

**THE ACCEPTANCE OF TECHNOLOGY EDUCATION BY MONTANA'S
INDUSTRIAL ARTS/TECHNOLOGY EDUCATION TEACHERS**

by

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ABSTRACT

The purpose of this study was to determine to what extent the technology education curriculum model has been accepted by Montana's industrial arts/technology education teachers. A secondary purpose was to discover if demographics and professional organization affiliation have impacted the acceptance of the technology education model. A questionnaire survey instrument was developed to gather information related to demographics, educational philosophy and program emphasis. A list of middle/junior high school and senior high school teachers was obtained from the Montana Office of Public Instruction. A response rate of 78% was achieved on the first mailing from a randomly selected sample of 203 IA/TE teachers.

The major conclusions from the study were that: 1) the industrial arts curriculum model predominated IA/TE programs in Montana; 2) the technology education curriculum model was being implemented to varying degrees by Montana's IA/TE teachers; 3) demographic variables contributed to the acceptance/nonacceptance of the TE curriculum model; 4) professional organization affiliation impacted the acceptance/nonacceptance of the TE curriculum model; and 5) teachers that perceived themselves as IA teachers and those that perceived themselves as TE teachers generally agreed on the same educational philosophy.

CHAPTER 1

INTRODUCTION

The educational paradigm of industrial arts has been in an unstable and insecure state ever since the national introduction of the curriculum titled "technology education" in the early to mid 1980's (Volk, 1996; Wicklein, 1997). This uncertainty was not only apparent in Montana but was true in other parts of the nation as well (Davis, personal communication, July 30, 1997; Rogers & Mahler, 1994). While some educators have embraced the new paradigm of technology education, others have been offended that it devalues traditional industrial arts education (Clark, 1989; Volk, 1996).

The literature base provided a variety of definitions for both industrial arts and technology education. Rudsill (1987) explained the difference in philosophies between the two by stating that industrial arts provided occupational skill training while technology education provided technological literacy. Ritz (1992) described industrial arts as the study of the skills and processes of industry with an emphasis on the construction of projects. His description of technology education included the study and application of the

systems of technology (communication, transportation and production), applying the technological method to solve problems and assessing the impacts of technology on society.

A review of educational journals from the past decade revealed that technology education is embraced by national educational leaders and professional organizations across the nation. Clark (1989) described how the technology education paradigm had developed strong support at most levels of American society. The irony of this is that it appeared the acceptance of the technology education paradigm by middle school and secondary school teachers in the field nationwide had only been mediocre at best (Rogers, 1995; Rogers and Mahler, 1994; Volk, 1996).

Research conducted in Montana during the mid 1980's found that the major emphasis of industrial arts and technology education (IA/TE) programs were student projects with an importance put on craftsmanship (Davis, 1985). The question addressed now is whether IA/TE teachers in Montana have changed their philosophies in the past dozen years and accepted the technology education paradigm, and if so to what extent.

To further confuse the issue, it was suspected that the emergence of two professional organizations in Montana (TEAM and MITEA) had in some instances forced IA/TE teachers to choose between educational philosophies. Members of TEAM embraced the philosophical basis of technology education.

On the other hand, MITEA members followed the more traditional industrial arts curriculum (Davis, personal communication, March 11, 1997).

The dichotomy of these state professional organizations raised issues concerning the lack of acceptance of technology education by traditional industrial arts educators. According to Clark (1989) the traditions and beliefs of industrial arts teachers, which are deeply rooted in traditional pedagogical methodologies, have slowed the progress of the acceptance of technology education. It seemed apparent that many IATE teachers were not interested in categorically disposing of a curriculum they spent their entire professional life developing.

Other reasons for the non-acceptance of technology education by traditional industrial arts instructors have been proposed. Volk (1996) suggested that the curriculum of technology education was inferior to traditional industrial arts and therefore was unacceptable to many teachers. Volk continued his criticism by stating that the modular method of instruction commonly used in technology education programs should be chastised for its vendor developed curriculum. Volk was also critical of the atmosphere of competition inherent to many technology education programs because of its "my success requires your failure" environment (p. 5).

"It appears that many efforts in the movement toward technology education have failed because changes have been made in name only, rather

than in an instructors' understanding of the underlying philosophical differences between industrial arts and technology education" (Clark, 1989 p. 1). White (1990) further emphasized the point by stating that "...industrial arts will not be technology education until underlying philosophical differences between industrial arts and technology education are understood and accepted by instructors" (p. 1). In 1962, Kuhn (cited in Clark, 1989) wrote that "emergence of a new candidate for paradigm" is followed by "the subsequent battle over its acceptance" (p. 7). Although the process of curriculum change has been under development for over ten years in Montana there is still dogma that needs to be sorted out by Montana's IA/TE teachers.

Statement of the Problem

It has been more than a decade since a new paradigm, technology education, was introduced to the industrial arts educators of Montana. It has yet to be determined, however, to what magnitude Montana's IA/TE educators have accepted this transformation in educational philosophy.

Purpose of the Study

The purpose of this study was to determine the extent technology education has been accepted by Montana's IA/TE teachers. A secondary purpose was to discover if certain demographic variables and professional organization membership have impacted the acceptance of the technology education paradigm.

Need for the Study

Are the IA/TE teachers in Montana split into two different camps in regards to teaching philosophies? Even the accepted abbreviation "IA/TE" certainly suggest this is in fact the case. After a decade of changing educational philosophies is it safe to assume that one camp has decided to adhere to traditional industrial arts "shop" classes, or perhaps upgrade to industrial technology, while the second camp has rejected industrial arts and accepted a new paradigm called technology education? According to Wright (1992), referring to the rift of technology education and industrial arts nationwide, this is a dangerous situation because it dissipates the focus of the field creating an unstable curriculum structure.

Rogers and Mahler (1994) cautioned that such a dichotomy in the profession makes it difficult for the typical classroom teacher to develop a sense of identity with regard to curricular content. Rogers and Mahler further stated that "If the various groups that comprise technology education, industrial technology education, and industrial arts cannot arrive at a consensus for the direction and amount of curricular change, the field faces possible extinction" (p.20).

Is this the case in Montana?, and if so, to what extent? The data collected from Montana's IATE teachers provided information that determined the extent to which technology education has been accepted statewide. It also determined if demographic variables such as school size, teacher age, geographic location, gender, or if belonging to a particular professional organization have had an effect on how technology education has been accepted. The information gathered in this study may help Montana's Office of Public Instruction and those in teacher training implement strategies for inservice of IATE teachers and guide them in curriculum decisions.

Methodology

The research methodology utilized for this study consisted of a questionnaire mailed to randomly selected IATE teachers currently teaching in

public middle schools and secondary schools located in Montana. A list of names and addresses of these teachers was obtained from the Montana Office of Public Instruction. Because one of the demographic variables analyzed included geographic location, an equal percentage of teachers was randomly selected from both the eastern and western pre-1993 congressional districts of Montana. A response rate of less than seventy percent would result in a weakening of the validity of conclusions (Gay, 1996). Therefore, seventy percent was the targeted minimum response rate for the sample population.

Questions on the survey relating to educational philosophy and program emphasis were obtained from current literature and the Montana School Accreditation Standards. The survey instrument was pre-tested by sending it to several selected IATE teachers in Montana to discover any difficulties in the comprehension of the questions and gain suggestions for improvement.

The returned questionnaires were analyzed to determine the results. Analysis of the data varied for each question and included the percentage of responders who selected each alternative within each question, the overall response rate and computation of averages. Additionally, the relationships between demographics and program emphasis/philosophy was investigated by relating the percentages of responses with the demographic variables.

Specific Objectives

The following objectives were identified for this study:

1. Determine the acceptance level of the technology education paradigm by Montana's industrial arts/technology education teachers.
2. Determine if demographics have an effect on the acceptance of technology education in the industrial arts/technology education programs in Montana's secondary schools.
3. Determine if professional organization affiliation has any impact on the acceptance of the new technology education paradigm.

Assumptions

This study was based on the following assumptions:

1. Some IA/TE teachers in Montana adhere to the educational philosophy of a traditional industrial arts curriculum while other teachers adhere to the educational philosophy of a technology education curriculum and still others are satisfied with a combination of the two philosophies.
2. There is a resistance by some teachers in Montana to change from industrial arts to technology education.

Limitations

The following limitation was identified for this study:

1. The study was directed at public middle and secondary schools in Montana and therefore did not include any private schools or elementary programs.

Definitions

The following terms are defined for clarification and to minimize misunderstanding:

1. Paradigm - A universally accepted set of models and beliefs held by a community of practitioners (Kuhn, 1962).
2. TEAM - An acronym for the Technology Education Association of Montana, affiliated with the International Technology Education Association.
3. MITEA - An acronym for the Montana Industrial Technology Education Association, affiliated with the American Vocational Association.
4. Technology Education - An education program that emphasizes the study and application of the systems of technology including production, communication and transportation. Major components of the program include applying the technological method of problem solving and assessing the

impacts that the application of technology has on individuals, societies and the environment. Technological literacy is a major class outcome (Ritz, 1992; Rudsill, 1987).

5. Industrial Arts - The program emphasis is on the development of knowledge and skills of the processes used in industry, material usage and tool skill development. The construction of a project is the class outcome (Ritz, 1992).
6. Industrial Technology - This is considered to be "modern" Industrial Arts. The emphasis is the same as Industrial Arts/Shop but these programs have brought in new technology tools such as computers, CNC equipment, lasers, etc. (Ritz, 1992).
7. Secondary Schools - Schools in Montana that include grades 7 through 12.
8. Middle Schools - Schools in Montana that include grades 6 through 8.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

This chapter provides insight into literature relevant to this study. It begins with an historical perspective of the development of industrial arts and technology education as a curriculum. Next, a discussion of the debate over the changes that have been proposed in the field of IATE will be reviewed. Finally, an examination of related studies will be addressed.

An Historical Perspective

Most curricula areas in education have had a long and stable history but the IATE curriculum appears to have a history indicating a lack of consistency in definitions, objectives and philosophy (Kirkwood, Foster & Bartow, 1994; Wright, 1992; Zuga, 1989). One chronic problem that appeared in the literature is that of a disparity between philosophy and the actual curriculum content practiced in

the schools (Clark, 1989; Foster, 1994; Kirkwood, et al. 1994; Waetjen, 1992; Zuga, 1989; Zuga, 1994). Although the original definition for industrial arts developed by Bonser and Mossman in 1923 is similar to the current definition of technology education, there has been a discrepancy throughout history between these widely published definitions (and corresponding philosophies) and what has actually taken place in the classrooms of this country (Foster, 1994; Zuga, 1994).

This discrepancy in no small part can be attributed to the lack of consistency in teacher preparation programs. Rogers (1996) conducted a survey to discover the technical content of IA/TE teacher education programs and found that there was a total lack of consistency around the country in this regard. Rogers (1996) concluded that "This lack of consistency could have a detrimental impact on the field, as graduates from its teacher education programs do not possess a common base of technical competencies" (p.10). The Council on Technology Teacher Education (CTTE) and the International Technology Education Association (ITEA), in association with the National Council for Accrediting Teacher Education, have attempted to implement nationwide teacher education standards that reflect the technology education paradigm. Despite these efforts Wright (1997) suggested there was evidence that change has not happened in a number of universities. Wright went on to state several reasons for the lack of change including resistance to change from

faculty members, insufficient resources and political power, lack of program control and lack of motivation and reward. It therefore comes as no surprise that IATE teachers around the country are providing a curriculum as varied as the teacher preparation institutions that they attended. This situation can only fuel the debate of the IATE reform movement. Unfortunately these circumstances may also be contributing to a steep decline in the number of IATE teacher graduates and the termination of a number of IATE teacher education programs across the country (Pucel & Flister, 1997; Volk, 1997).

Most IATE professionals believe the technology education paradigm was a result of the 1980's educational reform movement but Herschblach (1997) established that its theoretical roots go back to at least 1958. According to Herschblach "The genesis of technology education can be found in the work of Devore (1964), Olson (1958), Warner (1965), Ziel (1971) and others." (p. 20).

Wright (1992) described how IATE educators divided into three distinct camps during the 1960's; a technology camp, an industry camp and a child-centered camp. Wright also stated that much debate ensued concerning the content base for industrial arts among these opposing camps but that "...the vast majority of the field was unmoved. Most programs continued to focus their efforts on the skills involved in woodworking, metalworking, and drafting." (p. 1).

The publication of *Jackson's Mill Industrial Arts Curriculum Theory* in 1981 constituted a major attempt to consolidate the reform movement within IATE

curriculum (Wright, 1992). According to Wright the state of affairs was looking better at this juncture; "For a period of time, the *Jackson's Mill* curriculum consensus held and significant program improvements occurred." (p. 1). This was true for some areas of the country and perhaps more so at the university level but Kirkwood, et al. (1994) stated that "...*Jackson's Mill* was touted as having settled the matter by compromise, but acceptance was difficult to achieve." (p.10). Whatever the case, *Jackson's Mill* provided a much needed way to structure the knowledge of technology by instituting the human productive activities of communication, construction, manufacturing, and transportation (Wright, 1992). It was at this time period that "Professional discussion shifted from reforming industrial arts to replacing it altogether with a new subject – technology education. By the mid-1980's, a professional concensus emerged that industrial arts was no longer relevant and had been eclipsed in purpose." (Herschbach, 1997, p. 20).

The next milestone in curriculum development was *A Conceptual Framework for Technology Education* published in 1990 by Savage and Sterry. This plan built upon the *Jackson's Mill* endeavor, added bio-related technology as a human productive activity, and emphasized problem solving by application of the technological method (Savage, 1996). Even though this framework was considered by many to be the most comprehensive plan at the time for

developing curriculum, it did not gain sweeping acceptance and implementation by IATE teachers either (Wicklein, 1997).

The most recent attempt to define and set goals for IATE is the *Technology for All Americans* project. This project has two parts. The intent of Phase I, completed in 1996, produced a rationale and structure for the study of technology and stated that its goal was to "...offer a clear vision of what it means to be technologically literate, how this can be achieved at a national level, and why it is important for the nation." (ITEA, 1996, p. 49). This new structure supplanted the human productive activities of communication, manufacturing, construction and transportation with informational systems, physical systems and biological systems. The second part or Phase II, slated for release at the ITEA conference in 1999, "...will involve the development, consensus building, and validation of content standards for technology education in grades K-12, with assessment checkpoints or benchmarks at grades 2, 5, 8, and 12." (Technology for All Americans, 1995). Future plans of the *Technology for All Americans* project include student assessment standards, teacher enhancement and teacher preparation, and program standards for improvement of the learning environment. It was notable that the word "industry" or the term "industrial arts" was missing entirely from the *Technology for All Americans* Phase I document. This was noteworthy because it was the first major document that suggests that technology education has no relationship with the industrial arts curriculum.

The Debate Between Industrial Arts and Technology Education

It was no surprise that a curriculum that has witnessed such a turbulent past as that of IATE would embrace a certain amount of debate when attempting a reform in curriculum emphasis. The historical problems, including lack of definition, disagreement on curriculum content and program goals, and philosophy have been documented as areas of contention (Herschbach, 1992, 1996; Wicklein & Rojewski, 1995). In addition, Kirkwood, et al. (1994) , while discussing the 1983 study Bartow conducted to determine the current philosophy of industrial arts, stated that "Open debate focused on such topics as whether industry or technology should be the field's content base, the relationship of vocational education to industrial arts, and the value in changing the profession's name." (p.1). By the mid 1980's the reform movement from IA to TE was beginning to heat up. In a scathing attack Swanson (1984) let it be known to all readers of *The Technology Teacher* that "The plain truth of the matter is that the profession is not buying technology education", that "...industrial arts does not own technology any more than any other field of study.", and that "The technology education minority viewpoint dominating the industrial arts press is further confusing a confused profession." (p. 2). Volk (1997) suggested that since "...subjects such as science are using much of the equipment, activities,

and concepts "unique" to technology education, the need for a separate discrete subject has been reduced." (p.2).

Much of the debate over the years has been concerned with what constitutes technology education and whether or not it reflects new instructional content and serves new populations (Herschbach, 1992). Was technology education a natural evolution of industrial arts? Or, on the other hand, was technology education an entirely new, revolutionary curriculum? Foster (1994) pointed out that "...the evolutionary point of view regards industrial arts as the foundation for the change, while the revolutionary stance considers the change as the foundation of technology education." (p. 1).

Zuga (1989) revealed her belief of the evolutionary theory when she maintained that the goals and mission of industrial arts have, over time, "...reflected a drift towards more liberal education ideals with goals that specify the study of the relationships among industry, technology, and society, the interdisciplinary nature of the field, and general problem solving." (p. 1). These new goals Zuga referred to were ones that were widely accepted as goals of technology education. In contrast, Pullias, as quoted in Foster (1994), rejected the evolutionary theory and argued "...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..." (p. 1).

Volk (1996) took strong offense to the notion of technology education "evolving" from industrial arts. Volk did not appreciate the insinuations that "...in the grand march toward educational development and sophistication, technology education is placed in a superior position above industrial arts.", and "...those that still teach industrial arts are, by some default, considered "neanderthalic" in their approach, content, and relevance." (p. 1). He insisted that industrial arts was still a relevant and very useful educational program for many students to be involved in. Expressing his favored opinion on the evolution vs. revolution debate Volk went on to state that if one could "...argue that technology education is revolutionary, as opposed to evolutionary, then both subjects can coexist." (p. 2).

Foster (1994) included an additional perspective to the debate when he declared that there never has been, and still isn't, any appreciable difference concerning the definition, philosophy, or teaching strategies between industrial arts and technology education. Comparing the definitions of IATE from 1923 to 1993, Foster concluded that there are no major points of difference and therefore "...the "philosophical dimensions" of technology education are not essentially new." (p. 4). In other words, the original philosophy of industrial arts was the same as the current philosophy of technology education. Foster also observed that "...there is little evidence that this philosophy or these strategies have ever been seriously implemented on any large scale..." (p. 9). Foster

summed up by stating that there was a need to change from industrial arts but “..perhaps that change should be away from ignoring the ideal and toward attaining it. Technology education, in this light, can be seen as the final realization of the promise of industrial arts – not something foreign to it.” (p. 12).

Volk (1996), who argued that industrial arts was still a strong and relevant curriculum, maintained that there are three options available to the profession when he wrote:

The first option is to continue ignoring any association and relationship between industrial arts and technology education. In a sense, this continues the status quo. Also, public and professional confusion over the content and definition of the subject would continue.

The second option is to recognize the distinctly different objectives, content and approach between industrial arts and technology education. ...teachers would be certified and teach either industrial arts or technology education.

The third and most attractive option recognizes and accepts the common features of industrial arts and technology education thus minimizing their differences. Professional inclusion and tolerance on areas of definition, activities, tools, and objectives would characterize this approach. (p. 8).

From a review of the literature it was very apparent that technology education did in fact evolve from industrial arts. In a “perspective” article published in *The Technology Teacher* soon after the name change of the American Industrial Arts Association (AIAA) to the International Technology Education Association (ITEA), then president Thomas Hughes, in answering a question relevant to the organization “forgetting industrial arts” he answered,

"No! Our need and desire is to help the industrial arts profession evolve into a renewed solid position in the schools." (Hughes, 1985, p. 3). In the same article Hughes also stated "...industrial arts shall become or is indeed technology education" (p. 3). Eleven years later though, a contradiction apparently emerged. The *Technology for All Americans, A Rationale and Structure for the Study of Technology* (ITEA, 1996) project did not suggest a connection to the industrial arts curriculum. This can only be construed to mean that the ITEA, the organizational body who spearheaded the project, has moved towards the revolutionary theory and wants to distance itself from industrial arts.

Review of Related Studies

One of the first studies that described the acceptance of technology education by IATE teachers was conducted by Swanson in 1983 (Swanson, 1984). This study surveyed 150 Minnesota industrial arts teachers requesting them to categorize their programs as either technology, contemporary industrial practices, or traditional industrial arts. The results implied that the vast majority, 73.3 percent of the surveyed teachers, indicated that they taught traditional industrial arts while only 3.3 percent indicated that they taught a technology program.

Davis (1985) examined the attitude of rural Montana industrial arts teachers and administrators towards "state of the art industrial programs" and discovered if there were any "state of the art rural technological based industrial arts programs" actually in place at the time (p. 58). The study concluded that both teachers and administrators in rural Montana placed emphasis on traditional industrial arts programs in which the curricular content consisted mainly of students building projects and developing their craftsmanship skills. The study also concluded that "some technological based education is taking place in some industrial arts programs at the time of the study." (p. 59).

In the spring of 1987, Smallwood conducted a survey to discover Indiana teacher's attitudes after the first year implementing a new, state developed curriculum model based on the technology education identifiers of communications, construction, transportation and manufacturing (Smallwood, 1989). One demographic result of the survey indicated "...that junior high/middle school teachers pooled have a more favorable attitude toward the new curriculum than the high school teachers." (p. 34). The results also revealed that 40 percent of the teachers thought "...that students would be less likely to sign up for a "technology" class than a traditional class in woods or metals." (p. 35). It is interesting that even at this relatively early implementation of the technology education paradigm, 65 percent of the surveyed teachers agreed that it was important to the growth of the field to infuse new technology into their curriculum.

In addition, 61 percent believed that if this did not happen they would be doing a disservice to their students.

There was a national study conducted by Scarbough in 1989 which consisted of approximately 1600 teachers who were selected by their state supervisors (Zuga, 1994). This study concluded that, nationally, teachers agreed with the goals of technology education but still felt that skill development was important. With only an 18.5 percent of return it is difficult to state if this actually was the generally accepted position nationwide at the time.

Heidari (Zuga, 1994) discovered a discrepancy between what Idaho teachers believed and what their principals believed. In this study the teachers indicated they had changed to technology education and were quite happy with the results. However, the principals in this survey insinuated that the teachers had only changed the name of their classes with no appreciable change in the content.

Several studies involved a type of research methodology referred to as the Stages of Concern (SOC) model. Hall (as cited by Rogers, 1991) described the intent of this model when he said it "describes the feelings, perspectives, and attitude of individuals as they consider, approach, and implement use of an innovation". All studies reviewed using this method reported that teachers have resisted implementation of the technology education paradigm. Linnell (1992) used the SOC model to discover how North Carolina's industrial arts teachers

felt after implementing a state mandated curriculum change to technology education. Linnell discovered that the majority of North Carolina teachers had high scores in the beginning stages of concern which could lead them to "delay or even stop their implementation efforts and return to the familiar strategies they used in the past." (p. 51). Rogers (1991) had studied Nebraska teachers in both 1989 and 1990 to determine the acceptance level of technology education. The later report stated that there had not been any increase in the acceptance level between the two studies. "Non-adoption of technology education by industrial arts teachers is clearly indicated by the results of this study..." (p. 14). Rogers and Mahler (1992), also using the SOC model, compared the acceptance level of technology education between Nebraska and Idaho teachers. Overall, 24 percent of the teachers had accepted technology education while 76 percent had not accepted this paradigm shift. However, there was a marked difference between the two states because the report stated that "Idaho teachers indicated a 76 percent higher acceptance rate than Nebraska teachers." (p. 1).

Summary

A look at the historical development of the IA/TE curriculum provided a picture of inconsistency in definitions, objectives and philosophy. One chronic

problem appeared to be a discrepancy between the philosophical ideals of educational leaders and what was actually practiced in the classroom. One possible explanation for this was the fact that there was no consistency in the technical content in the county's teacher education programs. The 1981 publication of *Jackson's Mill Industrial Arts Curriculum Theory* attempted to unite the profession and direct it towards technology education. A *conceptual Framework for Technology Education* reinforced the *Jackson's Mill Theory*, added bio-related technology and emphasized problem solving activities within the technology education curriculum. The *Technology for All Americans* project, striving to appease much of the criticism of technology education, produced a rationale and structure for technology education and is currently working on standards for curriculum content.

The reform movement calling for a change from industrial arts and to technology education has spurred much debate. In many respects this debate surrounds the question of whether technology education is the current incarnation of industrial arts or if it consists of new and revolutionary curriculum content designed for general education. At least one researcher believed that technology education was simply the fulfillment of the original goals of industrial arts.

There have been a small number of studies relating to the acceptance of technology education by industrial arts teachers beginning in 1983. The general

consensus of these studies revealed that technology education has not been widely accepted by teachers in the field. It was discovered that some teachers do agree with the goals of technology education and in fact believed that they needed to include technology into their curriculum or they would not be meeting the needs of their students. The Stages Of Concern model was used by several researchers to assess teacher's feelings as they considered the change to teaching technology education. These studies corroborated one another by finding that the majority of teachers were in the early stages of concern.

According to the SOC model, high scores in the early stages reveal that the individual is still just investigating the innovation and has not as yet accepted it.

CHAPTER 3

METHODOLOGY

Introduction

To determine how IA/TE teachers in Montana have accepted the technology education paradigm a descriptive research method was implemented. Specifically, the survey research method was selected due to its nature of collecting data from members of a population to determine the current status of that population with respect to one or more variables (Gay, 1996). A survey questionnaire was utilized as the instrument to collect data from the population sample and was distributed via mail. The analysis of data varied by question and is explained in detail later in this chapter.

The information collected from the study was submitted to both TEAM and MITEA for dissemination to teachers, the Montana Office of Public Instruction, and to IA/TE teacher education institutions in Montana (Montana State University and Western Montana College of The University of Montana).

Descriptive Research

The descriptive research method can be effectively used for the collection of information to answer questions with respect to the current status of the content of the study. In other words, this type of study ascertains and reports the way things are and the researcher has no control over the status of what is, but can only measure what already exists (Gay, 1996). Since the objectives for the study were to determine the acceptance level of the technology education paradigm and to determine if demographics and/or professional organization affiliation had any impact on the acceptance of such implementation the descriptive research methodology was the best choice.

Population and Sample

The accessible population consisted of all middle (grades 6-8) and secondary (grades 7-12) IATE teachers in Montana. An electronic version of a database including all public school IATE teachers was obtained from the Montana Office of Public Instruction. The database included, among other information, teacher's names and school addresses. This database file, which was current for the 1996-97 school year, included 303 names. To obtain valid data the required sample size of a population of 303 is 169 subjects (Gay, 1996,

p. 125). To compensate for teachers who may not be teaching any more or had moved, the first mailing included 203 names, a 20 percent increase over the recommended 169.

To arrive at unbiased demographic data an equal percentage of teachers were selected from both eastern and western parts of the state. The pre-1993 eastern and western congressional districts were employed as the dividing line between the eastern and western parts of the state (Montana currently has only one congressional district due to population changes nationwide). Of the total population of 303 it was discovered that 149 (49%) taught in western Montana while 154 (51%) taught in eastern Montana. It was then calculated that 49% of the population sample of 203 resulted in 99 teachers being selected from the western region while 51% of the population sample required that 104 teachers represent the eastern region of the state. The total population of 303 names were divided into east and west categories depending on what congressional district they taught in. Numbers were next assigned to each teacher with the numbers E1 through E154 for eastern Montana and W1 through W149 for western Montana. Next, the appropriate number of names from each category (104 eastern and 99 western) were randomly selected.

Instrument Development

The controversy of either accepting or disregarding the technology education paradigm has been in debate for well over a decade. It was hoped that this level of emotional interest would motivate both sides of the debate to respond readily to a well constructed survey questionnaire. It was realized that the greatest chance for an acceptable response rate required a simple, short and easily completed survey (Appendix A). This resulted in a legal size page questionnaire with questions on both the front and back.

The format was kept structured, or closed-form and divided into two parts. The first part of the instrument included a question and selection of responses to choose. In addition, the response of "other" was included where appropriate to give the responder an opportunity to enter an answer that was not anticipated. This first part of the survey instrument included the demographic portion and collected information on years of teaching experience, gender, school size, grades taught, geographic location in the state, membership in professional organizations and location of post-secondary schooling and year of graduation. These demographic questions are similar to what is included in other surveys of this type. Some questions were added as a result of the feedback process during instrument development. All of the demographic questions were constructed to discover if one variable or another, such as age, gender, school

size, etc., were more or less likely to affect the responder's acceptance of the technology education paradigm.

Part two of the survey was designed to discover if the responders educational philosophy coincided with that of the technology education paradigm and what they perceived their program emphasis to be. Question eight was designed to ascertain the program emphasis each responder included in their program. The program emphases were derived from Ritz (1992) and included industrial arts/shop, industrial technology, technology education and an opportunity to write in an emphasis other than those provided. Although more difficult to analyze, question eight allowed the responder to use percentages for different program emphases. This was done to discover how many teachers have an educational philosophy that includes more than one of the current educational paradigms and to what degree. Question nine was developed using a Likert type scale where responders had a choice to either strongly agree, agree, disagree, strongly disagree or have no opinion/be neutral with a statement regarding their educational philosophy. It was emphasized that this was not an attempt to judge if what the responder believed in was either right or wrong but rather the intent was to determine the current status of the profession in regards to the acceptance of technology education. The statements in this section were derived from Ritz's (1992) technology education evaluative criteria and the prevocational industrial/technology education model learner goals put

forth in the Montana School Accreditation Standards (Program of Technology Education, 1994).

The survey instrument was critiqued by graduate committee members and then refined. The instrument was pretested to discover any deficiencies as well as suggestions for improvement. This was accomplished by mailing the survey, with a letter explaining the purpose, to the officers of both TEAM and MITEA (Appendix B). Gay (1996) recommends a pretesting sample of two or three people but it was felt that input be gathered from both professional organizations in the state. Consequently, the pretesting sample included three officers from each organization for a total of six (only four responded to the request). Suggestions from the pretest participants were incorporated into the final survey instrument.

A cover letter (Appendix C) was developed that explained what was being asked of the respondent and why. The importance and significance of the study was emphasized in hope that individual professionalism would be appealed to and thus encourage a response. The cover letter also stated a deadline of two weeks for responses to be returned in an enclosed stamped, self-addressed envelope. The population sample was also informed as to where the results of the study might be published. To keep records of who responded an assigned number was hand written at the top of each questionnaire but complete

confidentiality was assured to the responders. A list of individuals who participated in the study is included in Appendix D.

As previously stated, a response rate of less than seventy percent will result in a weakening of the validity of conclusions. Seventy percent was the targeted minimum response rate for both the eastern and western population samples. This required a minimum of 58 responses from western Montana and 60 from the eastern part of the state.

Analysis of Results

The response rate for the entire survey was determined by dividing the number of valid surveys returned by the total number surveys mailed out. In addition, the same procedure was used to determine the response rate to the survey instrument for both the eastern and western districts. Demographic data such as number of years teaching experience, gender, school classification, and grade level were analyzed for response rate by dividing the number of responses to a question by the total number of responses to that question. When comparing two variables such as the demographic variable school size to class time spent on technology education, the percentage each respondent gave within each demographic variable was totaled and divided by the number of respondents to furnish an average. In some instances, such as the comparison

of grade level taught and the emphasis placed on TE, further analyses were performed. This included, in addition to the average percentage of time spent on TE, what percentage of teachers spent 100%, more than 50%, or 0% of their class time on TE. Two different methods were used to analyze data regarding program emphases and educational philosophy. The percentage of class time spent on a particular curriculum model was represented by the number of respondents within a range of percentage of class time spent on that curriculum (0% - 25%, 26% - 50%, 51% - 75%, 76% - 100%). Likert type statements that assessed educational philosophy were analyzed by the total number of respondents to one of the possible responses (strongly agree, agree, disagree, strongly disagree, or no opinion). Conclusions were derived from analyzing the percentage of respondents that either agreed or disagreed with the statement.

CHAPTER 4

PRESENTATION AND INTERPRETATION OF RESULTS

Introduction

Industrial Arts/Technology Education teachers teaching in grades 6-12 were the population for this study. This included public middle schools, junior high schools and senior high schools in the state of Montana. Names were randomly selected from a list of 303 teachers provided by the Office of Public Instruction. The results of this study are presented in the following sections: 1) survey returns, 2) demographic analysis, 3) program emphasis and educational philosophy analysis, and 4) summary.

Survey Returns

As mentioned in Chapter 3, Gay (1996) stated that out of a total population of 303 an adequate sample size for a valid study was 169 subjects. To derive satisfactory conclusions from the sample population of 169 a response

rate of 70 percent was required. This implied that a total of 118 valid surveys needed to be returned. To meet the second objective of this study it was necessary to compare results from respondents teaching in both eastern and western Montana. To ensure an unbiased study relating to this geographic distribution, a minimum 70 percent response rate was needed from both eastern and western parts of the state. A minimum of 58 responses out of a sample population of 99 from the west and a minimum of 60 responses out of a sample population of 104 from the east was required.

The overall response rate was 132 valid surveys returned, or 78 percent on the first mailing. There were four surveys returned but not included in the data analysis. One was due to a recent death and three were returned several weeks after the deadline and therefore not in time to be included in the tally of results. The proportion of returns for both eastern and western Montana was above the number needed to reach the minimum 70 percent response rate in each district. As Table 1 indicated, there were 68 valid responses from western Montana, ten more than the minimum needed, and 64 valid responses from eastern Montana, four more than the minimum needed.

Table 1 Response Rate

	Required Population Sample Size	# of Surveys Mailed (20% more than required)	# of Surveys Returned	# of Usable Surveys	Percent of Sample from Respective District
Eastern Montana	86	104	65	64	74%
Western Montana	83	99	71	68	82%

Demographic Data

The demographic portion of the survey instrument consisted of seven questions. The information gathered included number of years teaching experience, gender, school rank or size, grades taught, geographic location, membership in professional organizations, and location of post-secondary education and year of graduation.

The data in Table 2 indicated that 44 %, or nearly half, of all respondents have more than 15 years of teaching experience. Teachers with ten or less years of experience made up 36% of the respondents while those with 11-15 years of experience made up the remaining 20%. This information indicated that although nearly half of the I/ATE teachers in Montana have been at the job for more than 15 years, the majority (56%) are at least 15 years away from retirement provided they stay in the profession for 25 years.

Table 2 Number of Years Teaching Experience

	1-3 Years	4-6 Years	7-10 Years	11-15 Years	16-20 Years	21 + Years
Total Responses	15	13	20	26	18	40
% of Response	11%	10%	15%	20%	14%	30%

The data in Table 3 revealed that IA/TE teachers with 7-10 years of experience were the most likely to incorporate the TE curriculum model into their program. These teachers on average emphasized TE during 39% of their class time. Those teachers with 4-6 years of experience were the least likely, averaging only 10.8% of their class time on TE curriculum. Table 3 also indicated that in general teachers with less experience (one to ten years) spent more time on TE than those with more than ten years of experience except for the anomaly of teachers with 4-6 years of experience.

Table 3 Comparison of Teaching Experience and Emphasis on TE

	1-3 years	4-6 years	7-10 years	11-15 years	16-20 years	21 + years
Average % of class time spent on IA	48.3%	57.9%	40.3%	58%	63%	64.9%
Average % of class time spent on IT	20.3%	20.4%	14.8%	23%	13.5%	17%
Average % of class time spent on TE	25.3%	10.8%	39%	13%	19%	15.5%
Average % of class time spent on "other" curriculum	6%	10.8%	5.9%	5.8%	4.4%	2.6%

The results of Table 4 showed that almost all IA/TE teachers in the state are male. This came as no surprise for a field traditionally dominated by men.

This indicated that the technology education paradigm has yet to result in more women interested in teaching technology education as their profession, at least in the state of Montana.

Table 4 Gender

	Female	Male
Total Responses	1	131
% of Response	<1%	>99%

Table 5 showed that all school classifications, or sizes, were represented in the results. Montana schools are classified mainly by student population but other criteria, such as geographic location, are also considered in the classification. Class AA schools have a student population of 1198 and up, class A schools range from 164-866, class B schools range from 124-411 and class C schools range from 14-178 students (Montana High School Association, 1996). The largest schools, classified as AA, were represented the most with 32% of the total responses.

Table 5 School Classification

	AA	A	B	C
Total Responses	43	30	32	27
% of Response	32%	23%	24%	20%

A demographic comparison of interest to this study was if technology education had been accepted more at larger urban schools (class AA and A) or more at smaller rural schools (class B and C). By comparing the demographic results in Table 5 with the information obtained from question number 8 (program emphasis) it was indicated that urban teachers spent slightly more class time teaching a TE curriculum, on average, than rural teachers. Table 6 showed that urban teachers spent an average 22.2% of their class time on TE whereas rural teachers spent an average 17.6% of their class time on the subject of TE.

Table 6 Comparison of School Size and Emphasis on TE

	Urban Schools	Rural Schools
Avg. % of class time spent on TE	22.2%	17.6%

Table 7 revealed that teachers from all middle and secondary grade levels were represented in this study. Those teaching grades 7-12 constituted the majority of respondents with 36% of the total.

Table 7 Grade Levels Taught

	6-8	7-8	7-12	9-12	10-12	Other
Total Responses	10	21	47	35	15	4
% of Response	7%	16%	36%	27%	11%	3%

Another area of comparison was that of grade level and the acceptance of technology education. Have Montana's IA/TE teachers followed a national trend by placing the emphasis of TE in the middle and junior high schools? The respondents that taught only middle school and/or junior high school constituted 23% of the total, as shown in Table 7. Of these, the teachers indicated that the average class time spent on teaching TE was 25% (Table 8), while the rest of class time was spent on teaching industrial arts, industrial technology or in a few cases, some other subject. Twenty-seven percent of the middle/junior high teachers dedicated their class to teaching TE 50% of the time or more. Seven percent of the middle/junior high teachers emphasized TE 100% of the time while 43% did not teach TE at all.

Of the 38% of respondents that taught only at the high school level (grades 9-12), an average of 19% of class time was devoted to teaching TE. Only 14% of these high school teachers spent half, or more than half, of their time teaching TE. Four percent taught TE 100% of the time while 37% did not teach TE at all.

The last group of respondents taught in grades 7-12 which meant they taught both junior high and high school grade levels. In this group an average of 18% of class time was devoted to teaching TE. Those teachers that taught TE at least 50% of the time was calculated to be 14%. Only 2% of the 7-12 teachers taught TE 100% of the time while an even 50% did not teach the subject at all.

Table 8 summarized the information comparing these three groups. The data indicated that the TE curriculum was being taught more at the middle/junior high school level by a small percentage but 43% of middle/junior high teachers did not include any TE curriculum at all.

Table 8 Comparison of Grade Level And Emphasis on TE

	middle & jr. high only	high school only	grades 7-12
Average % of class time spent on TE	25%	19%	18%
50% or more of class time spent on TE	27%	14%	14%
100% of class time spent on TE	7%	4%	2%
0% of class time spent on TE	43%	37%	50%

Table 9 illustrated a comparison between geographic location and the emphasis teachers placed on TE. It was apparent from this data that teachers in the eastern part of the state have accepted and implemented TE more so than their counterparts in the western portion of the state. The average percent of class time devoted to TE in eastern Montana is 27% and in western Montana it is 14%. More revealing is that more than half (57%) of western Montana teachers have not implemented TE whatsoever. Contrary to this, only 27% of eastern Montana teachers have not implemented TE to at least some extent. In other words, almost three fourths (73%) of eastern Montana teachers have

incorporated TE to some extent in their curriculum but only 43% of western Montana teachers have done likewise.

Table 9 Comparison of Geographic Location and Emphasis on TE

	Eastern Montana District	Western Montana District
Average % of class time spent on TE	27%	14%
50% or more of class time spent on TE	21%	13%
100% of class time spent on TE	6%	2%
0% of class time spent on TE	27%	57%

An objective of this study was to determine if professional organization affiliation had an influence on the acceptance of the TE paradigm. Table 10 revealed the number of respondents that belonged to the various professional organizations. These organizations included the American Vocational Association (AVA), the International Technology Education Association (ITEA), the Montana Industrial Technology Education Association (MITEA), which is the Montana association affiliated with AVA, and the Technology Education association of Montana (TEAM), which is the Montana association affiliated with ITEA. The most revealing statistic in Table 10 was that over half of the respondents (53%) did not belong to any professional organization.

Table 10 Membership in Professional Organizations

	AVA	ITEA	MITEA	TEAM	None	Other
Total Responses	17	18	11	37	70	20
% of Response *	13%	14%	8%	28%	53%	15%

* Some responders belong to more than one organization

Table 11 compared membership in a particular professional organization (question 6) and program emphasis (question 8). The intent was to discover if respondents affiliated with either AVA and/or MITEA or respondents affiliated with ITEA and/or TEAM preferred one curriculum emphasis over another. An analysis of the data indicated that a particular professional organization affiliation does have an impact on what curriculum was emphasized. Teachers affiliated with AVA and/or MITEA emphasized industrial arts 58% in their program's curriculum, industrial technology about 35% and technology education less than 10% of the time. Those teachers affiliated with ITEA and/or TEAM devoted 41% to industrial arts, 17% to industrial technology and almost 40% of their program to technology education.

Table 11 Comparison of Professional Organization Affiliation and Program Emphasis

	ITEA and/or TEAM Affiliation	AVA and/or MITEA Affiliation	Both AVA &/or MITEA & ITEA and/or TEAM Affiliation
Average % of class time spent on IA	41.4%	57.9%	39.8%
Average % of class time spent on IT	17.2%	32.5%	8%
Average % of class time spent on TE	39.4%	9.5%	43.8%
Average % of class time spent on "other" curriculum	2%	0%	8.3%

Question seven requested information relating to the college from which the respondent graduated. The results of this question were used to determine which philosophical paradigm each Montana institution was promoting. The overwhelming majority (114 respondents, or 89%) of respondents were graduates of a Montana institution. Table 12 indicated the percentages of graduates from each institution, Montana State University (MSU), Northern Montana College (NMC), and Western Montana College (WMC). These three institutions have traditionally offered degrees in industrial arts/technology education. Seven respondents graduated from other Montana institutions.

Table 12 Montana Institution Graduated From

	MSU	NMC	WMC	Other
Total Responses	33	32	42	7
% of Response *	29%	28%	37%	6%

*Out of 114 Montana Graduates

Table 13 indicated which Montana institution appeared to be promoting a particular paradigm. This was accomplished by comparing which institution a respondent graduated from and what their various program emphases were. An analysis of the data indicated that graduates from all Montana institutions placed the majority of their program emphasis on industrial arts. Graduates from both NMC and WMC emphasized IA approximately 64% of the time while MSU graduates emphasized IA just under half of the time. Both MSU and NMC graduates emphasized industrial technology approximately 15% of the time while WMC graduates emphasized IT about 23% of the time. Graduates from NMC and WMC emphasized technology education approximately 14% of the time while MSU graduates more than doubled that figure by emphasizing TE 33% of the time.

Table 13 Comparison Between Montana Institution
Graduated From and Program Emphasis

	MSU	NMC	WMC	Other Montana Institutions
% of Program Emphasis on IA	47%	65.3%	62.6%	52.5%
% of Program Emphasis on IT	15.7%	13.9%	22.7%	14.1%
% of Program Emphasis on TE	33.2%	15%	13.5%	12.5%
% of Program Emphasis on "other"	3.2%	5.8%	1.2%	20.8%

Program Emphasis and Educational Philosophy

The second part of the survey instrument determined the respondents program emphasis and educational philosophy. Question number eight determined program emphasis and was divided into three curriculums with the option of "other" and a place to write in an additional response. The three curriculums were industrial arts/shop, industrial technology, and technology education. A brief definition of each curriculum was included in the question. Respondents were asked to write in the percentage of emphasis each of the

three curriculums (or four if “other” was used) in their total program. Those that responded to “other” calculated as very small percentages and included such subjects as drivers education, vocational agriculture and art. The results of this question are presented in Charts 1, 2 and 3. This data was used to compare curricula across the state and also to correlate with other questions in the survey instrument. By comparing Charts 1, 2 and 3 it became apparent that the industrial arts curriculum dominates program emphasis, or class time, across the state of Montana. Chart 1 indicated that 70 out of 128 respondents or 54% emphasized IA in their curriculum by spending more than 50% of their class time on this curriculum.

Chart 1 Percentage of Class Time Spent on Industrial Arts

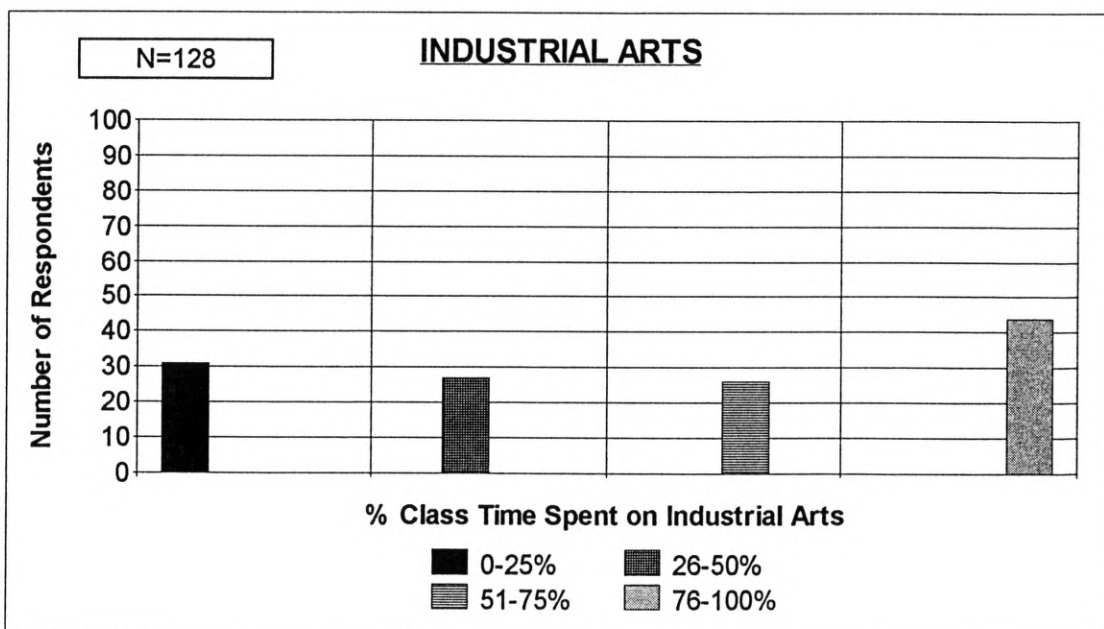


Chart 2 showed that that the curriculum of industrial technology is not emphasized by the vast majority of Montana IATE teachers. Seventy-five percent of respondents placed 0-25% emphasis on the IT curriculum and 8% emphasized IT more than 50% of the time in their classroom.

Chart 2 Percentage of Class Time Spent on Industrial Technology

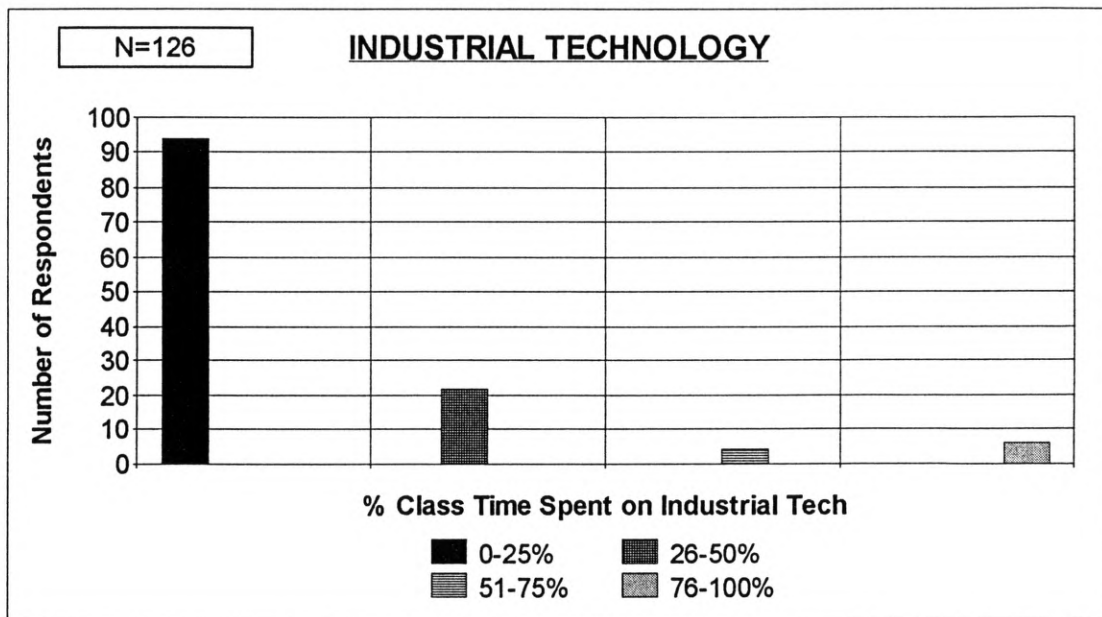
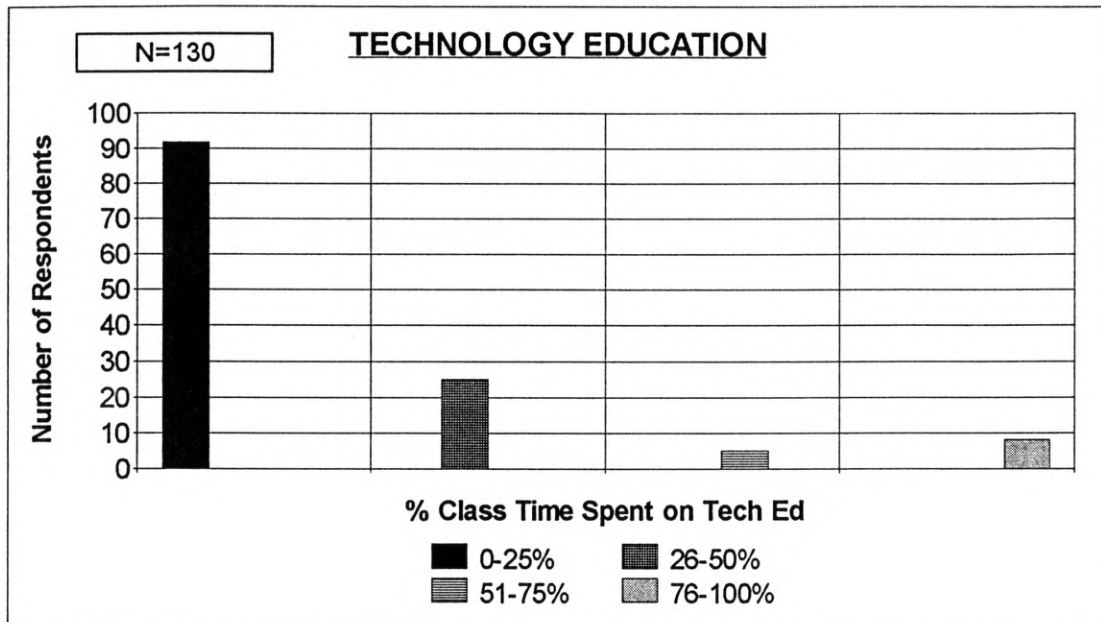


Chart 3 illustrated the program emphasis placed on technology education. The results were similar to the emphasis placed on IT. The majority (71%) of respondents spent 25% or less of their class time devoted to TE while 10% emphasized TE more than 50% of the time.

Chart 3 Percentage of Class Time Spent on Technology Education

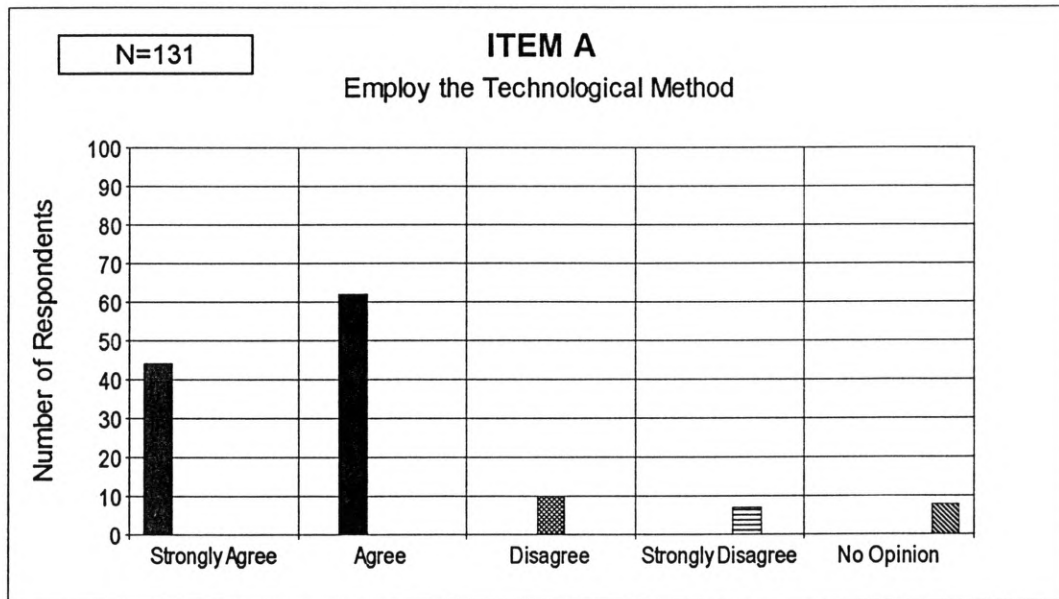


Question nine was designed to discover the educational philosophy of the respondents. It was a Likert type question and included eleven statements, items A-K, that contained criteria that constitute both industrial arts and technology education curricula. Two statements, items L and M, related to administrative and community perceptions. The leading statement to items A-K was: *I believe the program that I teach at my school should:*, and then respondents chose to strongly agree, agree, disagree, strongly disagree or have no opinion regarding the statement. An examination of the data included in Charts 4-16 indicated that regardless of the respondents perceived program emphasis, overall the majority of respondents either agreed or strongly agreed

with the statements in items A-K, no matter if they embodied the goals of IA or the goals of TE.

Item A included the definition for the “technological method” of problem solving. Respondents answering this statement agreed with at least one of the goals of TE. Chart 4 showed that 106 out of 131 respondents or 81% agreed or strongly agree with Item A, 13% disagreed or strongly disagreed and 6% had no opinion.

Chart 4 Employ the Technological Method to Solve Technical Problems



Item B (Chart 5) asked the respondent if they placed emphasis on craftsmanship and the construction of projects. Respondents in agreement with this statement were assumed to have an industrial arts/shop curriculum

emphasis. The overwhelming majority of respondents, 121 out of 132 or 92%, either agreed or strongly agreed with the statement and only 8% disagreed or strongly disagreed.

Chart 5 Place Emphasis on Craftsmanship and Construction of Projects

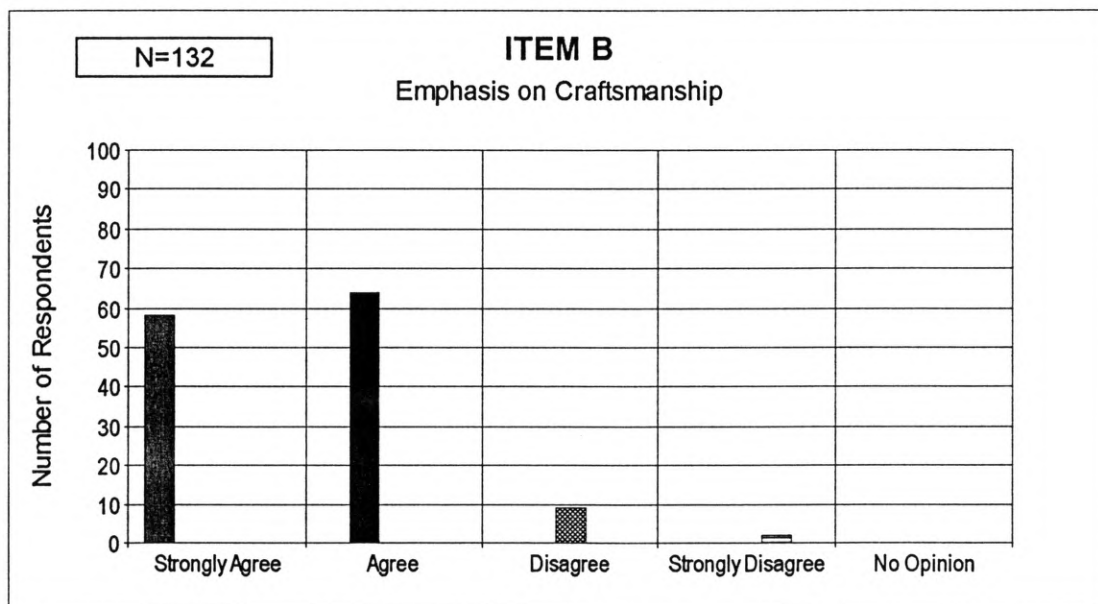
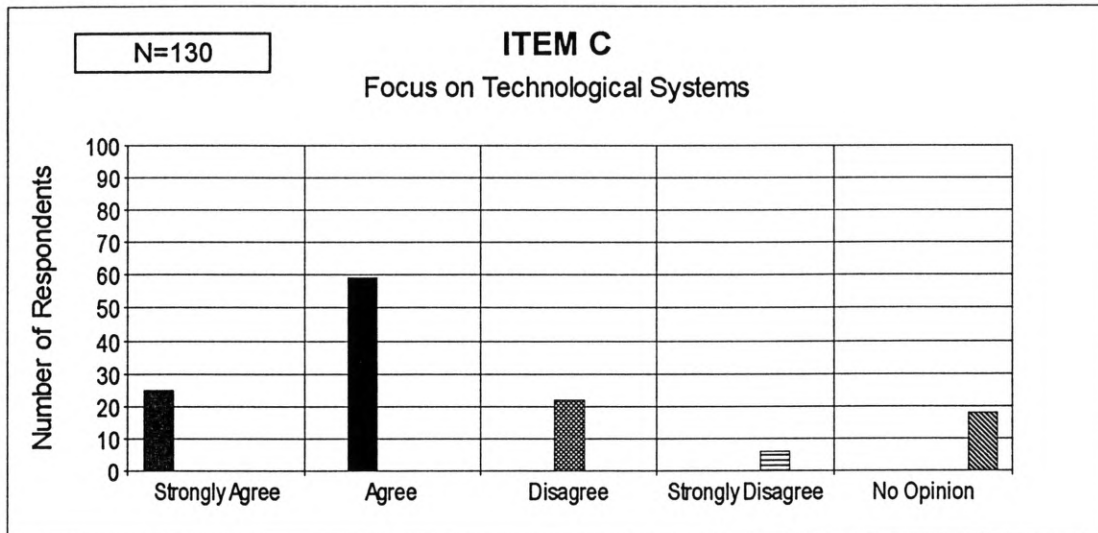


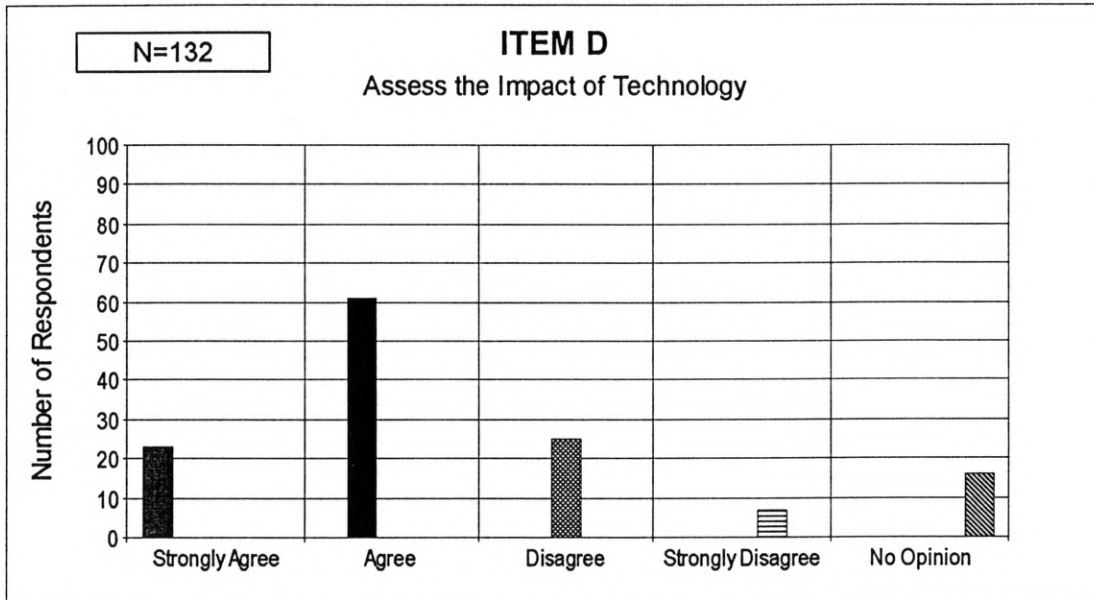
Chart 6 showed the results of Item C which asked respondents if their program should focus instruction on one or more of the technological systems of production, communication and transportation. An agreeable response was assumed that the respondent was in favor of the technology education paradigm. Although this statement did not find as much agreeable support as the others it still had over two thirds of the respondents (84 out of 130 or 65%) agree or strongly agree with the statement. Twenty-one percent disagreed or strongly disagreed and a relatively high proportion (14%) had no opinion.

Chart 6 Focus Instruction on the Technological Systems of Production, Communication & Transportation



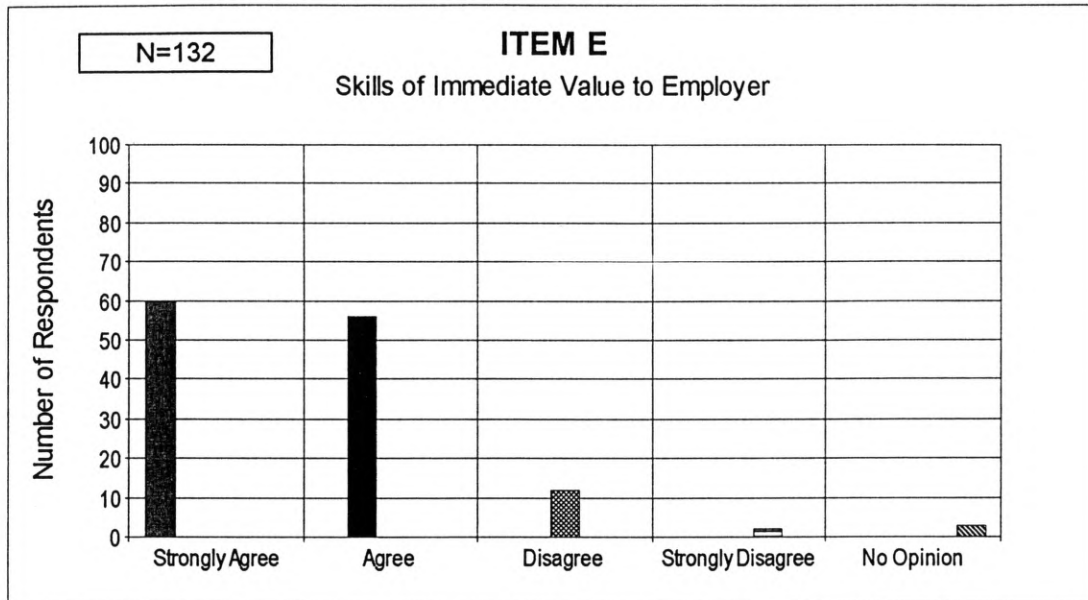
Item D asked respondents if their program should have students assess the impact of technology on individuals, society and the environment. This is widely regarded as a major program emphasis for TE curriculums and therefore an agreeable response was assumed that the respondent was in favor a TE program. Chart 7 showed that the majority (84 out of 132 or 64%) agreed or strongly agreed with the statement. This item was the only other statement besides Item C that did not have an overwhelming majority of agreeable responses. Twenty-four percent disagreed or strongly disagreed and 12% had no opinion.

Chart 7 Have Students Assess the Impact of Technology



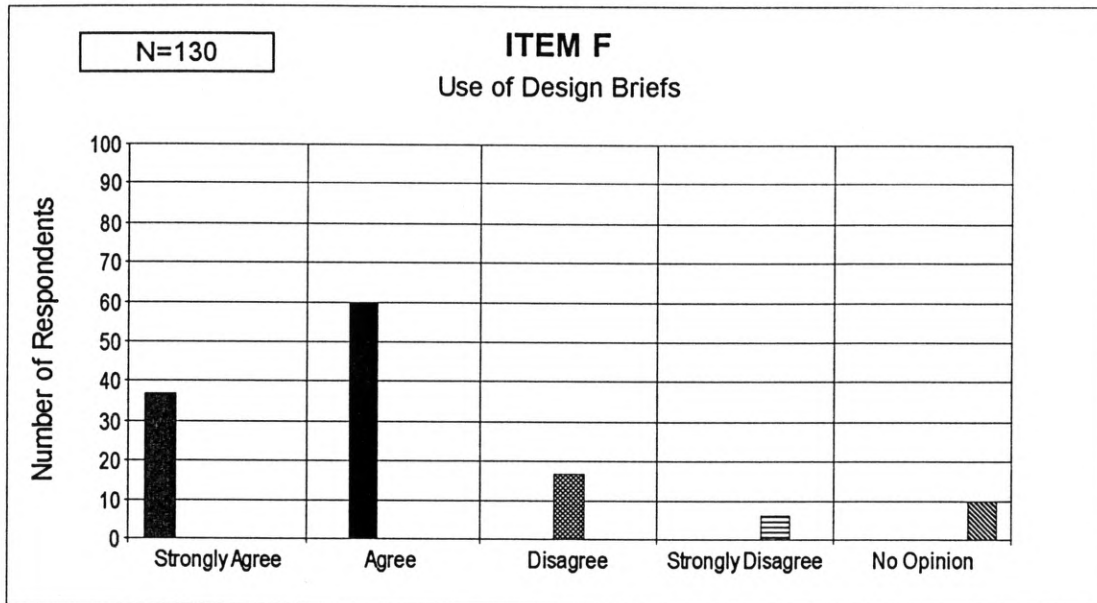
Item E asked respondents if their curricular program should provide manipulative skills that would be of immediate value to an employer. An agreeable response to this statement would suggest that the program was tied to an industrial arts or industrial technology model. Chart 8 showed that 115 out of 132 respondents or 87% agreed or strongly agreed with this statement. Only 11% disagreed or strongly disagreed and 2% had no opinion.

Chart 8 Provide Manipulative Skills of Immediate Value to an Employer



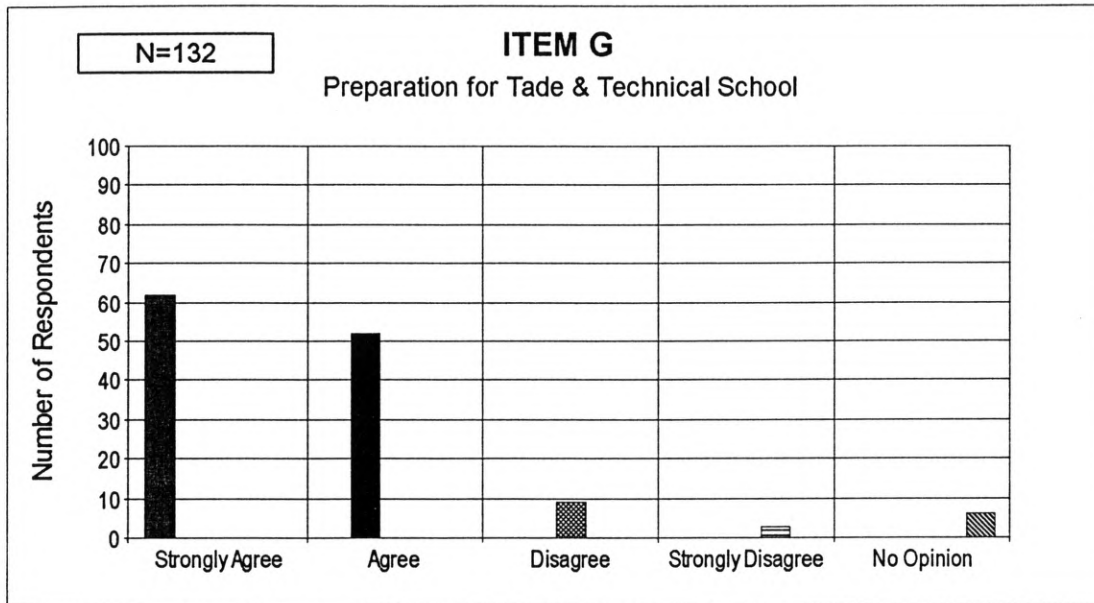
Item F asked respondents if they should develop student's critical thinking and problem solving skills through the use of "design briefs", or theoretical technological problems to solve, that require a substantial design element. The activity of proposing design briefs is common to technology education curricula so an agreeable response to this statement meant that the program was anchored to this curriculum. Chart 9 showed that 97 out of 130 respondents or 75% agreed or strongly agreed with the statement, 17.5% disagreed or strongly disagreed and 7.5% had no opinion.

Chart 9 Develop Problem Solving and Critical Thinking Skills Through "Design Briefs"



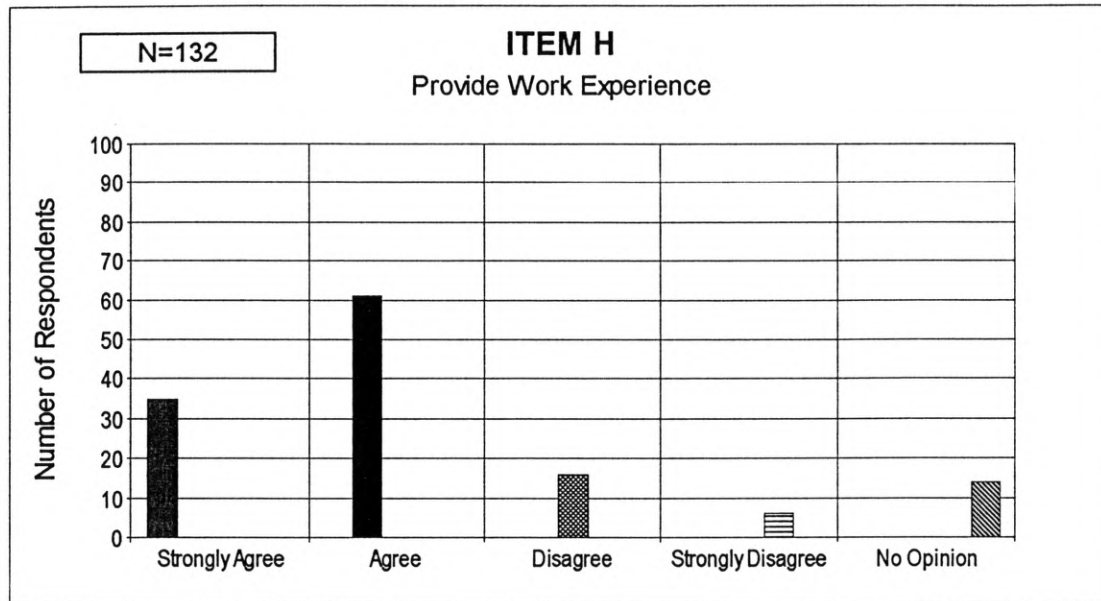
Item G related to a program's opportunity to prepare students for entry into post-secondary trade and technical school programs. This statement adheres to an industrial arts or industrial technology curriculum and an agreeable response would tie the respondents program to one of these curriculums. Chart 10 indicated that the vast majority of respondents, 114 out of 132 or 86%, agreed or strongly agreed with this statement. Nine percent disagreed and 5% had no opinion.

Chart 10 Prepare Students for Entry into Post
Secondary Trade and Technical Schools



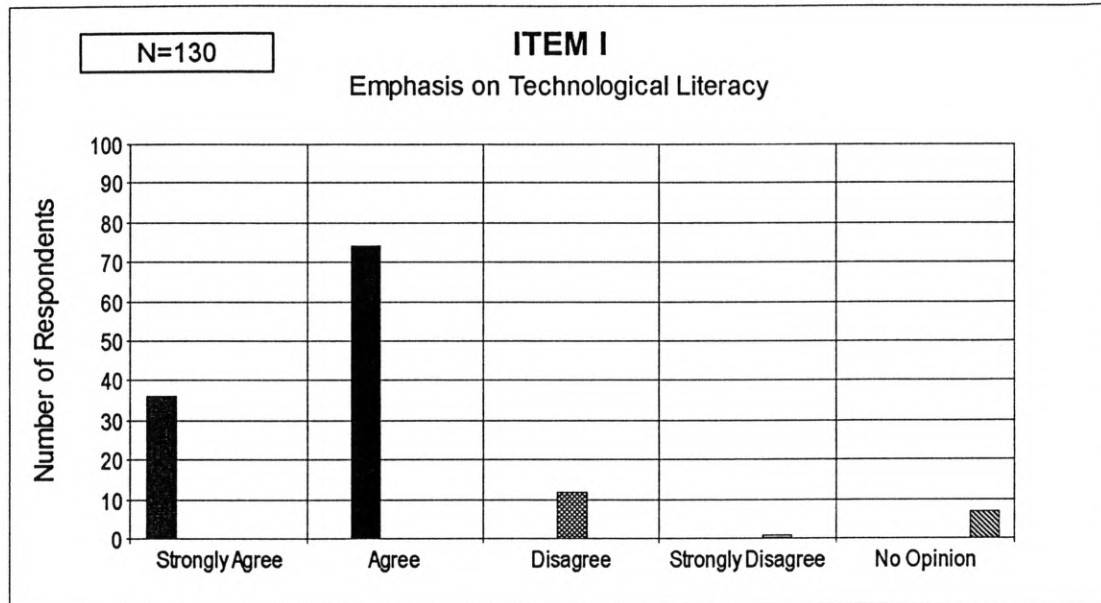
Item H asked if the respondents program should provide students with work experience while attending school. This statement was also considered an aspect of an industrial arts or industrial technology curriculum and an agreeable response indicated adherence to one of these models. Chart 11 showed that 96 out of 132 respondents or 73% agreed or strongly agreed with the statement, 16.5% disagreed or strongly disagreed and 10.5% had no opinion.

Chart 11 Provide Students With Work Experience While Attending School



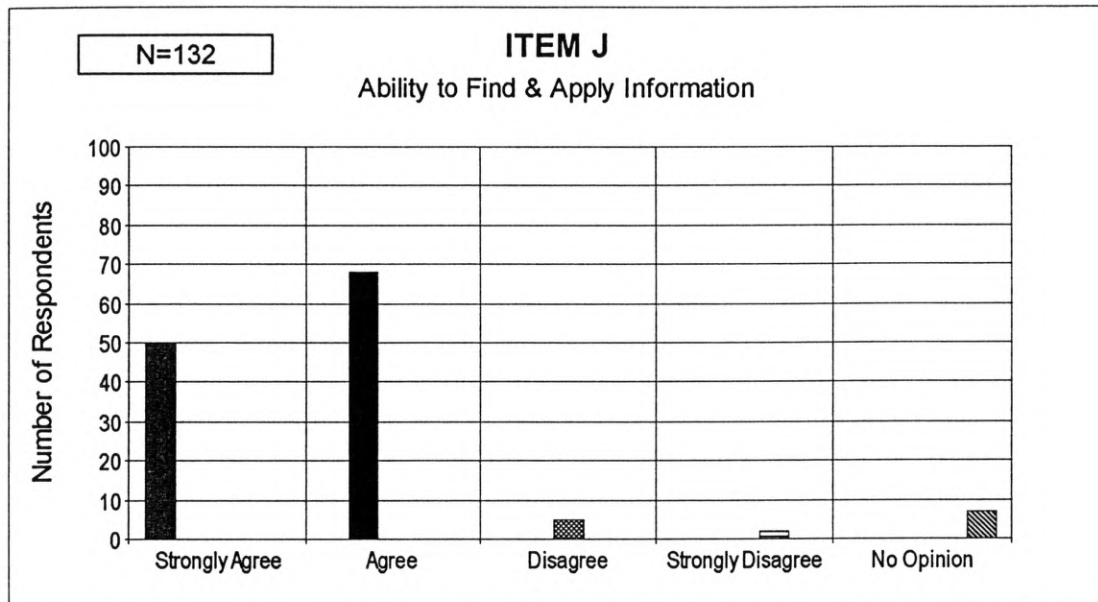
Item I asked respondents if their programs placed emphasis on technological literacy and helped students become comfortable living and working in a technological society. Since this is one of the foremost goals of a technology education curriculum an agreeable response to this statement aligned the respondent with the TE model. Chart 12 showed that once again an overwhelming majority of respondents (110 out of 130 or 85%) agreed or strongly agreed with the statement. Ten percent disagreed or strongly disagreed and 5% had no opinion.

Chart 12 Place Emphasis on Technological Literacy



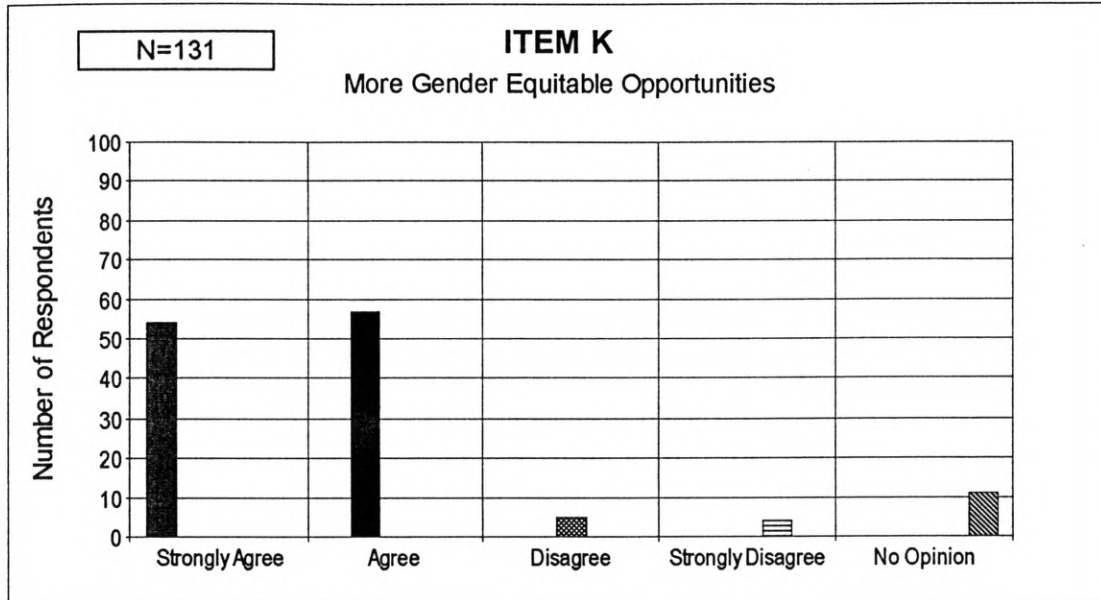
Item J asked respondents if the program they taught at their school should develop their student's ability to search, access, retrieve, synthesize and apply information to solve problems. This statement also conforms to the TE model so an agreeable response was assumed to be in accord with this paradigm. Chart 13 revealed that almost nine out of 10 respondents (118 out of 132 or 89%) agreed or strongly agreed with this statement. Only 5.5% disagreed or strongly disagreed and another 5.5% had no opinion.

Chart 13 Develop Student's Ability to Search, Access,
Retrieve, Synthesize & Apply Information



Item K asked if the respondent felt that their program should provide more gender equitable opportunities. Since this was a predicted outcome of the technology education paradigm an agreeable response would align the respondent with this model. However, in today's society not very many teachers would want to respond negatively to this statement. Chart 14 showed that 111 out of 131 respondents or 85% agreed or strongly agreed with the statement, 7% disagreed or strongly disagreed and 8% had no opinion.

Chart 14 Provide More Gender Equitable Educational Opportunities



Items L and M asked if the respondents felt their administrators and community desired either the industrial arts/industrial technology program model or the technology education program model. Chart 15 showed that a little more than half (67 out of 128 or 52%) of respondents agreed or strongly agreed that their administrators and community desired the technology education curriculum model. Fifty-two (41%) disagreed or strongly disagreed and nine (7%) had no opinion. Chart 16 showed that 102 out of 129 respondents or 79% agreed or strongly agreed that their administrators and community desired the industrial arts/industrial technology curriculum model. Twenty respondents (16%) disagreed or strongly disagreed and six (5%) had no opinion on this statement.

Chart 15 Technology Education Reflects the Desires
of School Administrators and Local Community

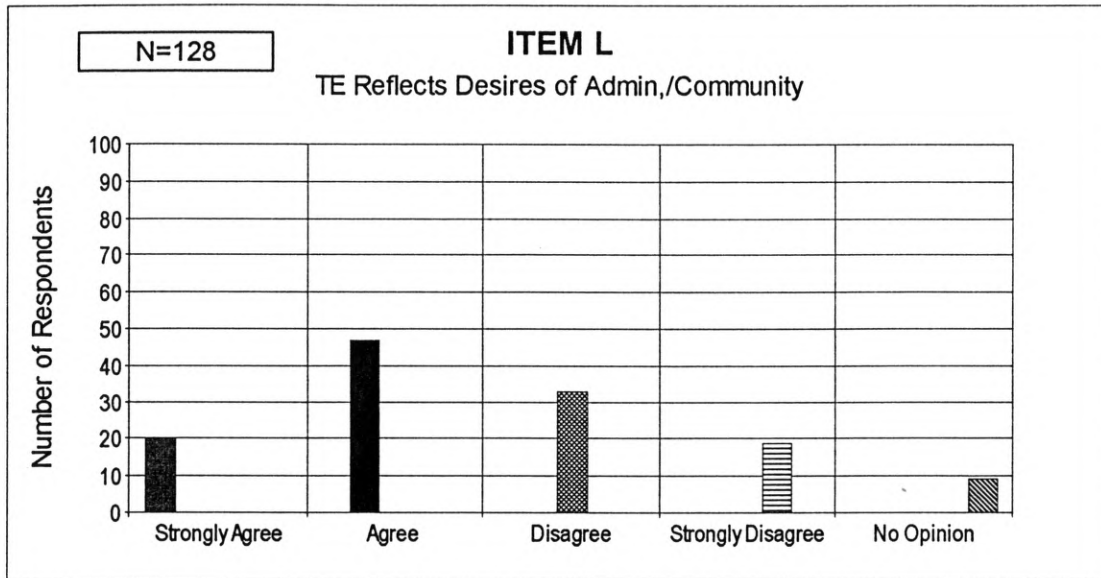
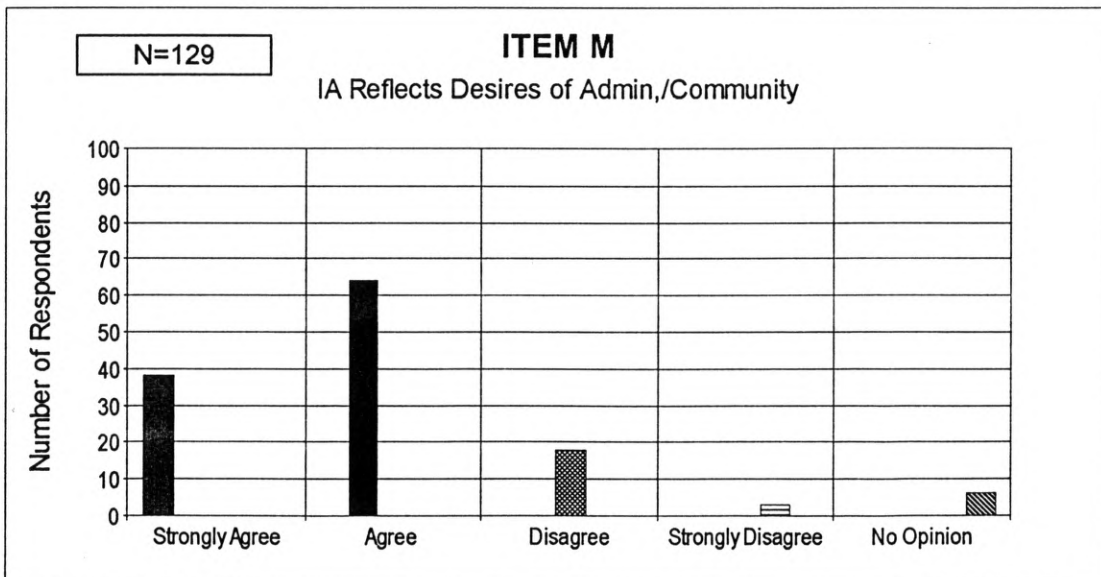


Chart 16 Industrial Arts Reflects the Desires of
School Administrators and Local Community



Summary

The response rate for the survey instrument was 132 valid surveys returned. This was a 78% response rate which exceeded the minimum requirement of 70%. Also, the response rate from both eastern and western Montana was above the minimum 70% target thus resulting in valid demographic comparisons. The adequate results of the first mailing negated the necessity of a second mailing. The experience of IA/TE teachers across the state was fairly well distributed. Those with 15 years or less of experience made up 56% of the total and those with more than 15 years experience made up 44%. However, 30% of IA/TE teachers had more than 21 years of experience indicating that approximately 90 positions may have to be filled in the next 5-10 years. Teachers with 7-10 years of experience were the most likely to incorporate the TE curriculum model into their programs. There could be a correlation made between these teachers and the fact that they were most likely in college during the mid 1980's when the technology education paradigm was first being introduced in Montana. Practically all IA/TE teachers in Montana are male. All school classes, or sizes, were represented in the returns with the largest schools, class AA, being represented the most. The results indicated that larger, urban school teachers spent a greater percentage of their class time devoted to the TE curriculum model than those of smaller, rural schools. There are several

possible reasons for this circumstance. First, large schools usually have bigger budgets than small schools thereby allowing them to invest in a new curriculum. Second, larger school districts commonly have curriculum developers that mandate what will be taught whereas in small schools the individual teacher has more authority in what will be taught. Third, there could be a perceived belief that urban students need to know more about technology and rural students need to know more about traditional skills such as welding because of their probable future careers.

All three school categories, middle schools, junior high schools and senior high schools (grades 6-12), were represented in the surveys returned. On average, middle and junior high school teachers spent a larger percentage of time devoted to the TE curriculum model than their counterparts at the senior high schools. On the other hand, an analysis of the data indicated that more high school teachers (63%) than middle/junior high teachers (57%) devoted at least some class time to TE curriculum. The demographic data also indicated that eastern Montana teachers dedicated a larger percentage of their class time to the TE model than those teachers in western Montana. An analysis of the data relating to professional organization affiliation revealed that those belonging to AVA/MITEA emphasized, on average, the TE curriculum model only 10% of their class time while those belonging to ITEA/TEAM emphasized, on average, the TE model 39.4% of their class time. The figures also revealed that more than half of

IA/TE teachers were not members of a professional organization devoted to their specific curriculum area. The vast majority of Montana's IA/TE teachers are graduates of a Montana institution. The data indicated that graduates from MSU emphasized the TE curriculum model, on average, more than twice as much as NMC and WMC graduates. A comparison of the data relating to the emphasis placed on one of the three curriculums (industrial arts/shop, industrial technology, and technology education) showed that industrial arts dominated program emphasis or class time. Industrial arts was emphasized, on average, more than 50% of the time by 54% of respondents. Industrial technology was emphasized, on average, more than 50% of the time by 8% of respondents. Technology education was emphasized, on average, more than 50% of the time by 10% of respondents.

The Likert type questions used to discover the respondent's educational philosophy revealed a paradox. Although the data indicated that the industrial arts curriculum model dominated program emphasis, the vast majority of respondents agreed with all of the educational philosophy questions regardless if they adhered to the industrial arts or the technology education paradigms. Slightly more than half of the respondents felt that their administrators and community desired the TE curriculum model in their school. Almost eight out of 10 respondents felt that their administrators and community desired the IA/IT curriculum model in their school. This indicated that the majority of respondents

felt as if their administration and community desired that both IA/IT and TE curriculum models should be represented in their schools.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The introduction of a new curriculum entitled Technology Education in the 1980's provoked confusion within the ranks of industrial arts teachers in Montana and around the nation. Some educators have accepted and welcomed this new paradigm but others have been angered and offended because, among other reasons, in their mind it devalues the traditional industrial arts curriculum. Research conducted in Montana during the mid 1980's discovered that traditional industrial arts, with an emphasis on project construction and craftsmanship, predominated programs around the state. In Montana, the emergence of two professional organizations was suspected of further emphasizing the split between the two camps. The purpose of this study was to determine the extent technology education has been accepted by Montana's I/TE teachers. A secondary purpose was to discover how demographic

variables and professional organization affiliation had impacted the acceptance of the technology education paradigm.

A review of related literature revealed that historically the evolution of the IATE curriculum base has been awash with inconsistency in definitions, objectives and philosophy. One chronic problem, a philosophical discrepancy between educational leaders and classroom teachers, has kept reoccurring over the years. An explanation for this may be the fact that there was no consistency in technical content in the country's teacher education programs. The *Jackson's Mill Industrial Arts Curriculum Theory*, published in 1981, was an attempt to unite the profession and direct it towards the technology education curriculum model. This effort was continued with the 1990 publication of *A Conceptual Framework for Technology Education* which added bio-related technology and emphasized problem solving in the curriculum. More recently, the *Technology for All Americans* project produced a rationale and structure for technology education and is currently working on standards for curriculum development. This was an immense and much needed (perhaps long overdue) effort by proponents of technology education and may satisfy some of the critics of the technology education paradigm. Much of the professional debate stimulated by the technology education paradigm focused on the question of whether TE is the current incarnation of IA or if it is a totally new and revolutionary curriculum designed for general education. There were several studies nationwide between

1983 and 1992 related to the acceptance of TE by IA teachers. The general consensus of these studies revealed that the technology education model has not been widely accepted by teachers in the field.

The survey research method was utilized for this study. A questionnaire survey was developed and mailed to 203 randomly selected IA/TE teachers in Montana. The overall response was 132 valid surveys returned. This was a 78% return rate, well above the 70% minimum required to arrive at valid conclusions. The experience level of IA/TE teachers across the state was well distributed though the data indicated that there is the possibility of approximately 90 positions opening up in five to ten years due to future retirement of IA/TE teachers. This fact could eventually affect the acceptance level of TE in Montana because the data generally indicated that more experienced teachers emphasized TE infrequently and less experienced (presumably younger) teachers emphasized TE more often. Almost all IA/TE teachers in Montana are male. Analysis of the data indicated that the industrial arts curriculum dominated IA/TE programs in Montana. The data showed that those teachers that did incorporate the technology education curriculum into their program, to at least some extent, had the following profile: Male with 7-10 years of teaching experience, taught at a larger, urban school at the middle or junior high level in eastern Montana, was a graduate of MSU and a member of ITEA and/or TEAM. In other words, TE was less likely to be taught by a more experienced teacher

(more than 10 years experience) at smaller, rural schools, in senior high schools, in western Montana, by graduates of WMC or NMC, and by members of AVA/MITEA. The data also revealed a need to encourage more professional organization membership by Montana's IA/TE teachers. Less than half of IA/TE teachers in the state benefit from the activities and professional development provided by these organizations. Even though the data showed that the industrial arts model dominated program emphasis, the vast majority of respondents agreed with all of the educational philosophy questions regardless if they adhered to the industrial arts or the technology education curriculum model. This implied that the two camps are closer in educational philosophy than either one of them may realize. A little more than half of the respondents felt that their administration and community desired the TE model to be taught in their school while almost 80% felt their administration and community desired the IA model. The industrial arts model again dominated here but it was noteworthy that the majority of respondents felt as if both curriculum models should be represented in their schools.

Conclusions

The following conclusions may be drawn from this study:

1. The industrial arts curriculum model predominated IA/TE programs in Montana thus providing evidence that the technology education paradigm has not been generally accepted by Montana's IA/TE teachers.
2. The technology education curriculum model was being implemented to varying degrees by Montana's IA/TE teachers.
3. Demographic variables such as school size, geographic location, years of teaching experience, etc. contributed to the acceptance/nonacceptance of the technology education curriculum model.
4. Professional organization affiliation did have an impact on the acceptance/nonacceptance of the technology education curriculum model.
5. Teachers that perceived themselves as industrial arts teachers and those that perceived themselves as technology education teachers generally agreed on the same educational philosophy.

Recommendations

The following recommendations, based on the research and findings of this study, are presented as follows:

1. Encourage all IA/TE teachers in Montana to begin a dialogue regarding the status and future direction of the profession.

2. Educational leaders in the state of Montana should advocate a willingness to accept that both curriculum models have important positions in Montana's schools and to eliminate the dichotomy that has prevailed for the past decade.
3. Encourage more IA/TE teachers to become members of professional organizations.
4. All relevant teacher training institutions in Montana, along with the Office of Public Instruction, should agree on a comprehensive strategy for the future direction of the profession in Montana and then universally support and implement it.

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APPENDICES

APPENDIX A

SURVEY INSTRUMENT

Please answer the following demographic questions

- ## **PART II - PROGRAM EMPHASIS AND EDUCATIONAL PHILOSOPHY**

- (over)

DIRECTIONS FOR THE FOLLOWING SECTION:

Listed below are statements that include criteria that constitute both industrial arts and technology education programs (the last two questions relate to administrator/community perceptions). Please rate these statements using the following scale:

- SA - 4 - strongly agree with statement
 A - 3 - agree with statement
 D - 2 - disagree with the statement
 SD - 1 - strongly disagree with statement
 N - 0 - no opinion/neutral

9. I believe the program that I teach at my school should:	SA	A	D	SD	N
A. Employ the "technological method" to solve technical problems. (This method includes the systematic steps of identifying the problem, developing alternative solutions, evaluating the possible solutions, and applying appropriate technological resources and processes to solve the problem).	4	3	2	1	0
B. Place emphasis on craftsmanship and the construction of projects.	4	3	2	1	0
C. Focus instruction on one or more of the technological systems and sub-systems of production (processing, bio-related, construction and manufacturing), communication (graphic, electronic, and telecommunication), and transportation (land, marine, air and space).	4	3	2	1	0
D. Have students assess the impact technology has had and may have on individuals, societies, and the environment.	4	3	2	1	0
E. Provide students with manipulative skills that would be of immediate value to an employer.	4	3	2	1	0
F. Develop student's critical thinking and problem solving skills by proposing theoretical technological problems (design briefs) that require a substantial design element.	4	3	2	1	0
G. Prepare students for entry into post secondary trade and technical school programs.	4	3	2	1	0
H. Provide students with work experience while attending school.	4	3	2	1	0
I. Place emphasis on technological literacy and help students become comfortable with living and working in a technological world.	4	3	2	1	0
J. Develop student's ability to search, access, retrieve and synthesize information and then apply this new knowledge to solve current problems.	4	3	2	1	0
K. Provide more gender-equitable educational opportunities.	4	3	2	1	0
L. Technology education reflects the desires of my school administrators and the local community.	4	3	2	1	0
M. Industrial arts/industrial technology reflects the desires of my school administrators and the local community.	4	3	2	1	0

APPENDIX B
INDIVIDUALS WHO TESTED VALIDITY
OF SURVEY INSTRUMENT

Ken Bruwelheide, Ph.D., Technology Education Department, Montana State University, Bozeman, MT

Scott Davis, Ph.D., Technology Education Department, Montana State University, Bozeman, MT

Tim Dolphay, teacher and president of MITEA, Savage, MT

John Hickey, teacher and secretary of TEAM, Bozeman, MT

Jamie Isaly, teacher and treasurer of TEAM, Bozeman, MT

Nat Jaeggli, MA, Extended Studies, Montana State University, Bozeman, MT

Dennis Pings, teacher and secretary/treasurer of MITEA, Victor, MT

APPENDIX C

**COVER LETTER TO ACCOMPANY
SURVEY INSTRUMENT**

[Date]
1225 Indian Creek Rd.
Eureka, MT 59917

Dear [first name],

It has been well over a decade since the introduction in Montana of a new curriculum called "Technology Education". It has become apparent that some teachers have accepted this new curriculum while other teachers have chosen not to accept it.

To complete my masters program at Montana State University, I am conducting research to determine to what extent Montana's I/ATE teachers have accepted the philosophy of Technology Education. I believe the results of this survey will be of interest to all I/ATE educators and educational leaders in the state. My results will be forwarded to the appropriate departments at MSU and WMC and to the presidents of MITEA and TEAM with a request that the results be published in their respective newsletters for many of you to see. Several key people at the Office of Public Instruction in Helena are very interested in viewing the results of this survey. **Let your voice be heard!** Hopefully this information will help in the development of strategies for further direction and development of our profession in the state of Montana.

It is important for you to understand that the intent of this research is NOT to judge whether either Industrial Arts or Technology Education is the right or wrong curriculum that we should be teaching in Montana. The intent of this project is simply to determine the current status of the profession by discovering the percentage of teachers in the state who have or have not accepted the philosophy of Technology Education. It is also the intent of this study to analyze demographics and other variables as they relate to the acceptance of the Technology Education philosophy.

In completing the enclosed questionnaire please keep the following in mind:

- Question #8 is designed to discover your program's emphasis. With each type of program listed there are brief definitions which were derived from current articles and studies. These may not be all inclusive of what you teach and you may not totally agree with the definitions for each program. In other words, there are probably as many definitions as there are teachers. For the purpose of this study please consider the definitions I have included. I believe that the results of the study will be an accurate representation of what type of programs are taught in Montana regardless of agreeing on *exact* definitions.
- Question #9 was designed to discover your educational philosophy. These statements were also derived from current articles and previous studies similar to this one. Some statements lean towards the technology education philosophy, others towards industrial arts, and some may relate to both. Please remember while filling out this section that this is NOT an attempt to judge if what you teach is right or wrong but simply to determine the current status of the profession in Montana.

Of the approximately 300 I/ATE teachers in Montana, you have been randomly selected to be a part of this study. An equal percentage of teachers were selected from both eastern and western Montana. Although there is a number assigned to your survey, it will be used for data recording purposes only. Your complete anonymity is guaranteed. To get accurate results I need your participation. **The survey takes approximately 5-10 minutes to fill out.** Remember, let your opinion count in the results that will be forwarded to OPI and the teacher training institutions in the state.

Please complete the enclosed survey by [date] and return it in the enclosed postage paid envelope. Thank you very much for cooperation.

Sincerely,

Kevin Ruble

APPENDIX D
INDIVIDUALS WHO PARTICIPATED IN THE STUDY

Jerry Murphy
 Terry Selph
 Jeffery Vial
 James Lubke
 Ronald Kimmet
 Ronald Wright
 Roy Ehresmann
 Barry Lee
 Mark Schmaltz
 Henry Roy
 Robert Powell
 Curt Prchal
 Robert Wennerberg
 Duff Gray
 David Tolton
 Craig Nielson
 Edward Jutz
 Thomas Morris
 Melvin Mikkola
 Loren Drivdahl
 Darrell Benner
 Joe Paine
 Duane Larsen
 Lawrence Mires
 John Labonty
 James Stone
 Peter Schuster
 David Roos
 James Bott
 Aaron Oksa
 Dwight Freeman
 Russell Samuelson
 Tim Dolfay
 Guy Melby
 Stephen Gonzalez
 Steve Ray
 Tom McMakin
 Dean Myers
 Jeff Steiner
 David Mikulecky
 Lyle Swenson
 Clayton Clanin

Robert Craig
 Dan Wilkins
 Patrick Trujillo
 Joseph Wilkins
 Michael Hocesvar
 Derik Senger
 Carl Rosenleaf
 Donald Ekert
 Les Richardson
 Darwin Feakes
 James Carrol
 Steven Diedrich
 Earl Furlong
 Dan McKenty
 Mark McCormick
 Mark Ekberg
 Jeffery Brown
 Danny Bartel
 Darrell Laubach
 Jesse Kibbee
 Brian Hayes
 Timothy Hagen
 Daniel Wooley
 Royal Westervelt
 David Herdina
 John Davis
 Darin Cummings
 Allan Walter
 Gary Duff
 Harold Holmes
 Greg Upham
 Lynn Carr
 Henry Begler
 Matthew Allen
 Raymond Berg
 James Heisler
 Clinton Watson
 Vincent Forsman
 Daniel Cornell
 Michael Lawson
 Dennis Shea
 John Magnus

Ryan Pesanti
 Steven Conrady
 Mark Rogstad
 John Hickey
 Douglas Batson
 Calvin Warrington
 William Richards
 Jay McCurry
 Tom Wheeler
 Jess Stovall
 Mark Lally
 Gayle Clark
 Jeffrey Hungerford
 Stephen Harris
 James Johnson
 James Swofford
 James Ingalls
 Russell Faris
 Ken Lutz
 Albert Jones
 Harry Lippy
 John Mikesell
 Mark Faroni
 Robert Hodge
 John Fred
 Alan Haskins
 Martin Dickerson
 Daren Gunlock
 Mark Darow
 John Bauman
 Shawn Holmes
 Curtis Kegel
 Charles Jensen
 Roger Cassidy
 Dick Richardson
 Dennis Pings
 Bruce Fitzgerald
 Dennis Latimer
 Todd Fiske
 Gary Kamps
 Ernest Lommatsch
 John Hammond

Chuck Manning
Leslie Saari
Todd Berget
James Brittenham
Chris Ruffatto