outcomes assessment accreditation model (Rudisill, 2006):

Figure 2.1 Accreditation Model
The overall “objective of NAIT accreditation is to ensure that programs in Industrial Technology that are accredited meet or exceed established standards and that outcome measures are used to continuously improve programs” (Rudisill, 2006, p. 2). Currently the Mississippi State University Industrial Technology program is not NAIT accredited but actions are being taken to resolve that issue. The accreditation will be beneficial because the program will have national recognition and will be recognized by professional and peer institutions; the program will be rigorous and will help structure the curriculum for those students preparing for employment. NAIT accreditation will also allow the MSU program to become accountable for the information that the students are required to have. This will allow the educational program to be studied and compared to other universities. It is said that “the quality of an educational program to a great extent depends on the performance of its graduates on the job” (Zargari & Hayes, 1999, p. 2). With the accreditation being in place, the quality of the Industrial Technology curriculum can be assessed and recommendations can be made. The question as to how that quality is measured is sometimes an arduous task.

According to the Industrial Technology Handbook (NAIT, 1998), “The advancement of [IT] graduates within organizations shall be tracked to endure advancement to positions of increasing responsibility….Follow-up studies of graduates should be conducted every two to five years” (p.33). The follow-up studies will assist in the assessment of quality in the curriculum because they are asking those students how they viewed their education. The follow-up studies will also try to justify the components of the curriculum by looking into what worked and what did not work.
A review of literature shows that there are some institutions of higher learning such as the University of Lowell that have performed national surveys of their technology program graduates in order to “determine the quality of the degree program” (Tuholksi & Marchand, 1986). The necessary skills students need to be productive in industry are very important. Industry requires students to have a combination of theoretical and hands-on knowledge and experiences prior to finishing their academic programs. In a similar study polling technical employees, “…it was found that a significant number of those participating felt that faculty should have amassed at least three to five years of industrial experience prior to teaching” (Downing, 1999). In addition, quality will be increased if the students participated in a curriculum and lab experiences that were similar to true industrial experiences. “It was indicated that making these changes to curriculum could potentially increase the percentage of students that can effectively contribute to their organizations within a short period of time or without having to undergo extensive training” (Shaw & Downing, 2002, p. 3). The curriculum is another important factor when determining quality. It provides the students with a course of action that serves a purpose of educating them as they take certain courses in Industrial Technology.

**Curriculum Factors in Regards to Industrial Technology**

The success of students in Industrial Technology is dependent on a well designed strategically ran educational system designed to inform the students about technology. This system and ample resources to support it are very important in producing productive
industrial technologists. One of the central missions of educational institutions is to train students for a thriving conversion from the mind set of school to the workplace. Patrick and Zargari (1998) stated that in order to accomplish the successful transition from the world of school to the workplace, “universities must offer a curriculum that provides students with a basic understanding of the technological society in which they live” (p.2). The main intent of Industrial Technology programs was to “render students with the knowledge, skills, attitudes, abilities and values essential to the continuing development of society and the industries to which they belong” (Brown & Meier, 2005, p.2).

Technology itself is a concept that is always changing and because of this so should the curriculum that produces those students that deal with technology and the environment that it operates in. College graduates may not be able to effectively participate in our technology-based society unless they are provided with the right resources. An objective of education is to emancipate individuals from “ignorance, prejudice, and narrowness by providing information, awareness, and understanding of various life issues” (Patrick & Zargari, 1998, p. 2).

The Industrial Technology curriculum should provide graduates with the capability of using and managing technology and a reasonable understanding of what makes technology work. A curriculum that does this will facilitate students with the experience of working with various technological devices and processes. A technology course and curriculum should “place an increased emphasis on the study of industry and technology, critical consumerism, and the development of intellectual processes and
interpersonal behavioral skills” (White, 1990). The curriculum in other countries even stress technological knowledge.

According to the New Zealand Ministry of Education (1995), the technology curriculums in New Zealand are to “develop technological knowledge, and understanding, technological capability, and an understanding and awareness of the interrelationship between technology and society” (p. 130). New Zealand’s technology curriculum looked at the fact that it is impossible to do something technological without having knowledge of technology first. Also knowing what technology is available and its capability. In addition, the curriculum looked at the fact that the students should know how beliefs, values, and ethics played an important role in technological development and influenced attitudes towards technological advancement. The practice of technology outside the world of the classroom encompasses a diverse range of activities and the students need to know that and how that impacts society as well as the physical environment. There are those who do not support just the mental understanding of technology a utilitarian approach has been applied to the understanding of technology.

Frederick Bonser stressed that “the industrial arts as a study utilize hand work as a means to help in developing meanings and values, as a way of clarifying ideas and cultivating appreciations” (Bonser, 1932, p.203). According to Edwards (2002) the lack of “hand skill development in our schools [curriculum] limits the student’s engagement in the active learning process and retards the student’s growth and development” (p.8). The Industrial Technology curriculum should not only include mental understanding but also a practical approach and understanding of how technology works in society.
Advocates of the hands-on approach in the Industrial Technology curriculum have reported that the “strength of the industrial arts curriculum is its ability to engage the learner in individualized projects that require hand skill development” (Jewell, 1995). Today, the Industrial Technology curriculum is placing more focus on the subjects of industry and technology by utilizing cognitive and affective intellectual processes. This requires pedagogical curriculums that enhance the students’ ability to have a practical approach as well as a mental ability to use technology. The curriculum factors are not the only pressing issues that educators of Industrial Technology have to cope with; diversity is becoming a major concern in the field.

**Gender Issues in Industrial Technology**

As the workforce changes, there is an increasing demand for companies and managers to be more sensitive to cultural diversity. Technology is available to everyone today, so what really makes a difference to an organization is people and how effective they are in maximizing their potential (Bell, 1999).

Diversification in the workforce is essential, it allows for different view points, perspectives and solutions to problems that may exist. The Industrial Technology program unifies the use of technology with society and diversity is definitely needed. Women are outnumbered in Industrial Technology and that is becoming an issue among technologists. “The goal of diversity is not to assimilate women and minorities into a dominant white male culture, but to create a heterogeneous organizational milieu” (Thomas, 1990). If that is the case then why are women not present in the Industrial
Technology program? Kulatunga, Shaw, & Nelson (1999) found that “the faculty population of Industrial Technology departments was reported to be less than 8% female by one study” and a more recent study puts the “percentage of Industrial Technology faculty at the university level at 9.8%” (Kasi & Dugger, 2000). Another study found that women students “represent only 16% of Industrial Technology majors” (Kasi & Dugger, 2000). After its inception, women and their voices were closed off from Industrial Arts and industrial education.

According to Zuga (1997), “the early female advocates and practitioners in industrial arts were slowly eliminated and the record of their participation in the field conveniently forgotten” (p. 206). In an earlier section of this paper there were mentioned two people that influenced the creation of Industrial Technology, Bonser and Mossman. A male and a female, respectively, but after reviewing the related literature, Lois Mossman’s name was slowly phased out in the discussion of Industrial Technology. Zuga (1997) stated the fact that:

…the increasingly male dominated profession of industrial arts mirrored these social patterns and, soon, even the early voices of the women were erased through the way in which the industrial arts literature from the 1930s through the 1950s exhibits a lack of women’s voices, while the literature from the 1880s through the 1920s and the 1960s through the present incorporates women’s voices. There was a collective suppression of women’s voices by simple omission such as the habit of referring in conversation and in press to the most frequently used definition of
industrial arts, as the “Bonser” definition (Smith, 1981; Lux, 1981) and which is the Bonser and Mossman (1923) definition.

The regular decline of women and their voices from Industrial Technology is slowly being reversed as women are beginning to take active roles in industrial education. They have a long road ahead of them though, considering that they are working from the deficit created by past omissions in that “about two percent, at best, of the total profession of teachers and teacher educators are estimated to be female” (Wright & Devier, 1989; Quon & Smith 1991). Technology educators speculate that the omission of women’s voices over time may have changed the course of Industrial Arts and technology education.

The issue of the lack of women participants in Industrial Technology was also evident in technology education in Korea. The technology education program was offered to both boys and girls in academic high school until 1969. Subsequent to that the program was mainly offered to the boys while the girls were taught home economics. This manifested because of tradition and the socially accepted idea that social life is for man and home life is for woman. Bostic (1998) argued that “society’s idea of what is ‘proper’ work for females may be the most influential factor” (p. 2) in determining women’s choice of a career. Many women today would not accept that “home life” ideology due to the fact that technology itself does not discriminate nor does it fit only one gender. There should be homogeneity in technology education because women have ideas, concepts, and solutions to everyday technological problems. The technology education program had been gender biased for a long time and women are beginning to
speak out about the “back seat” position that they have been forced to take. There are even some companies that have promoted a “women friendly” environment. According to Business Week’s “Best Companies for Women” (Konrad, 1990), the following companies are pacesetters in the race to employ a “woman-friendly culture” within their companies: Avon, CBS, Dayton-Hudson, Gannett, Kelly Services and U.S. West. This has proven to be beneficial to woman because other companies are using these companies as benchmarks and copying their efforts.

Summary

Industrial technology has had many different names and has been greatly influenced by society. Like all things that occur in life, change has played its part in the curriculum and pedagogy of Industrial Technology. Women who once played a vital role in the introduction of Industrial Technology have been silenced and the program has become mainly a man’s educational concept. Is that good or bad? Who is to say that women cannot influence the future of Industrial Technology? If the curriculum can change to accommodate society and other countries can begin to include Industrial Technology in their school programs then the inclusion of women should be considered. Accreditation of Industrial Technology programs does not look at gender differences but rather the quality of the programs.

Quality was defined in the Collins English Dictionary and Thesaurus as a “degree or standard of excellence, esp. a high standard” (Collins English Dictionary and Thesaurus, 1994). Gender is not mentioned as a criterion for accreditation and should not
be a factor. The National Association of Industrial Technology (NAIT) now known as Association of Technology, Management and Applied Engineering (ATMAE) played a key role in the standards that educational programs abide by and this organization also established quality benchmarks.

The Mississippi State University Industrial Technology program is striving to become accredited and meet/exceed those benchmarks. This study not only gave some historical facts of Industrial Technology and the path that it has taken and will continue to take but also contributed to the MSU Industrial Technology program to fulfill the necessary objectives that will allow it to be accredited. The program of Industrial Technology has an obligation to aid those graduating to be effective and successful in their careers. They should be able to transfer what they have learned in the classroom to their respective employments.
CHAPTER III

METHODOLOGY

Introduction

The focus of this study was to investigate Industrial Technology alumni perceptions of the Industrial Technology undergraduate program at Mississippi State University and the transferability of the skills to industry. The researcher chose to do this study because over the past 50 years Industrial Technology has developed from programs in Industrial Arts and vocational trade teacher education to programs in Industrial Technology (Strong, Kassapoglou, Dugger, & Rudisill, 1999). This means that the curriculum has changed in regards to the program as well as the qualifications for those majoring in Industrial Technology to find and secure a job in the field. This chapter is comprised of the following sections; research design, population of the study, instrument, data collection, administration of the instrument, validity of the instrument, reliability of the instrument and methods of data analysis. The following research questions were used as the conceptual framework to gather data for this study. The research questions were:

1. What are the alumni perceptions of the transferability of the skills acquired from their Industrial Technology program to industry?

2. What are alumni perceptions of the support services provided in the Industrial Technology program?
3. Does a relationship exist between alumni perceptions of the Industrial Technology program and various demographic characteristics?

4. Do differences exist between alumnus who have gained employment in the field of Industrial Technology and those who did not gain employment in Industrial Technology related jobs?

**Research Design**

In order to conduct this study at Mississippi State University, the researcher got permission from the Institutional Review Board (IRB). On June 6 2007, IRB notice #07-118 was issued (Appendix A). The researcher used a descriptive research design, more specifically, a survey research design that included open-ended questions, Likert-scale questions, multiple-choice questions, numerical questions and categorical questions. Survey research is used to “obtain information about the preferences, attitudes, practices, concerns, or interests of some group.” (Gay & Airasion, 2003, p. 20). Survey research designs are used to collect quantitative information, which is a method that involves “collecting and analyzing numerical data from tests, questionnaires, checklists and surveys.” (Gay & Airasion, 2003, p. 20). This type of research design was appropriate because the participants were able to freely express their perceptions of the undergraduate Industrial Technology program in the Department of Instructional Systems and Workforce Development at Mississippi State University. A copy of the survey can be found in Appendix B.
Population

The participants were in the following concentration areas of Industrial Technology: Manufacturing Management, Industrial Distribution, Industrial Automation and Manufacturing and Maintenance Management. The participants obtained a baccalaureate degree in Industrial Technology (INDT) in the Department of Instructional Systems and Workforce Development at Mississippi State University (MSU) between 2000 and 2007. The concentration area of Manufacturing Management was pre 2004 and the concentration areas of Industrial Automation and Manufacturing and Maintenance Management was post 2004. The Industrial Distribution concentration was included in both pre and post 2004 curriculums.

The justification for choosing pre 2004 and post 2004 concentration areas was due to the fact that the Industrial Technology program went through a dramatic curriculum change in 2004. The researcher chose not to separate the pre 2004 and post 2004 participants to study them individually because of the extremely higher number of pre 2004 participants to the number of post 2004 participants. A list of 219 alumni between 2000 and 2007 was obtained from the Alumni Department at MSU of which 35 (16%) alumni volunteered. All of the 35 alumni volunteers were male.

Instrumentation

The type of instrument that was used to collect data for this study was a survey (Appendix B). The survey was developed to investigate alumni perceptions of the Industrial Technology undergraduate program and the transferability of the skills to
industry. The questionnaire items used in this survey were adapted from Latif and Sutton’s (2001) questionnaire as well as Zargari and Hayes’ (2001) questionnaires. The permission letter from Sutton can be seen in Appendix C and oral permission was given to the researcher from Zargari during a meeting with him at the 2007 NAIT convention. Their questionnaires were designed to assess Industrial Technology alumni perceptions of their curriculum with regards to quality of the courses and areas of needed improvement (Latif & Sutton, 2001; Zargari & Hayes, 2001). The researcher’s questionnaire was modified to reflect the program at Mississippi State University by changing the questions to represent the curriculum of Industrial Technology at MSU. The previous questionnaires addressed the quality of the curriculum at another university and did not focus on the participants’ perceptions. Also some of the questions that were in the abovementioned questionnaires were deleted as they did not pertain to the focus of the study, which was to evaluate the participants’ perceptions of the Industrial Technology program at MSU.

The questionnaire was divided into four sections. Section A focused on demographic data and asked questions such as: what is your gender, age and is your present position directly related to your program of study? Section A had 18 questionnaire items in this section, and they pertained to demographic information only.

Section B was used to determine the participants’ perception of the academic program and asked questions such as: “I perceive that the academic program helped me in gaining employment, and I perceive that Industrial Technology courses need to be redesigned to make the relevant to industry?” Section B had 13 questionnaire items
which pertained to the participants’ perception of the academic program and
questionnaire item 13 allowed the participant to write out any additional perceptions of
the academic program that they may have.

Section C was used to assess the participants’ perception of the support systems,
such as the instructors and facilities in the Industrial Technology program. Section C had
5 questionnaire items that focused on the participants’ perception of their support
systems.

Finally, Section D sought relevance of the participants’ academic program to their
employment and asked such questions as “I perceive that my course of study in Industrial
Technology is related to my job, and I perceive that the Industrial Technology program
prepared me to be competitive in my field?” Section D had 10 questionnaire items which
pertained to relevance of the participants’ academic program to their employment. The
survey had four sections. Each section began with number one so that the researcher
could easily distinguish between the sections. The instrument used the 18 demographic
questionnaire items from Section A to aid in the analysis. The 13 questionnaire items
from Section B, 5 questionnaire items from Section C and the 10 questionnaire items
from Section D were used to form 28 five point Likert scaled questionnaire items to
gather the participants’ perceptions using the following five point scale: 1-strongly
disagree, 2-disagree, 3-undecided, 4-agree, and 5-strongly agree.
Validity of the Instrument

Content validity was used to determine whether the instrument measures what it is supposed to measure. Content validity is “the extent to which inferences from a test’s scores adequately represents the content or conceptual domain that the test is claimed to measure” (Gall, Gall, & Borg, 2003, p. 621). The researcher obtained content validity of the instrument by allowing a panel of experts to determine whether or not the instrument measures what it is supposed to measure. The panel of experts comprised of two instructors and one professor from the Department of Instructional Systems and Workforce Development at Mississippi State University, all of who have working and teaching experience in the field of Industrial Technology. The panel read the instrument to ensure that the questionnaire items were comprehensible, addressed the research questions and that the instrument format was appropriate. The feedback they provided was used to modify and improve the questionnaire.

Reliability of the Instrument

The researcher administered the instrument to twelve senior class Industrial Technology students who had work experience. The instrument was administered again to the same students two weeks later and the data was collected. To establish internal consistency of the self-reported survey, Cronbach’s Coefficient alpha was administered. Cronbach’s Coefficient alpha is “a general formula for estimating internal inconsistency based on a determination of how all items on a test relate to all other items and to the total test.” (Gay & Airasian, 2003, p. 386). Internal consistency “measures the extent to
which items of a test (or subtest or scale) are positively intercorrelated and thus all measure the same construct or trait.” (Ary, Jacobs, & Razavieh, 1996, p. 569). The analysis computed an alpha of 0.854 for the instrument. The aforementioned value of 0.854 showed a very strong association among the items on the instrument. These participants were not included in the population of the study.

Reliability is “the degree to which scores obtained with an instrument are consistent measures of whatever the instrument measures.” (Fraenkel & Wallen, 2003, p. 166). Reliability was determined using the test/retest method. This method “involves administering the same test twice to the same group after a certain time interval has elapsed.” (Fraenkel & Wallen, 2003, p.166). Fraenkel and Wallen (2003) stated that the test/retest method is “a procedure for determining the extent to which scores from an instrument are reliable over time by correlating the scores from two administrations of the same instrument to the same individuals” (p.G-8).

**Administration of the Instrument**

The researcher collected data from participants during the fall 2008 semester. The questionnaire package that was delivered to the research participants included a copy of the questionnaire (see Appendix B), a consent form (see Appendix D), a short description of the study (see Appendix E) and a stamped addressed envelope for the return process. A list of 219 alumni from 2000-2007 was obtained from the alumni center at Mississippi State University. The packages were mailed out to the 219 alumni and were given three
weeks to return the instrument. The potential participants were also notified that they could withdraw from the study at any time and that their responses would be confidential.

Each instrument was coded with distinctive numbers to help the researcher identify participants who did not complete and return the instrument in order to conduct follow-ups on non returns. Once the data was received the researcher ensured confidentiality by destroying the identifying number. Of the 219 potential alumnus, 35 returned the survey. The low return of the alumnus survey could be attributed to the fact that majority of the alumni were not located in spite of rigorous follow-up efforts. The researcher discovered that Mississippi State Alumni Office did not have current addresses of former students. There were numerous attempts to locate them through their known mailing address and telephone numbers but these were not successful in most cases.

*Dealing with Non-returns*

To establish that non returns were not statistically different from participants who returned the instrument initially, the researcher conducted a follow up on non returns by randomly selecting eight of those participants who did not return the instrument. They (non returns) were contacted by telephone and asked to complete randomly selected questions from the survey that directly pertained to their perceptions of the Industrial Technology undergraduate program at Mississippi State University and the transferability of the skills to industry. Five questions came from section B, perception of academic program; two questions came from section C, perception of support systems; and eight questions came from section D, relevance of academic programs to employment. The
researcher statistically compared those alumni students who returned the survey to those that did not respond, using an independent $t$-test analysis. The justification for the independent $t$-test analysis was to determine whether the alumni students who returned the survey were statistically different from non-respondents. The independent $t$-test analysis revealed that there was not a statistical difference between the responses of the participants that returned the questionnaire and those that did. The $p$ value did indicate that the 35 participants that returned the questionnaire were similar to the 8 who did not.

**Method of Data Analysis**

The researcher analyzed the data using descriptive and inferential statistics. A description of how the research questions were analyzed is explained in the following list:

1. What are alumni perceptions of the transferability of the skills acquired from their Industrial Technology program to industry? The researcher used the 13 questionnaire items of Section B and the 10 questionnaire items of Section D to gather the information.

2. What are alumni perceptions of the support services provided in the Industrial Technology program? The researcher used all 5 questionnaire items of Section C to gather the information.

3. Does a relationship exist between alumni perceptions of the Industrial Technology program and various demographic characteristics? The researcher used various demographic characteristics from Section A and all 13
questionnaire items from Section B of the instrument to gather the information.

4. Do differences exist between alumnus who have gained employment in the field of Industrial Technology and those who did not gain employment in Industrial Technology related jobs? The researcher used all 13 questionnaire items from Section B and questionnaire item 15 from Section A to gather the information.

Descriptive statistics, inferential statistics, simple frequency distribution and percentages were used to determine the perceptions’ of the alumnus volunteers. In addition, multiple regression were used to determine if a relationship existed between the perceptions of alumni of the Industrial Technology program and demographic information. An independent t-test was used to determine if differences exist among participants that gained employment in Industrial Technology related areas and those that did not.
CHAPTER IV

FINDINGS

The purpose of this study was to examine the perceptions of alumnus in the Industrial Technology program at Mississippi State University and their perceptions of the adequacy of the connection to workplace industrial requirements. A survey was used to gather pertinent information about the participants’ perceptions of the Industrial Technology program. The questionnaire items used in this survey were adapted from Latif and Sutton’s (2001) questionnaire as well as Zargari and Hayes’ (2001) questionnaires. These questionnaires were modified to reflect the program at Mississippi State University. The questionnaire consisted of four sections: Section A collected demographic information, Section B looked at the alumni perceptions of the academic program, Section C looked at the alumni perceptions of the support systems of the Industrial Technology program and Section D looked at the relevance of the academic program and the participants’ job employment. There were a total of 46 questionnaire items; the questionnaire is shown in Appendix B.

This chapter reports the findings as related to the four research questions that guided the study. The research questions were:

1. What are the alumni perceptions of the transferability of the skills acquired from their Industrial Technology program to industry?
2. What are alumni perceptions of the support services provided in the Industrial Technology program?

3. Does a relationship exist between alumni perceptions of the Industrial Technology program and various demographic characteristics?

4. Do differences exist between alumnus who have gained employment in the field of Industrial Technology and those who did not gain employment in Industrial Technology related jobs?

**Descriptive Characteristics of Respondents**

There were 219 potential participants for the study; 35 participants returned the survey. The 35 participants represented the sample for the study and generalizations should not be made beyond this group. The age of the participants when the data was collected ranged from 23 to 41 years. The number of participants in the age range 23-27 years old (42.85%) and 28-32 years old (42.85%) was the same. The latter age range indicated that these participants would have been considered by definition, non-traditional students during their enrollment in the Industrial Technology program since they were students who were over the age of 25 and pursuing a degree. The range with the least number of participants was the range 38-42 (2.86%). The majority of the alumni participants were Caucasians (88.57%) and African Americans made up 11.42% of the participants. All of the participants were male. Table 4.1 displays the age range of the participants.
Table 4.1 Age of Participants (n=35)

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-27</td>
<td>15</td>
<td>42.85</td>
</tr>
<tr>
<td>28-32</td>
<td>15</td>
<td>42.85</td>
</tr>
<tr>
<td>33-37</td>
<td>4</td>
<td>11.43</td>
</tr>
<tr>
<td>38-42</td>
<td>1</td>
<td>2.86</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

The participants represented individuals who were initially enrolled in the Industrial Technology program at Mississippi State University either prior to or after Fall 2004. This distinction is important since changes to the program, which were initiated in the Fall 2004 semester, to include areas of concentration in: Manufacturing Management, Industrial Distribution, Industrial Automation and Manufacturing and Maintenance Management. The area of Manufacturing Management was available in the program prior to 2004 and the areas of Industrial Automation and Manufacturing and Maintenance Management were available after 2003. The area of Industrial Distribution was included both before 2004 and after 2003. The areas of concentration in Automation and Manufacturing and Maintenance Management were added to reflect the changing environment of industry. Table 4.2 shows the number of alumni in the concentration areas of Industrial Technology. One of the participants did not answer the question, which made the N value 34 instead of 35. A majority of the participants (80.00%) selected an area of concentration in Manufacturing Management; this area was followed by Manufacturing and Maintenance Management with 14.30% of participants. This information aided the researcher in determining if the participants’ current employment
area was related to the area of emphasis and the degree program that they completed at Mississippi State University.

**Table 4.2** Description of the Participants by Area of Concentration (n=35)

<table>
<thead>
<tr>
<th>Concentration Areas</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Management</td>
<td>28</td>
<td>80.00</td>
</tr>
<tr>
<td>Manufacturing and Maintenance Management</td>
<td>5</td>
<td>14.30</td>
</tr>
<tr>
<td>Industrial Distribution</td>
<td>1</td>
<td>2.90</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.3 shows the number of participants who indicated that they were employed in an area related to their area of concentration: 65.70% of the participants indicated that they were employed in an area related to their area of concentration. The participants who indicated that they were not employed in an area related to the area of concentration reported that they were working in military logistics, defense contracts, technical sales, construction, steel industry, and transportation; in most cases; jobs that still appeared to be related to the field of Industrial Technology but not in the participants area of concentration. The participants who indicated that they were employed in an area related to their area of concentration were employed in: manufacturing, maintenance, automation, quality assurance, time and motion, safety, electrical/electronics, robotics and management. Some of the employment areas necessitated that the participants acquire an advanced degree. Table 4.4 shows that most participants had not acquired an advanced degree.
Table 4.3  Participants' Job Related to their Degree Area (n=35)

<table>
<thead>
<tr>
<th>Job Related to Degree Area</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>12</td>
<td>34.30</td>
</tr>
<tr>
<td>Yes</td>
<td>23</td>
<td>65.70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 4.4, the majority of the participants (91.40%) did not have an advanced degree. Two participants earned a degree in Master of Science in Technology (MST) and one participant had a Master of Science in Engineering.

Table 4.4  Participants with an Advanced Degree (n=35)

<table>
<thead>
<tr>
<th>Participants with advanced degrees</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>32</td>
<td>91.40</td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>8.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Data Analysis of the Research Questions**

*Research Question One*

Research question 1 asked: What are the alumni perceptions of the transferability of the skills acquired from their Industrial Technology program to industry? The researcher used all 13 questionnaire items of section B; Perception of Academic Program as well as all 10 questionnaire items of section D; Relevance of Academic Programs to Employment to provide data for this question, and tables 4.5 and 4.6 shows the results respectively. Table 4.5 shows the descriptive statistics generated from the 13 questions from section B; Perception of Academic Program. Question 1; the academic program
helped me in gaining employment, had the highest percentage of strongly agree responses, 57.1%. This shows that overall, the alumni perception of the program was positive and that the program met their needs to obtain employment. In addition, question 11 showed that 34.3% disagreed and 51.4% strongly disagreed that their program was not applicable to the field. Question 5, the continuity in the courses offered in Industrial Technology provided me with relevant knowledge in the field. Nearly 63% of the participants agreed that the link between courses was beneficial to them. When asked if the Industrial Technology courses provided them with relevant problem-solving skills needed in the work place (Question 9), 62.9% of the participants agreed with this statement. Nearly 57% of the participants agreed that the Industrial Technology courses need to be redesigned to make them relevant to industry (Question 13).

Table 4.5  Alumni Perceptions of Academic Program, Section B (n=35)

<table>
<thead>
<tr>
<th>Questionnaire items measuring students’ perceptions of the Industrial Technology Program</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The academic program helped me in gaining employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>20</td>
<td>57.1</td>
</tr>
<tr>
<td>Agree</td>
<td>13</td>
<td>37.1</td>
</tr>
<tr>
<td>Undecided</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2.9</td>
</tr>
</tbody>
</table>
Table 4.5 cont.

2. The quality of instruction I received in the program helped me gain employment

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>0</td>
<td>2.9</td>
<td>8.6</td>
<td>45.7</td>
<td>42.9</td>
</tr>
</tbody>
</table>

3. The Industrial Technology lab activities provided me with the skills to gain employment

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>8</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>22.9</td>
<td>42.9</td>
<td>34.3</td>
</tr>
</tbody>
</table>

4. There were several hands-on applications in Industrial Technology that benefited me in making a decision about employment

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>6</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>0</td>
<td>5.7</td>
<td>17.1</td>
<td>45.7</td>
<td>31.4</td>
</tr>
</tbody>
</table>

5. The continuity in the courses offered in Industrial Technology provided me with relevant knowledge in the field

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>8.6</td>
<td>62.9</td>
<td>28.6</td>
</tr>
</tbody>
</table>
Table 4.5 cont.

<table>
<thead>
<tr>
<th>Questionnaire items measuring students’ perceptions of the Industrial Technology Program</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Overall, I am satisfied with the Industrial Technology program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>Undecided</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Agree</td>
<td>14</td>
<td>40.0</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>17</td>
<td>48.6</td>
</tr>
<tr>
<td>7. The degree to which technology is integrated into my program was adequate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Undecided</td>
<td>7</td>
<td>20.0</td>
</tr>
<tr>
<td>Agree</td>
<td>20</td>
<td>57.1</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td>8. The equipment used in my program was similar to the equipment used in my place of employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>5</td>
<td>14.3</td>
</tr>
<tr>
<td>Undecided</td>
<td>10</td>
<td>28.6</td>
</tr>
<tr>
<td>Agree</td>
<td>17</td>
<td>48.6</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>9. The Industrial Technology courses provided me with relevant problem-solving skills needed in the work place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td>Undecided</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Agree</td>
<td>22</td>
<td>62.9</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>10</td>
<td>28.6</td>
</tr>
</tbody>
</table>
Table 4.5 cont.

10. The Industrial Technology program improved my communication skills which assisted me in gaining employment

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
<td>11.4</td>
</tr>
<tr>
<td>Undecided</td>
<td>8</td>
<td>22.9</td>
</tr>
<tr>
<td>Agree</td>
<td>13</td>
<td>37.1</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>9</td>
<td>25.7</td>
</tr>
</tbody>
</table>

Questionnaire items measuring students’ perceptions of the Industrial Technology Program

11. My program was not applicable to the field

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>18</td>
<td>51.4</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>12</td>
<td>34.3</td>
</tr>
<tr>
<td>Undecided</td>
<td>4</td>
<td>11.4</td>
</tr>
<tr>
<td>Agree</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

12. The Industrial Technology courses emphasized team work which is a useful skill in the field

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>Agree</td>
<td>16</td>
<td>45.7</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>15</td>
<td>42.9</td>
</tr>
</tbody>
</table>

13. Industrial Technology courses need to be redesigned to make them relevant to industry

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>8</td>
<td>22.9</td>
</tr>
<tr>
<td>Undecided</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td>Agree</td>
<td>15</td>
<td>42.9</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>5</td>
<td>14.3</td>
</tr>
</tbody>
</table>
Table 4.6 shows the descriptive statistics for the 10 questionnaire items from section D; Relevance of Academic Programs to Employment as answered by the participants. The responses to question 5 indicated that approximately 69% of the participants felt that the hands-on structure of Industrial Technology was relevant to their job. According to question 8, approximately 85% of the participants indicated that they felt management courses they received in Industrial Technology program were relevant to their jobs.

Table 4.6  Relevance of Academic Programs to Employment, Section D (n=35)

<table>
<thead>
<tr>
<th>Questionnaire items measuring students’ Perceptions of the Ind Tech Program</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The knowledge I have acquired in the Industrial Technology program made me competent for employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>Agree</td>
<td>16</td>
<td>45.7</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>16</td>
<td>45.7</td>
</tr>
<tr>
<td>2. My course of study in Industrial Technology is related to my job</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>Undecided</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td>Agree</td>
<td>14</td>
<td>40.0</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>11</td>
<td>31.4</td>
</tr>
</tbody>
</table>
Table 4.6 cont.

3. The education I received in Industrial Technology does provide me with skills I can use in my job

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undecided</td>
<td>2</td>
<td>5.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>16</td>
<td>45.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>16</td>
<td>45.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. The Industrial Technology program prepared me to be competitive in my field

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>8.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undecided</td>
<td>7</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>12</td>
<td>34.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>13</td>
<td>37.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. The hands-on experience I received in the Industrial Technology program is relevant to my job

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>8.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undecided</td>
<td>8</td>
<td>22.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>15</td>
<td>42.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>9</td>
<td>25.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. The feedback provided by instructors helped my excel in the program

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
<td>8.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>19</td>
<td>54.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>12</td>
<td>34.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.6 cont.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. The technology courses I received from Industrial Technology is relevant to my job</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>8. The management courses I received from Industrial Technology is relevant to my job</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>9. The business courses I received from Industrial Technology is relevant to my job</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>10. The job preparation I received from other university sources on campus was adequate</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>

The following figures 4.1-4.5, illustrate additional findings related to research question 1, What are the alumni perceptions of the transferability of the skills acquired
from their Industrial Technology program to industry? Figure 4.1 illustrates questionnaire item number 2 from section D, My course of study in Industrial Technology is related to my job. Over 71% of the participants perceived that their course of study was related to their job, and only 11% reported that their course of study was not related to their job.

![Bar Chart](chart.png)

Figure 4.1 Perceptions of Item Number 2. My Course of Study in Industrial Technology is Related to my Job

Figure 4.2 illustrates questionnaire item number 1 from section D, The knowledge I have acquired in the Industrial Technology program made me competent for employment. Approximately 91% of the participants perceived that they have gained...
knowledge in the field of Industrial Technology and that that knowledge was beneficial to them.

![Figure 4.2 Perceptions of Item Number 1. The Knowledge I have Acquired in the Industrial Technology Program Made me Competent for Employment](image)

Figure 4.3 shows questionnaire item number 9 from section D, The business courses I received from Industrial Technology are relevant to my job. Over 75% of the participants perceived that their business courses were related and applicable to their current job and less than 6% perceived that their business courses were not.
Figure 4.3  Perceptions of Item 9. The Business Courses I Received From Industrial Technology is Relevant to my Job

Figure 4.4 illustrates questionnaire item number 7 from section D, The technology courses I received from Industrial Technology are relevant to my job. The responses to question 7 indicated that approximately 74% of the participants felt that the technology courses they took were applicable to their job. This response coincided with the fact that 65.70% of the participants indicated that they were employed in an area related to their area of emphasis and degree, which was either in manufacturing, maintenance, automation, quality, time and motion, safety, electrical/electronics, robotics or management.
Figure 4.4 Perceptions of Item Number 7. The Technology Courses I Received from Industrial Technology is Relevant to my Job

Figure 4.5 illustrates questionnaire item number 3 from section D, the education I received in Industrial Technology did provide me with skills I can use in my job. The responses to question 3 indicated that over 90% of the participants felt that the overall education in Industrial Technology supplied them with the appropriate skills needed in their job and less than 3% felt that their education that the received did not provide them with the appropriate skills needed in their job.
Research Question Two

Research question 2 asked: What are alumni perceptions of the support services provided in the Industrial Technology program? The researcher used all 5 questionnaire items of Section C; Perception of the support systems, to provide data for this question and table 4.7 shows the results. The responses to question 2 indicated that 97% of the participants perceived that they were supported by the Industrial Technology faculty, while less than 3% perceived differently. According to question 4, nearly 89% perceived that the Industrial Technology facilities aided them in being successful in the program. According to question 1, over 80% of the participants perceived that the instructors in the
Industrial Technology program were well educated about the field and area of specialization.

Table 4.7  Perceptions of the Support Systems (n=35)

<table>
<thead>
<tr>
<th>Perception</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The instructors in Industrial Technology are knowledgeable in their area of specialization/discipline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td>Undecided</td>
<td>14</td>
<td>40.0</td>
</tr>
<tr>
<td>Agree</td>
<td>17</td>
<td>48.6</td>
</tr>
<tr>
<td>2. The Industrial Technology faculty were supportive in the Industrial Technology program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Undecided</td>
<td>14</td>
<td>40.0</td>
</tr>
<tr>
<td>Agree</td>
<td>20</td>
<td>57.1</td>
</tr>
<tr>
<td>3. There were enough faculty to cover Industrial Technology courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>12</td>
<td>34.3</td>
</tr>
<tr>
<td>Disagree</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td>Undecided</td>
<td>13</td>
<td>37.1</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>11.4</td>
</tr>
</tbody>
</table>
Table 4.7 cont.

| 4. The Industrial Technology facilities assisted me to succeed in my program |
|-------------------------------|----------|--------|
|                               | Strongly | 1      |
|                               | Disagree | 0      |
|                               | Disagree | 0      |
|                               | Undecided| 3      |
|                               | Agree    | 21     |
|                               | Strongly | 10     |
|                               | Agree    | 60.0   |
|                               |          | 28.6   |

| 5. The faculty advisement was beneficial to me in Industrial Technology |
|-----------------------------|----------|--------|
|                             | Strongly | 0      |
|                             | Disagree | 0      |
|                             | Disagree | 2      |
|                             | Undecided| 2      |
|                             | Agree    | 15     |
|                             | Strongly | 16     |
|                             | Agree    | 42.9   |
|                             |          | 45.7   |

Figures 4.6 and 4.7 represent additional findings related to research question 2.

What are alumni perceptions of the support services provided in the Industrial Technology program? Figure 4.6 illustrates questionnaire item number 3 from section C; there were enough faculty to cover Industrial Technology courses. Only 37% of the participants perceived that the number of faculty was adequate in the program and 34% of the participants perceived that there was not enough faculty to cover Industrial Technology courses.
Figure 4.6 Perceptions of Item Number 3, There Were Enough Faculty to Cover Industrial Technology Courses

Figure 4.7 illustrates questionnaire item number 5 from section C; The faculty advisement was beneficial to me in Industrial Technology. Approximately 89% of the participants perceived that the faculty provided them with good advice regarding the Industrial Technology courses that they should take as well as their areas of concentration.
Research Question Three

Research question 3 asked: Does a relationship exist between alumni perceptions of the Industrial Technology program and various demographic characteristics? The researcher used 4 questionnaire items that pertained to salary, race, age and marital status from Section A, Demographics and all 13 questionnaire items from Section B, Perception of Academic Program of the instrument to gather the information. Multiple regression was used to analyze the data for this question. Tables 4.8 and 4.9 illustrates the multiple linear regression findings. The $R^2$-squared values indicated a proportion of variance in
alumni perceptions of the Industrial Technology program which can be predicted from
the variables race, age, marital status and salary. For example, in model 1, 31.6% of the
variance in alumni perceptions of the Industrial Technology program scores can be
predicted from the predictor variables. The adjusted R-squared values signified the
proportional change in the R-squared value if the study were to be replicated with a much
larger sample. It also allowed the researcher to see how well the model could be
generalized. Model 3 indicated that the adjusted R-squared value would be the difference
between the R-squared value and the adjusted R-squared value (.246-.134=.112 or
11.2%). If the model were derived from the population rather than a sample, 11.2% less
variance would be accounted for in the outcome. (see Table 4.8).

Table 4.8 illustrates 3 models that pertained to alumni perception questionnaire
items 7, 9, and 10 respectively, in section B of the instrument. These questionnaire items
had one or two of the predictor variables (race, age, marital status, and salary)
significantly affecting the criterion variable (alumni perception of the Industrial
Technology Program). In table 4.8 the $R^2$ value for Model 3 indicates that 32.2% of the
criterion variance can be accounted for by its relationship with the predictor variables.
The $t$-test indicated if any of the Beta coefficients of the models were statistically
significant. In Model 1, the predictor variable age was a statistically significant predictor
of alumni perception that pertained to questionnaire item 7; I perceived that the degree to
which technology is integrated into my program was adequate, p. $\leq .05$. In Model 2, the
predictor variables race and salary were statistically significant predictors of alumni
perception that pertained to questionnaire item 9, I perceive the Industrial Technology
courses provided me with relevant problem solving skills needed in the work place, p. ≤ .05. In Model 3, the predictor variables age and salary were statistically significant predictors of alumni perception that pertained to questionnaire item 10; I perceived that the Industrial Technology program improved my communication skills which assisted me in gaining employment, p. ≤ .05.

Table 4.8 Alumni Perceptions of the Program Based on Demographic Characteristics (n=35)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1: Alumni Perception Item 7*</td>
</tr>
<tr>
<td>Criterion Variable</td>
<td>β</td>
</tr>
<tr>
<td>Constant</td>
<td>7.35</td>
</tr>
<tr>
<td>Predictor Variables</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>-.107</td>
</tr>
<tr>
<td>Age</td>
<td>-.472</td>
</tr>
<tr>
<td>Married</td>
<td>.036</td>
</tr>
<tr>
<td>Salary</td>
<td>-.161</td>
</tr>
<tr>
<td>R²</td>
<td>0.316</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.222</td>
</tr>
</tbody>
</table>

*p < 0.05

1. Alumni perception question 7 – I perceived that the degree to which technology is integrated into my program was adequate
2. Alumni perception question 9 – I perceived that the Industrial Technology courses provided me with relevant problem-solving skills needed in the work place
3. Alumni perception question 10 – I perceived that the Industrial Technology program improved my communication skills which assisted me in gaining employment

Table 4.9 illustrates 3 models that pertained to alumni perception questionnaire items 11, 13, and 8 respectively, in section B of the instrument. These questionnaire
items had one or two of the predictor variables (race, age, marital status, and salary) significantly affecting the criterion variable (alumni perception of the Industrial Technology Program). In table 4.9 the $R^2$ value for Model 2 indicates that 31.3% of the criterion variance can be accounted for by its relationship with the predictor variables. The $t$-test indicated if any of the Beta coefficients of the models were statistically significant. In Model 4, the predictor variables age and salary were statistically significant predictors of alumni perception that pertained to questionnaire item 11; I perceived that my program was not applicable to the field, $p. \leq .05$. In Model 5 the predictor variable race was a statistically significant predictor of alumni perception that pertained to questionnaire item 13, I perceived that the Industrial Technology courses need to be redesigned to make them relevant to industry, $p. \leq .05$. In Model 6 the predictor variable age was a statistically significant predictor of alumni perception that related to questionnaire item 8, I perceived that the equipment used in my program was similar to the equipment used in my place of employment, $p. \leq .05$.

Research Question Four

Research question 4 asked: Do differences exist between alumnus who have gained employment in the field of Industrial Technology and those who did not gain employment in Industrial Technology (INDT) related jobs? The researcher used all 13 questionnaire items from Section B and one questionnaire item from Section A, questionnaire item 15, (Is your present position directly related to your program of study?) to gather the information. An independent $t$-test was conducted to evaluate
whether there was a statistically significant difference between the alumni that have
gained employment in the field of Industrial Technology and those that did not.

Table 4.10 illustrates that the mean score was slightly higher for those alumni that
had employment in the field of Industrial Technology (M = 3.77, SD = .390) than those
that did not have employment in the field of Industrial Technology (M = 3.74, SD = .385)
and the two groups were not significantly different, \( t(33) = .256, p = .799 \).

<table>
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<th>Employment in the field</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
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<td>.390</td>
<td>0.256</td>
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<td>.799</td>
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<tr>
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<td>12</td>
<td>3.74</td>
<td>.385</td>
<td></td>
<td></td>
<td>.799</td>
</tr>
</tbody>
</table>

\(* p < .05\)

**Descriptive Research Summary**

This chapter presented data analysis in the form of tables and figures to give a
description of the alumni perceptions of the questionnaire items asked on the researcher’s
survey (see Appendix B) that pertained to the Industrial Technology undergraduate
program at Mississippi State University. The alumnus answered questionnaire items that
related to their perceptions about the skills they had acquired from the program and the
support services of the program. This chapter also discussed the relationship among
alumnus in their perceptions of the Industrial Technology program as well as evaluated if
there was a difference between alumnus who have gained employment in the field of
Industrial Technology and those who did not gain employment in Industrial Technology related jobs.

Additionally, analysis of data revealed demographic information regarding age, concentration areas of the alumni participants, whether or not alumni had jobs related to their degree area, and how many alumni had higher degrees. The majority (85.70%) of alumni who participated in the study were in the age range of 23-32 and there were no females in the study. Only 2.9% of the alumni participants concentrated their Industrial Technology degree in Industrial Distribution and none of the alumni concentrated in the area of Industrial Automation. When asked if the alumni’s job related to their degree, 34.3% of the alumni participants answered no and when asked if they had a degree higher than a bachelor, only 3% of the alumni participants answered yes.
CHAPTER V
DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to investigate the alumni perceptions of the Industrial Technology program and its transferability to industry. Knowledge transfer according to Devin (2006, pp.2-9) was “the ability to apply information learned in one context to new contexts”. The participants of this study consisted of 35 alumni volunteers who have obtained a baccalaureate degree in Industrial Technology (INDT) in the Department of Instructional Systems and Workforce Development at Mississippi State University (MSU) between 2000 and 2007 and all of the alumni volunteers were males. The majority of the participants fell in the 23-32 years old age range. This chapter includes the following sections: discussion of the findings, conclusions drawn from the findings and recommendations. A survey was used to gather and evaluate the alumni perceptions’ of the Industrial Technology program and its transferability to industry and their responses were later recoded to allow for analysis. This study concentrated on four research questions that were either based on Likert-scale items, descriptive statistics, both or inferential statistics. Descriptive statistics, frequencies, percentages, multiple regression and the independent $t$-test analysis were computed to examine the perceptions of the alumni. Data was analyzed using the Statistical Package for the Social Sciences (SPSS) 16 version sof
Discussion of the Findings

Research question one examined the alumni perceptions of the transferability of the skills acquired from their Industrial Technology program to industry. The researcher used two sections: B, Perception of Academic Program and D, Relevance of Academic Programs to Employment of the instrument to analyze this question. Approximately 57.1% indicated that the academic program helped them in gaining employment. However, questionnaire item 11 in section B showed that 34.3% disagreed and 51.4% strongly disagreed that their program was not applicable to the field. This perception could be attributed to the alumnus obtaining employment in areas of the Industrial Technology field or others perceiving that some of the courses that they took did directly relate to Industrial Technology such as quality assurance, fluid mechanics, basic and advanced electricity as well as welding.

When asked if the equipment used in the program was similar to the equipment used in their place of employment, only 5.7% strongly disagreed, which indicated that the program does have up-to-date equipment that is used in industry and when ask if the Industrial Technology courses provided me with relevant problem-solving skills needed in the work place, 62.9% of the participants agreed with this statement. The reader should keep in mind that Industrial Technology was defined as, “a field of study designed to prepare technical and/or management oriented professionals for employment in business, industry, education, and government” (NAIT, 1997, p. 1) who want employment “leading to supervisory and management positions in the production or logistics areas of industry” (Mississippi State University, 2009). The 62.9% rate, that
pertained to question 9, showed that the majority of the participants perceived that the Industrial Technology courses had provided them with the necessary problem-solving skills needed to obtain a supervisory or management position. This was an encouraging find because it encompassed the definition of Industrial Technology.

Nearly 57% of the participants agreed that the Industrial Technology courses need to be redesigned to make them relevant to industry (Question 13). The fact that the field of Industrial Technology is hands-on oriented, may have played a role in this perception and majority of the participants may be employed in an industrial environment that requires that physical capability. More lab activities may be considered instead of lectures. Considering that this study had more alumnus in the pre 2004 concentration areas, this finding may have been influenced and due to the curriculum being changed after the 2003 academic year, skewness is present in this result. In respect to the alumni perception of the relevance of the academic program, overall 91.4% indicated that the knowledge they have acquired in the Industrial Technology program made them competent for employment and 91.4% also indicated that the education they received in Industrial Technology did provide them with skills they can use in their job.

Approximately 69% of the participants felt that the hands-on structure of Industrial Technology was relevant to their job. This is echoed in chapter I, when Foster (1995) stated that “the curriculum needed to be modified so that students would have to design their own projects in classrooms that require them to complete projects as part of the coursework”. This emphasized the need for hands on learning in Industrial Technology and is still evident today.
Overall, 74.3% of the alumni indicated that the technology courses they had received from Industrial Technology were relevant to their job. This finding pointed out that the alumni believed that the job they had was relevant and directly related to their academic program. In addition, over 71% of the participants perceived that their course of study was related to their job, and only 11% reported that their course of study was not related to their job. This finding was important because it proved, according to the participants that their course of study in Industrial Technology was in some function, related to their job. Approximately 85% of the participants indicated that they felt management courses they received in Industrial Technology program were relevant to their jobs, question 8. This is an important find because an Industrial Technologist, by definition, migrates to a supervisor or manager position in the field and they need these necessary skills to obtain that position.

Research question two examined the alumni perceptions of the support services provided in the Industrial Technology program. More than 95% of the alumni reported that the Industrial Technology faculty were supportive in the Industrial Technology program. One student stated in the comments section of the survey that “Instructors and staff were very involved in students’ educational path. They went above and beyond to motivate, guide, and educate students through Industrial Technology. NAIT’s, involvement was exceptional and made the educational experience more enjoyable. Industrial Technology staff worked wonders with the limited equipment/materials they were afforded by the department to educate us”. Furthermore, 34.3% disagreed with the statement that there was enough faculty to cover Industrial Technology courses. This
finding indicated that the alumni perceived that there should be more faculty to cover the curriculum in the Industrial Technology program.

Overall, 88.6% of the alumni indicated that the instructors in Industrial Technology are knowledgeable in their area of specialization/discipline. This finding was very important because it showed that the alumni perceived that their instructors had adequate background knowledge about the subject areas that they were in and also the instructors were able to transfer their work experiences to the classroom. In general, 88.6% of the alumni perceived that the faculty advisement was beneficial to them in Industrial Technology. This finding showed that the alumni trusted the faculty to guide them in the right direction regarding their course of study and the proper courses to take.

Research question three examined if a relationship existed between alumni perceptions of the Industrial Technology program and various demographic characteristics? When asked if the degree to which technology is integrated into my program was adequate, questionnaire item 7; the variable age had a statistically significant impact on the outcome. This could be implicated by the fact that the majority of the participants were over the age 25 and had not been involved with recent technology. There was also a statistically significant difference when looking at the variable age and the statement I perceived that the equipment used in my program was similar to the equipment used in my place of employment, questionnaire item 8. The variable race and the questionnaire item 13, I perceived that the Industrial Technology courses need to be redesigned to make them relevant to industry had a statistically significant difference. This perception was confirmed by one of the alumni’s comments
in the comments section of the questionnaire that stated, “In my occupation I have not used the technical aspects of the Industrial Tech degree. I do feel the industrial classes are vital to give a student the proper vocabulary and thought process to enter the industrial workforce, however; in comparison to engineering counter parts I have found myself lost in basic concepts. I feel the IT degree was a fun program that introduced basic ideas and awareness of ideas and concepts of what was in the technology field but not enough knowledge to speak about it intelligently. I feel more focus on leadership, small group projects and research papers as group projects would help future IT students up for better success. I honestly feel the IT degree does what is intended create a middle manager in an industrial setting, but this is too broad of a goal. I feel more specialized studies on the basics will set IT students apart from our much better versed engineering counter parts that can be competed with, technical wise”. There was a statistically significant difference between the variables race and salary and questionnaire item 9, I perceived that the Industrial Technology courses provided me with relevant problem-solving skills needed in the work place. There was also a statistically significant difference between the variables age and salary and questionnaire item 10, I perceived that the Industrial Technology program improved my communication skills which assisted me in gaining employment. This finding is significant because it reiterated the fact that industrial technologist must be able to communicate as they are, as an end result, designed to be prepared for technical and/or management oriented professionals. When looking at the variables age and salary and questionnaire item 11, I perceived that my program was not applicable to the field, there was a statistically significant difference.
Research question four examined if differences existed between alumni who have gained employment in the field of Industrial Technology and those who did not gain employment in Industrial Technology (INDT) related jobs? The findings for this question indicated that there was no statistically significant difference between those alumni who have gained employment in the field of Industrial Technology and those that did not gain employment in Industrial Technology related jobs. This finding re-emphasized the definition of Industrial Technology as, “a field of study designed to prepare technical and/or management oriented professionals for employment in business, industry, education, and government” (NAIT, 1997, p. 1) who want employment “leading to supervisory and management positions in the production or logistics areas of industry” (Mississippi State University, 2009) and implied that the curriculum of Industrial Technology had a broad range of study that allowed the alumni to pursue a variety of employment options associated with Industrial Technology.

**Conclusions**

Alumni provided valuable information in identifying changes and perceptions of Industrial Technology programs and according to Butler, Izadi, and Toosi (1995), “With regard to the importance of alumni input to IT programs, a Delphi panel of chairpersons of accredited IT programs identified alumni involvement as an extremely important research topic for Industrial Technology”. Based on this study which looked at 35 alumni perceptions of the Industrial Technology program and its transferability to
industry, several implications and conclusions can be drawn. The implications and conclusions may only be generalized to the 35 alumni who participated in this study.

The major finding of this study was that the alumni perceived the Industrial Technology curriculum to be adequate for current industry. This is important because the main intent of Industrial Technology programs was to “render students with the knowledge, skills, attitudes, abilities and values essential to the continuing development of society and the industries to which they belong” (Brown & Meier, 2005, p.2). Zargari and Hayes (1999) stated, “the majority of IT graduates have been able to enter the workforce in a position related to their field of study, and are satisfied with their occupations”, with 80% of those participants agreeing that their present occupation was directly related to their respective programs in the study of 1999 and 65.70% perceiving the same sentiment in 2009, the researcher’s findings are very similar. Findings also showed that alumni are pleased with their problem-solving ability with a 91.5% approval rating and this was one of the factors that influenced the curriculum development of Industrial Technology. Industrial Technology was influenced by the lack of knowledge that alumni had in regards to problem solving ability and according to Zargari and Coddington (1999) “….The discipline of Industrial Technology was established to meet the needs of business and industry for employees who could use the complex tools of production and at the same time were able to manage personnel and facilities.” This has continued to be a focal point for studies in Industrial Technology.

Considering the perceptual findings of the alumnus when it came to whether or not they felt more competent after earning a degree in Industrial Technology, Zargari’s
and Hayes’s (1999) study produced a 49% agree rating while the researcher’s study produced a 45.7% rating. With respect to the percentages, the Industrial Technology curriculum seemed to be motionless when it came to improving the alumni’s competence level. This finding showed that the alumni perceived that their competence level did not increase in the area of Industrial Technology after they obtained their degree and this is an issue that may need to be addressed.

Another perception that is echoed in both Zargari’s and the researcher’s studies are the support services provided in the Industrial Technology programs. Advising, mentoring, and teaching are high motivational factors when it came to completing a degree and in Industrial Technology those factors are rated among the top three. Advising and/or mentoring are the ability of a professor or teacher to guide the student through their respective programs effectively. In Zargari’s and Hayes’s (1999) study, advising/mentoring, according to the alumni’s perceptions, produced some positive remarks and the researcher’s study produced the same sentiments. The alumni perceptions to the questionnaire items in Section C, Perception of the support systems all had positive percentage ratings of 80% or higher except for questionnaire item 3, there were enough faculty to cover Industrial Technology courses, which produced a positive percentage rating of only 48.5%. Overall the researcher’s study reflected the alumni perceptions in Zargari’s and Hayes 1999 study. In addition to instructors providing guidance, the ability of the instructors to transfer knowledge to the students based on the Industrial Technology curriculum is imperative. The findings of the researcher’s study showed that the alumnus had the same perceptions of the alumnus in the Zargari’s and
Hayes’s (1999) study that evaluated the alumni’s perception of the knowledge of the instructors teaching abilities.

Alumnus not only expressed their perceptions of the support services in the Industrial Technology program but also perceived that the program should be included in a different college or school. One of the comments that the alumni wrote in the comments section of the questionnaire were, “I’m sure that the Industrial Technology curriculum has improved significantly at MSU since my attendance. I’ve written as well as called several faculty members of the Industrial Technology department at MSU asking why is the program in the Dept of Education when other universities (majority of them) have the program in the Dept. or College of Engineering. Most Industrial Technology students go into engineering or technical fields that are no different from industrial engineering graduates. It is difficult to explain to people the degree as well as why the diploma says College of Education when the job title and responsibilities are engineering related.” Since majority of the Industrial Technology alumni obtain jobs in engineering fields, this is the consensus of several alumni. The only problem is that Industrial Technology does not have an engineering background and a lot of industries view Industrial Technologists as engineers, therefore giving them engineering type assignments. This is another issue that needs to be investigated.

The descriptive findings of this study showed that females represented 0% of the alumnus participants, which has been another issue in the field of Industrial Technology. Females have not had a distinct voice in Industrial Technology in a long time. After its inception, women and their voices were closed off from Industrial Arts and industrial
education. According to Zuga (1997), “the early female advocates and practitioners in Industrial Arts were slowly eliminated and the record of their participation in the field conveniently forgotten” (p. 206). Female industrial technologists are definitely outnumbered in the field as well as in universities and colleges, moreover in the department at Mississippi State University.

According to one study “the faculty population of Industrial Technology departments was reported to be less than 8% female by one study” and a more recent study puts the “percentage of Industrial Technology faculty at the university level at 9.8%” (Kasi & Dugger, 2000). This low percentage is also represented in the classrooms. The researcher noticed that of 219 alumni who have obtained a baccalaureate degree in Industrial Technology (INDT) in the Department of Instructional Systems and Workforce Development at Mississippi State University (MSU) between 2000 and 2007, females represented less than 6%. This fact is supported by a study that found that women students “represent only 16% of Industrial Technology majors” (Kasi & Dugger, 2000). Females are not being represented well in the field of Industrial Technology and some attribute this to the views of society, Bostic (1998) argued that “society’s idea of what is ‘proper’ work for females may be the most influential factor” (p. 2).

**Recommendations**

As universities and colleges prepare to send Industrial Technologists out into society, they must keep in mind that the challenges ahead of higher education in the 21st
Century are immense. The ever continuing demand for accountability, the changing technological aspects of society and alternative types of course delivery are all contributing to the questions: Are students prepared for employment after graduation? Do graduates possess the skills that industry desire?

Based on the research findings of this study, the following recommendations are made for instructors of the Industrial Technology program at MSU to help strengthen the curriculum program.

1. There should be more opportunities for students to work with “real-world” companies on projects within Starkville and surrounding areas to promote more hands-on learning experiences, which is a vital aspect of Industrial Technology.

2. Faculty recruitment is a priority in Industrial Technology to increase the faculty to student ratio.

3. Future studies should be conducted to determine if the curriculum program is adjusting to societal changes as well as industry requirements.

4. Future studies should be conducted with graduating seniors to determine their perception of the Industrial Technology curriculum.

5. Recruiting needs to be more varied in the field of Industrial Technology to focus not only on male students but female students as well.

6. Future studies should be conducted according to ATMAE in order for the MSU Industrial Technology program to become and continue to be accredited.

7. Equipment needs to be updated accordingly to stay abreast with industry practices.
8. Future studies should be conducted with co-op and intern students in Industrial Technology to determine the transferability of their acquired skills to industry.

9. Future studies should be done with the Industrial Technology staff to determine their perceptions of the program.
REFERENCES


98


State Committee on Coordination and Development. (1934). *A Prospectus for Industrial Arts in Ohio*. Columbus: Author.


APPENDIX A

IRB APPROVAL LETTER
June 4, 2007

Hashium Lawrence
1257 Louisville St. Apt. 78
Starkville, MS 39759

RE: IRB Study #07-118: An investigation of graduate students’ perception of the industrial technology undergraduate program at Mississippi State University and its transferability to industry

Dear Mr. Lawrence:

The above referenced project was reviewed and approved via administrative review on 6/4/2007 in accordance with 45 CFR 46.101(b)(2). Continuing review is not necessary for this project. However, any modification to the project must be reviewed and approved by the IRB prior to implementation. Any failure to adhere to the approved protocol could result in suspension or termination of your project. The IRB reserves the right, at anytime during the project period, to observe you and the additional researchers on this project.

Please refer to your IRB number (#07-118) when contacting our office regarding this application.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact Christine Williams at cwilliams@research.msstate.edu or 325-5220.

Sincerely,

Christine Williams
IRB Compliance Administrator

cc: John Wyatt
APPENDIX B

INDUSTRIAL TECHNOLOGY QUESTIONNAIRE
Instructions:

The purpose of this self-report questionnaire survey is to assess the Industrial Technology students’ transferability of the knowledge gained in the program to industry. The questionnaire contains four parts. Section A is the demographic information. Section B looks at the perception of the academic program. Section C looks at the perception of the support systems of the Industrial Technology program. Section D looks at the relevance of the academic program and your job employment.

Section A: Demographic Information

Please read the following questions/descriptions and respond to the number(s) that are appropriate to you.

1. Gender
   1. Male
   2. Female

2. What is your race?
   1. Caucasian
   2. African American
   3. American Indian/Alaskan Native
   4. Asian or Pacific Islander
   5. Hispanic
   6. Other, please specify__________________________
3. Age:___________________________

4. Are you married? (if your answer is yes, please answer question number 5)
   1. No
   2. Yes

5. Were you married:
   1. After you obtained your undergraduate degree
   2. During your course of study

6. Did you have a job while you were in school? (if your answer is yes, please answer question number 7)
   1. Yes
   2. No

7. Were you employed:
   1. Full-time
   2. Part-time

8. Degree Earned: Please circle your degree earned in Industrial Technology
   1. B.S. Industrial Technology-Manufacturing & Maintenance Management
   2. B.S. Industrial Technology-Industrial Automation
   3. B.S. Industrial Technology-Industrial Distribution
   B.S. Industrial Technology-Manufacturing Mgt.

9. What year did you receive your undergraduate degree?
   ________________________________

10. Do you have a degree higher than a Bachelor’s?
    1. No
    2. Yes (if yes please state which)_________________________________

11. How old were you when you received your undergraduate degree?
    1. 20 and below
    2. 21-24
    3. 25-28
    4. 29-32
    5. 33-36
6. 37-40
7. 41 and older

12. In what state do you work? ________________________________

13. What is your current job title? ________________________________

14. What area does your current position include? Circle all that apply.
   1. Manufacturing
   2. Maintenance
   3. Automation
   4. Quality
   5. Time and Motion
   6. Safety
   7. Electrical/Electronics
   8. Robotics
   9. Management
   10. Other______________________________

15. Is your present position directly related to your program of study?
   1. Yes
   2. No

16. What is the primary function of the company/organization where you work?
   1. Aviation
   2. Communications
   3. Consulting
   4. Distribution
   5. Education
   6. Manufacturing
   7. Technical Sales
   8. Transportation
   9. Other______________________________

17. I have had _________ job(s) in the field of Industrial Technology?
   1. 1
   2. 2
   3. 3
   4. 4 or more
18. What is your present salary?
   1. Below $35,000 $36,000-$40,000
   2. $41,000-$45,000 $46,000-$50,000
   3. $51,000-$55,000 $56,000-$60,000
   4. $61,000-$65,000 $66,000-$70,000
   5. $71,000-more
Section B: Perception of Academic Program

Please circle the number that best reflects your opinion on each statement/characteristic

Questionnaire Items

<table>
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<tr>
<th></th>
<th>SD</th>
<th>DA</th>
<th>UND</th>
<th>AG</th>
<th>SA</th>
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</tbody>
</table>

SD=Strongly Disagree DA=Disagree
UND=Undecided AG=Agree SA=Strongly Agree

I perceive that…

1. the academic program helped me in gaining employment

2. the quality of instruction I received in the program helped me gain employment

3. the Industrial Technology lab activities provided me with the skills to gain employment

4. there were several hands-on applications in Industrial Technology that benefited me in making a decision about employment

5. the continuity in the courses offered in Industrial Technology provided me with relevant knowledge in the field

6. overall, I am satisfied with the Industrial technology program

111
7. the degree to which technology is integrated into my program was adequate
   1 2 3 4 5

8. the equipment used in my program was similar to the equipment used in my place of employment
   1 2 3 4 5

9. the Industrial Technology courses provided me with relevant problem-solving skills needed in the work place
   1 2 3 4 5

10. the Industrial Technology program improved my communication skills which assisted me in gaining employment
    1 2 3 4 5

11. my program was not applicable to the field
    1 2 3 4 5

12. the Industrial Technology courses emphasized team work which is a useful skill in the field
    1 2 3 4 5

13. Industrial Technology courses need to be redesigned to make them relevant to industry
    1 2 3 4 5

Please provide any additional comments that you may have:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
### Section C: Perceptions of Support Systems

*Please circle the number that best reflects your opinion on each statement/characteristic*

**Questionnaire Items**

<table>
<thead>
<tr>
<th>SD</th>
<th>DA</th>
<th>UND</th>
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</tbody>
</table>

SD=Strongly Disagree DA=Disagree
UND=Undecided AG=Agree SA=Strongly Agree

---

I perceive that...

1. the instructors in Industrial Technology are knowledgeable in their area of specialization/discipline

   1  2  3  4  5

2. the Industrial Technology faculty were supportive in the Industrial Technology program

   1  2  3  4  5

3. there were enough faculty to cover Industrial Technology courses

   1  2  3  4  5

4. the Industrial Technology facilities assisted me to succeed in my program

   1  2  3  4  5

5. the faculty advisement was beneficial to me in Industrial Technology

   1  2  3  4  5
Section D: Relevance of Academic Programs to Employment

*Please circle the number that best reflects your opinion on each statement/characteristic*

**Questionnaire Items**

<table>
<thead>
<tr>
<th>SD</th>
<th>DA</th>
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</tbody>
</table>

SD=Strongly Disagree DA=Disagree
UND=Undecided AG=Agree SA=Strongly Agree

I perceive that…
1. the knowledge I have acquired in the Industrial Technology program made me competent for employment
2. my course of study in Industrial Technology is related to my job
3. the education I received in Industrial Technology does provide me with skills I can use in my job
4. the Industrial Technology program prepared me to be competitive in my field
5. the hands-on experience I received in the Industrial Technology program is relevant to my job
6. the feedback provided by instructors helped me excel in the program
7. the technology courses I received from Industrial Technology is relevant to my job
8. the management courses I received from Industrial Technology is relevant to my job
    1  2  3  4  5

9. the business courses I received from Industrial Technology is relevant to my job
    1  2  3  4  5

10. that the job preparation I received from other university sources on campus was adequate
    1  2  3  4  5
APPENDIX C
PERMISSION LETTER TO USE AND ADOPT
THE INDUSTRIAL TECHNOLOGY QUESTIONNAIRE
Hashium,

I have no problem with you using the instrument. Please consider this email formal permission on my part.

Best wishes,

Dr. Sutton

Mathias J. Sutton, Ph.D.
Associate Professor
Industrial Technology
Purdue University
401 N. Grant Street
West Lafayette, IN 47907-2021
Voice: (765) 494-1100
Fax: (765) 496-2700
APPENDIX D

INFORMED CONSENT LETTER
INFORMED CONSENT

Heshium Lawrence
Dr. John Wyatt

An Investigation of Alumni Perceptions of the Industrial Technology Undergraduate Program at Mississippi State University and its Transferability to Industry

Department of Instructional Systems and Workforce Development

Mississippi State University

I am conducting a research study. The purpose of this research is to gather information on the perceptions of the Industrial Technology program in the Department of Instructional Systems and Workforce Development at Mississippi State University. I believe that the information gathered in this study will aid the creators of the Industrial Technology curriculum program at Mississippi State University in their curriculum development in regards to job obtainment for Industrial Technology students. The time that it should take you to complete this study will be approximately 30 minutes.

If you agree to participate, you will be asked to complete a 46-item questionnaire. The survey will be made up of questions that will ask you to indicate your perceptions about the Industrial Technology program and how well you believe that the program has prepared you for employment in you area.
There are no foreseeable risks that might occur as a result of your participation in this research project.

Information obtained about you during this study will not be shared with anyone other than the researchers listed above. The data in this study will be reported based on the group’s results and you will not be identified by name at anytime during or following this research project.

Informed Consent Statement

1. I have been informed of the procedures to be used in this study. I understand that I will be asked to complete a 30 minute survey.

2. I understand that there are no known risks expected with participation in this study.

3. I understand that I can skip items and withdraw from this study at anytime.

4. If I have any questions regarding this study, I can contact Heshium Lawrence at 662-325-8318 or Dr. John Wyatt at 662-325-7257. I may also contact the office of Regulatory Compliance at Mississippi State University at 662-325-5220.

Please keep this form for your records.
APPENDIX E

SHORT DESCRIPTION OF SURVEY
INDUSTRIAL TECHNOLOGY QUESTIONNAIRE

An investigation of alumni perceptions of the Industrial Technology undergraduate program at Mississippi State University and its transferability to industry

I am a doctoral student in the Department of Instructional System & Workforce Development at Mississippi State University. (IRB number #07-118). I am conducting research to examine graduate student’s perception of the Industrial Technology (INDT) program at Mississippi State University (MSU). The purpose of this study is to assess the validity of the INDT program at MSU. This information will provide educators with pertinent information about the programs transferability gained into the workforce. Specifically, the researcher aims to determine whether the INDT programs provides MSU students with the knowledge and skills to succeed in the workplace.

The questionnaire is comprised of four sections; demographic information, quality of academic offerings, INDT support systems and finally relevance of academic programs. This questionnaire will take you approximately 30 minutes to complete. I am requesting voluntary participation and you can withdraw your participation at any time if
you choose to. Your participation will be confidential. The questionnaire and the information collected will be destroyed after the data is coded. After you have completed your questionnaire, please return it to the researcher (Heshium Lawrence) via mail. If you have any questions concerning the questionnaire, please contact me on (662) 325-8318 or e-mail me at hrl2@msstate.edu.

Thank you very much for your timely response and cooperation. Your participation is very beneficial and important. A summary report will be developed, if you desire, I will provide you with a copy of that summary. Thank you again for your time and assistance.

Sincerely yours,

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