



Elements common to quality and success in secondary technology education programs
by Lemuel E Miller

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in
Technology Education
Montana State University
© Copyright by Lemuel E Miller (1997)

Abstract:

The purpose of this study was to identify and rank those factors that contribute to the quality and success of secondary technology education programs. An expert panel consisting of fifteen secondary technology education teachers, recognized through the International Technology Education Association, 1996 program excellence award, participated in a three-round Delphi survey.

In the first round survey, participants were asked to identify five elements that contribute to quality in secondary technology education programs, and five elements that contribute to success in secondary technology education programs. A second round survey, employing a ten point rating scale, ranked the 36 quality statements and 44 success statements identified in the first round survey. The third round study achieved consensus regarding the importance of identified program quality and success elements, and determined an assigned ranking for these factors as perceived by the panel of experts.

Significant program quality elements identified included; dedicated instructors, knowledgeable and multitalented facilitators, individuals who have a strong belief in the need for technology education, personnel who are committed to excellence, personnel who have a vision of the future, and classroom teachers who are flexible and open to new ideas. Flexible, environmentally friendly facilities were important as well.

Departmental support, administrative support, community support, and strong leadership on the part of the program area teacher were identified as being key program success elements.

ELEMENTS COMMON TO QUALITY AND SUCCESS IN SECONDARY
TECHNOLOGY EDUCATION PROGRAMS

by
Lemuel E. Miller

A thesis submitted in partial fulfillment
of the requirements for the degree

of
Master of Science
in
Technology Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

May 1997

N378
M6156

APPROVAL

of a thesis submitted by
Lemuel Eldredge Miller IV

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

Graduate Committee Chair

Scott E. Davis
(Signature)

6/26/97
(Date)

Approved for the Department of Education

Department Head

Paula Hegg
(Signature)

July 3, 1997
(Date)

Approved for the College of Graduate Studies

Graduate Dean

R. L. Brown
(Signature)

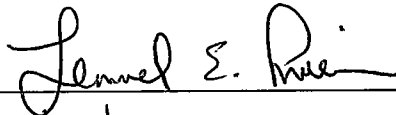
7/9/97
(Date)

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a master's degree at Montana State University, I agree that the Library shall make it available to borrowers under the rules of the Library.

If I have indicated my intention to copyright this thesis by including a copyright notice page, copying is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for permission for extended quotation from or reproduction of this thesis in whole or in parts may be granted only by the copyright holder.

Signature



Date

6/15/97

ACKNOWLEDGEMENTS

The development of materials present in this thesis resulted largely from a distance education experience. A great amount of effort rests with Dr. Scott E. Davis my graduate committee chair person. Dr. Davis has been a solid influence in my research efforts through positive feedback, excellent accessibility, and timely communications of pending deadlines.

It was Dr. Doug Polette who first sparked my interest in Technology Education. Without the great influence of Doug, I would not have entertained graduate studies in Technology Education at Montana State University. To this very day, the influence and spirit of Doug Polette motivate me in my teaching and learning.

The quality of the research present within this thesis would not have been possible without the participation of the fifteen expert panel members from International Technology Education Association programs of distinction. This thesis could not have been completed without their expert opinion and timely feedback.

Many hours were spent isolated from my wife Peggy and son Daniel as I committed to research and writing. I am indebted to Peggy for keeping me on schedule, and reminding me of my desire to see this project through to completion.

TABLE OF CONTENTS

ABSTRACT.....	x
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES.....	vii
LIST OF FIGURES.....	ix
CHAPTER 1: INTRODUCTION AND METHODOLOGY.....	1
Present Program Approaches.....	2
Purpose of the Study	5
Need for the Study.....	5
Research Questions to be Answered by the Investigation..	7
Assumptions.....	8
Limitations and Delimitations.....	8
Limitations.....	8
Study Period.....	8
Study Population.....	9
Delimitations.....	9
Scope of the Study.....	9
Definitions.....	9
Methodology.....	11
General Description.....	11
Population.....	12
Development of Survey Instruments.....	12
Study Administration.....	12
Data Collection and Reporting.....	13
CHAPTER 2: REVIEW OF THE RELATED LITERATURE.....	14
Strategic Planning.....	20
Summary.....	22
CHAPTER 3: RESEARCH METHODOLOGY.....	24
Method Selection.....	24
Selection of the Expert Panel.....	26
Data Acquisition and Analysis.....	28
Development of the Survey Instruments.....	28
Data Analysis.....	32
CHAPTER 4: RESULTS.....	34
Data Gathering.....	34
Demographic Data of Expert Panel Members.....	35
Grade Range of the School.....	36

Number of Students at the School.....	36
Specific Classes the Expert Panel Member was Responsible For Teaching.....	37
Number of Years the Expert Panel Member Had Been Teaching.....	37
Number of Years Expert Panel Member has Been in His/Her Teaching Position.....	38
Specific Teaching Area Endorsements Maintained by the Expert Panel Member.....	38
Professional Memberships Maintained by the Expert Panel Member.....	39
The Expert Panel Members School Location.....	40
Synopsis of Demographic Information.....	40
Round One Procedure.....	40
Synthesis of Round One Results.....	41
Round Two Survey Instrument.....	43
Round Three Survey Instrument.....	49
Discussion.....	57
 CHAPTER 5: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.....	65
Purpose of the Study.....	65
Research Questions.....	66
Study Design.....	67
Findings.....	69
Conclusions.....	73
Recommendations.....	74
 REFERENCES.....	77
 APPENDICES.....	81
A International Technology Education Association, Program Excellence in Technology Education, Program Self Study.....	82
B Survey Cover Letters and Instruments.....	93

LIST OF TABLES

TABLE	Page
1 Program Quality Elements Identified.	30
2 Program Success Elements Identified.	31
3 Grade Range of Schools, Expert Panel Members.	36
4 School Size, Expert Panel Faculty Members.	36
5 Specific Classes Taught by Expert Panel Members.	37
6 Years of Teaching Experience, Expert Panel Members.	38
7 Number of Years Expert Panel Member Had Been In Current Teaching Position.	38
8 Specific Teaching Area Endorsements Maintained by Expert Panel Members.	39
9 Professional Association Memberships Reported by Expert Panel Members.	39
10 School Location as Reported by Expert Panel Members.	40
11 Quality Curriculum Elements.	45
12 Quality Facilities and Equipment Elements.	46
13 Quality Support Structure Elements.	46
14 Success Support Structure Elements.	47
15 Success Personnel Elements.	48
16 Success Student Skill Development Elements.	49
17 Quality Curriculum Elements, Third Round Survey.	52
18 Quality facilities and Equipment Elements, Third Round Survey.	53
19 Quality Support Structure Elements, Third Round Survey.	54

TABLE		Page
20	Success Support Structure Elements, Third Round Survey.	55
21	Success Personnel Elements, Third Round Survey.	56
22	Success Student Skill Development Elements, Third Round Survey.	57

LIST OF FIGURES

FIGURE	PAGE
1 SCANS Report, Future Schools Comparison.....	18

ABSTRACT

The purpose of this study was to identify and rank those factors that contribute to the quality and success of secondary technology education programs. An expert panel consisting of fifteen secondary technology education teachers, recognized through the International Technology Education Association, 1996 program excellence award, participated in a three-round Delphi survey.

In the first round survey, participants were asked to identify five elements that contribute to quality in secondary technology education programs, and five elements that contribute to success in secondary technology education programs. A second round survey, employing a ten point rating scale, ranked the 36 quality statements and 44 success statements identified in the first round survey. The third round study achieved consensus regarding the importance of identified program quality and success elements, and determined an assigned ranking for these factors as perceived by the panel of experts.

Significant program quality elements identified included; dedicated instructors; knowledgeable and multi-talented facilitators, individuals who have a strong belief in the need for technology education, personnel who are committed to excellence, personnel who have a vision of the future, and classroom teachers who are flexible and open to new ideas. Flexible, environmentally friendly facilities were important as well.

Departmental support, administrative support, community support, and strong leadership on the part of the program area teacher were identified as being key program success elements.

CHAPTER 1

INTRODUCTION AND METHODOLOGY

The emerging educational discipline of Technology Education is at a crossroads in its ongoing evolution. Varied program models have developed from the perceived need to establish technological literacy in our population. Many of these programs have evolved through a transition from Industrial Arts Education curricula to programmatic instructional classrooms emphasizing Technology Education.

Zuga (1989), in her review of written curriculum documents from 1898 to 1988 noticed a definitive repositioning of goal statements, hence a theoretical shift in the field over the period. Historically it was noted that the instructional goals of Industrial Arts instruction closely reflected the importance of manual training, fine motor skill development, the use of tools and the importance of consumerism and career exploration. Today however, Zuga noted that greater emphasis was more likely to be placed on the subjects of industry and technology, the teaching of cognitive and affective intellectual processes, and the role of consumerism.

Zuga (1989) described curriculum designs that have

emerged from this shift. Academic curriculum designs emerged to focus on the body of knowledge that comprises the varied disciplines of technology. Technical curriculum designs were based on the analysis of performance or process. Intellectual processes curriculum focused on problem solving, critical thinking and traits such as creativity and problem solving. Social curricular design utilized real world situations to enhance education or create educational events that impact the future. Lastly, personal curriculum designs were learner-centered and focus on the individual needs and interests of the student.

Present Program Approaches

Petrina (1993) commented on one familiar approach to program transition. In writing on the packaged approach to program modeling, Petrina provided a critical review on the Modular Approach to Technology Education (MATE), commenting that; "MATE represents more of a continuation of problematic Industrial Arts practices than a change." (Petrina, 1993, p. 73). Another programmatic discussion was brought forth by Purcel (1993), who suggested that Technology Education should focus on the technological method and the basic notion that technology was a means of meeting human needs with attention paid to the societal consequences, advancing technical skills, and the growing knowledge base. Additional review of program methodology was provided within the Project Based structuring of Technology Education. This methodology emphasized the use of tools, processes and

critical thinking to establish group collaboration on projects.

Further complicating the future of the Technology Education profession is the fact that a myriad of definitions for Technology Education and Technological Literacy exist. A close examination revealed that these definitions share certain commonalities (Savage, 1990). Just as there appeared to be some degree of agreement within the profession regarding program taxonomy, a review of current literature revealed that there was little current data that was supportive of those elements that contributed to quality programs of instruction in Technology Education.

Lacroix (1987) recognized the importance of this problem, and stated that we have as yet to clearly define what was acceptable professional performance in our field.

The significance of this problem to technology education is considerable. Indeed, technology educations continued acceptance by the educational community is directly dependent on the quality of its curriculum, and this curriculum is dependent upon the quality and effectiveness of the instruction. (Lacroix, 1987, p.32)

Technology Education is an emerging curriculum that has roots within the more traditional Industrial Arts curriculum. Purcel, (1993) stated that two major changes were driving the shift from the traditional Industrial Arts curriculum to the implementation of Technology Education programs.

As society has evolved from the industrial age to the information age, the composition of the work force has changed and the amount of training and breadth of education needed by students to be

adequately prepared for jobs and to become technologically literate has increased. Fewer and fewer people actually participate in production and service occupations requiring industrial age skills and practices. Therefore, industrial arts-based technology education programs have been viewed as less important in the general education of all students. (p.2)

The transition from programs of Industrial Arts instruction to programs reflecting an emphasis on Technology Education has been largely driven at a grass roots level throughout the country. Numerous successful programs of technology education are recognized annually through the criteria established by the International Technology Education Association's Program Excellence Awards (ITEA, Affiliate Representative Resource Book, 1996). The International Technology Education Association attempts to place notable programs in the national and international spotlight every year by recognizing superior technology education programs in member states, provinces, and countries. These award winning programs serve as a standard for comparison and models for the development of other programs.

Pullias in a 1992 article entitled "What is Technology Education", described the three methods that individual teachers may take regarding the implementation of Technology Education. Described in detail are the revolutionary, evolutionary and an approach that is representative of a tact that would disguise what we have been doing for years and make it look like a new curriculum.

A review of the current literature has suggested that there are a number of highly successful and nationally recognized programs of Technology Education in the country. These programs have developed through the methods suggested by Pullias, and are based upon curriculum designs described by Zuga. The question then becomes one of seeking the elements that were common to program quality, and then success, within site based Technology Education programs.

Purpose of the Study

The purpose of this study was to identify and describe the elements common to secondary Technology Education program quality and success.

Need for the Study

Numerous successful programs of Technology Education are profiled each year by the International Technology Education Association (ITEA). Each of these programs thrived under the influence of local, regional and national resources that directly or indirectly influenced program success. Recognizing the dynamic forces that drive technology and the modern work-place, the need for future planning for technology education, and the forces driving technology education curriculum, there appears to be a need to describe, through consensus building, those elements that

are common to quality and success in programs that have currently been assigned places of excellence within the profession.

When examined, identified Technology Education programs of excellence within the profession, showed a relationship between program quality and program success. The literature leads one to believe that quality programs insure success in programs.

First impressions and quality delivery of services are important for technology educators. When we describe our programs, when people stop in and look at our laboratories, and when students talk about their experiences in classes, we can rest easier if these experiences are based on quality. (Bensen, 1990, p.3)

Quality programs of instruction become important in development of technological literacy. Establishing technological literacy within our population is a goal of Technology Education. Hayden (1991) mentioned that technology was a learned phenomenon, therefore being literate about technology should also be a learned phenomenon. Hayden further stated the need for additional research that investigated the methodology that contributed to or increased technological literacy most efficiently. He went on to state in his recommendations for further research the following; "It seems logical that before we try to increase a student's technological literacy we first know the best way or ways to do so." (p. 41)

A review of the literature currently available in the field indicated that many practitioners were cautious in

describing how they believe technological literacy should be developed. However, teacher educators, practitioners, and professionals from business and industry recently convened to develop a rationale and structure document for the study of technology. The need for technological literacy was presented in the document "Technology for All Americans, A Rationale and Structure for the Study of Technology".

Technological literacy is much more than just knowledge about computers and their application. It involves a vision where each citizen has a degree of knowledge about the nature, behavior, power and consequences of technology from a broad perspective. Inherently, it involves educational programs where learners become engaged in critical thinking as they design and develop products, systems, and environments to solve practical problems. (ITEA, 1996, p. 1)

Descriptive material developed from the results of this study may help to improve the condition of secondary Technology Education Programs nationally, and will fill a definitive research gap, hence giving us one indication of the status of the profession at this point in time.

Research Questions to be Answered by the Investigation

1. What are the core elements contributing to quality and success in secondary Technology Education programs?
2. What is the rank assignment regarding importance of the elements contributing to quality and success in secondary Technology Education programs?

Assumptions

1. The researcher accepted the validity of the criteria used to select the 1996 ITEA Program Excellence Award recipients. Award selection criteria is further detailed in the section labeled appendices.
2. Further definition of the elements contributing to program strength in secondary Technology Education is necessary, as there exists a knowledge gap within the profession. (Bensen, 1990)
3. There exists consensus regarding elements of program quality and success, among nationally dispersed educators administering secondary Technology Education programs of distinction.
4. A consensus based ranking of secondary Technology Education program quality and success elements can be achieved.

Limitations and Delimitations

For purposes of organization, the following conditions were applied to this study:

Limitations

Study Period. A three round Delphi type study employing

a Panel of Experts from the 36 programs selected in the 1996 ITEA Secondary Program Excellence Awards, will be conducted from December 1996 to March 1997.

Study Population

The initial study employing a panel of experts was selected as described in the section entitled Methodology.

Delimitations

Scope of the Study. A self selected panel of experts from 15 geographically dispersed Technology Education programs representing middle and high school educators was used to complete a three round Delphi study as described by Issac and Michael (1981).

Definitions

1. *Delphi Technique:* A research process designed to generate group consensus while minimizing associated disadvantages such as the bandwagon effect of majority opinion, powers associated with a persuasive individual, vulnerability of associated group dynamics and the unwillingness of individuals to abandon publicly stated positions. This process initially identifies group members

who will generate the consensus position, however the researcher interacts with them individually to provide collective feedback from the group. An informed consensus is derived from the group after several rounds of sampling from the group. (Issac & Michael, 1981)

2. *Industrial Arts Education*: "Industrial Arts as a curriculum area is defined as those phases of general education which deal with technology - its evolution, utilization, and significance; with industry - its organization, materials, occupations, processes, and products; and with the problems and benefits resulting from the technological and industrial nature of society." (Maley, 1978, p.273)

3. *MATE*: Modular Approach to Technology Education. "Connotes a self contained (i.e., "everything" is there for the student) instructional system defined by programmed learning theory, technological devices and equipment." (Petrina, 1993, p.72)

4. *Project Based Technology Education*: An educational methodology gaining acceptance in Technology Education, whereby students collaboratively apply tools, materials, and processes to the cooperative solution of realistic design challenges. (Graumann, 1993)

5. *Quality as applied to Technology Education Programs:*

Those programs that attract better employees (faculty), are selected by more clients (students), whose products are in higher demand (graduates), and provide better service in real world application (teaching). (Ritz & Loepp, 1990)

6. *Strategic Planning:* A process associated with understanding the environment, defining organizational goals, identifying options, formulate and implementing decisions, and evaluating performance. Placed in the context of a plan, it is a process of exploiting the new and different opportunities of tomorrow. (Morrison, Renfro & Buchner, 1984)

7. *Technology Education:* "The knowledge and study of human endeavors in creating and using resources, processes, and systems to manage the artificial and natural environment to extend human potential and enhance the relationship of these to individuals and society." (Savage, 1990, p.8)

Methodology

General Description

Due to the exploratory nature of the problem presented,

descriptive research was appropriate for this study. It is anticipated that information derived from this study will provide a basis for additional research.

As previously described in the section entitled Purpose of the Study, a panel of experts was assembled and the Delphi technique used to sample consensus on the issue of the elements determining quality and success in Technology Education Programs.

Population. The study population consisted of individuals self selected from the 36 secondary programs recognized by the International Technology Education Association as ITEA Program Excellence Award Recipients in 1996.

Development of Survey Instruments. The initial panel of experts study utilized the Delphi technique in the form of a ten item query to develop a listing of 36 quality elements and 44 success elements. The second round survey instrument emerged from elements identified in the first round study. As described by Issac and Michael (1981), the third and last round of questions developed a ranking of these elements.

Study Administration. The respective study instruments were administered by mail during the time period previously identified in the Study Period. Extensive follow up

procedures were used, including second letters soliciting survey response, and telephone contacts as necessary.

Data Collection and Reporting. A detailed description of the ranked factors contributing to program quality and success was compiled and reported as based upon the research conducted.

CHAPTER 2

REVIEW OF THE RELATED LITERATURE

The advent of the emerging educational discipline of Technology Education is largely seen as an extended transition of the well known Industrial Arts Curriculum. The need for Technology Education is supported in the following quote from Dugger, Bame, and Pinder, (1985),

Because American Culture is distinctively characterized as technological, it becomes the function of schools to give every student insights and understandings of the technological nature of the culture. This is what the program of Technology Education strives to do. (p.7)

The reader will note that earlier we provided definitions that clearly provided insight into the cognitive domain associated with Industrial Arts Education and Technology Education. "Industrial Arts as a curriculum area is designed as those phases of general education which deal with technology - its evolution, utilization, and significance; - with industry - its organization, materials, occupations, processes and products" (Smith, 1970, p.20). This definition of Industrial Arts Education can be contrasted to the following definition of Technology Education that was presented by Savage (1990). "The

knowledge and study of human endeavors in creating and using resources, processes, and systems to manage the artificial and natural environment to extend human potential and enhance the relationship of these to individuals and society" (p.8). The similarities between the teaching disciplines was mentioned as well as the apparent, natural transition from a program reliant on manual arts practices to one emphasizing information age technologies. The discipline of Technology Education clearly progressed from programmatic models of Industrial Arts Education. Again we can add further proof to this transition by the following quote that mentioned the relationship between progress and technology.

Progress has always been directly linked to the management of technology. The study of technology should be an integral part of the school curriculum with emphasis on the fact that people control technology. Only people can determine whether technology will be applied to their benefit or to their ultimate disadvantage.
(Dugger, Bame, Pinder, 1985, p.3)

Literature clearly supports the internal need for a change in curriculum structure that is present within the Industrial Arts and Technology Education community. An external need for change and transition is supported by a study completed by Daugherty and Wicklein, (1993) in which they surveyed mathematical, science and technology teachers on their perceptions of Technology Education. In concluding remarks on the study, Daugherty and Wicklein commented that "The issue of how technology education is perceived has

influenced, and will continue to influence, the development of the technology education discipline." (p.44) The authors of the study further described the apparent disparities between perceived teaching methods, curriculum content and curriculum integration needs amongst those surveyed.

Daugherty and Wicklein (1993) provided evidence in their study that suggested a compelling need to further investigate and describe various phenomenon within the profession. Quoted below are their recommendations for further study.

1. The technology education profession should develop strategic plans to overcome stereotypical perceptions of the discipline.
 2. Technology education potential cannot be fully reached until there is a clear understanding across disciplinary boundaries as to what characteristics exemplify technology education.
 3. Technology education can more effectively emphasize the connections between mathematics, science, and technology education.
 4. Coordinated planning that includes professionals from mathematics, science and technology education is a critical component for the future of integrated curriculum among the three disciplines.
 5. Workshops and presentations should be provided for mathematics and science teachers in an effort to improve their perception of the technology education discipline.
 6. Further study should be conducted examining the public perception of technology education as a discipline in the secondary school.
 7. Research should be conducted investigating the methods of overcoming stereotypical perceptions often held by associated secondary education faculty members.
- (Daugherty & Wicklein, 1993, p.44)

Clearly apparent in the summary provided by Daugherty

and Wicklein was the need to overcome stereotypical perceptions of the discipline. Other elements included identifying the boundaries of the Technology Education discipline, more effectively emphasizing the math, science-technology education connection and the need to pursue planning that would place Technology Education in an appropriate role as a critical component of any integrated curriculum.

Layton (1993) examined Technology Education from the perspective of Science Educators.

At an international conference on science, technology and mathematics education in 1991, one science educator dubbed technology as "the new kid on the curriculum block", adding that we need to keep a careful watch on developments to see if the relationship with other subjects would evolve as "bully or buddy", "colonizer or collaborator". Certainly, the inclusion of technology as a component of general education poses intriguing problems of curriculum organization and inter-relationships, to say nothing of content, pedagogy and assessment. (Layton, 1993, p.57)

Additional emphasis for the importance of Technology Education is provided in the Secretary's Commission on Achieving Necessary Skills report also known as SCANS. The SCANS report specifically identified technology as a workplace competency. "Technology: Selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies" (SCANS, 1993, p.5). The SCANS report further contrasted the present school learning environments with those of anticipated future learning environments. Presented in Table 1 is an

informative comparison of today's schools with those of tomorrow. This comparison is meaningful in the discussion of this study, as apparent here are the future trends that will shape quality education.

Figure 1: SCANS Report, Future Schools Comparison.

TODAY'S SCHOOLS	TOMORROW'S SCHOOLS
<u>STRATEGY</u>	
-Basic Skills development.	-Thinking Skills development.
-Testing separate from teaching.	-Assessment integral to teaching.
<u>LEARNING ENVIRONMENT</u>	
-Reliance on short-term memory.	-Active knowledge construction.
-Students working as individuals.	-Cooperative problem solving.
-Basic before higher order.	-Skills in real problems context.
<u>MANAGEMENT</u>	
-Supervised by administration.	-Learner centered, teacher directed.
<u>OUTCOME</u>	
-Some students learn to think.	-All students learn to think.

(SCANS, 1993, p.7)

Also set forth in the SCANS report were benchmarks for high performance education. Benchmarks of performance become critical if an organization is to improve operating efficiencies and operational direction. Without attention to direction organizations become blinded by what George Washington University Professor, Jerry B. Harvey (1993) termed the "Abliene Paradox." This term described a condition where an organization is going about its business with no real destination of thought processes or planning.

Pullias (1997) mentioned that a current curricular trend in Technology Education is the modular classroom.

They seem to be the trend. However, questions are beginning to surface regarding life after modular.

Many teachers are beginning to discover that modular labs are limited in the kinds of experiences they provide, and are virtually "dead end" (Pullias, 1997).

Pullias developed thoughts critical of modular or canned learning environments. He mentions that the modular concept is only a stop-gap measure for what Technology Education really needs. In concluding Pullias mentioned the need to think beyond modular and the mediocrity in instruction that he believed to be associated with this form of curriculum delivery.

The educational discipline of technology education does indeed find itself at a crossroads in evolution. Given the lack of perceived direction, the apparent control being exerted on curriculum through the influence of the Modular Approach to Technology Education-MATE (Petrina, 1993), and the perceived need on the part of leading professionals in Technology Education to seek change, a formal strategy defining critical program elements is needed.

The development of educational standards in Technology Education programs is not a new concept. However, emerging National Standards for Technology Education will soon have some influence on the profession. To date numerous national, regional and state planning guides have brought about structured program change. Cuetara, (1988) mentioned that program guides and the standards they often define, present a systematic approach to attaining regionally or nationally accepted program benchmarks. Often ignored in program guides were descriptions of benchmarks that define quality

experiences, quality environments, and a measure of the importance of local resources to the success of Technology Education.

Lacking also were strategic plans that define direction in program growth and evolution. Morrison, Renfro, and Buchner (1984) illuminated the need to further understand and define our future learning experiences by stating the following; "Rapid technological developments in computers and telecommunications are revolutionizing instruction and management" (p.1).

Strategic Planning

A basis for modern strategic planning is established through a collection of data that examines the internal and external forces influencing organizations.

Modern strategic planning recognizes that organizations are shaped by outside forces at least as much as by internal ones. In particular, it represents an effort to make this year's decisions more intelligent by looking toward the probable future in coupling the decisions to an overall institutional strategy. (Morrison, Renfro & Buchner, 1984, p.1)

Strategic planning has gained a renewed acceptance in the public and private sectors of our society. However, the concepts apparent in modern strategic planning have in fact been well known to us for some time. Skinner (1968) recognized concepts aligned with strategic planning.

Education must become more efficient. To this end curricula must be revised and simplified, and text books and classroom techniques improved. In any other field a demand

for increased production would have led at once to the invention of laborsaving capital equipment. Education has reached this stage very late, possibly through a misconception of its task." (Skinner, 1968, p. 29)

Skinner mentioned that there was a misconception of the task. If it were our intent to improve classroom techniques and revise curricula to keep pace with changes in society then there must be a renewed interest in quality of our product. "Technology education programs must all make quality a priority" (Ritz, Franzie & Loepp, 1990, p.5). Defining what constitutes a quality program in Technology Education will become an on-going task within the profession.

This statement was further explained by Ritz, Franzie and Loepp, (1990):

Quality programs are deserving of more funding; they attract better employees (faculty); they are selected by more clients (students); their products are in higher demand (graduates); and they provide better service in real world application (teaching). (p.7)

Understanding the elements that define quality in instruction and facilities is critical to the profession. In commenting on the role of educational facilities in successful Technology Education programs, Brad and Terry Thode (1993) emphasized the importance of the Technology Education facility in the public's eye.

As programs and curricula change there are a number of points of view about the role that facilities play in the successful technology program. While most would agree that a comprehensive curriculum must first be in place as the foundation for any facility and equipment

decisions, there are those who believe that this most visible part of the program creates that public relations image and proclaims loudly that something new is going on. (Thode, 1993, p.17)

Cummings, Jensen and Todd (1987) further emphasized the program quality-facilities connection. Todd further commented on the need for facilities to be flexible, responsive to change and economical.

Summary

We are in the midst of an evolution that is changing many industrial arts education classrooms to programs reflecting the modernistic approach of technology education. The transition is seen as a natural synthesis as curriculum strives to keep pace with the times. The diversity of programs and curricular approach were mentioned as being areas of concern. These concerns are further compounded with the apparent misconceptions of technology education that exist in the math and science education communities.

The apparent lack of strategic planning in the discipline was evidenced by several authors. Research appears to be lacking that would be supportive of the need to define program quality and success elements. Information defining program quality and success elements would provide educators with the benchmarks necessary to enhance programs through strategic planning. Adding further weight to this

statement is a comment by Waetjen (1991) reflecting on the need for research in Technology Education.

Die hards claim that research isn't needed and instead offer up dozens of anecdotal accounts of students who have benefited from taking courses in technology education. But no matter how titillating the anecdotes, they simply do not convince deans, superintendents and boards of education. Only research results will be convincing. Research has moved from the periphery to the very core of the educational process. Indeed research has established itself as a primary vehicle by which change is promoted and effected in education. (p.3).

A base of research in the discipline of Technology Education must be established if practicing educators are to understand the importance of program elements such as facilities, on-going curriculum revision, equipment needs and trends, public relations, and the critical general education connection. Technology Education is a field of study that seeks to establish technological literacy in our population. At least one scholar has suggested that to increase technological literacy, we must first understand the best way or ways to do so (Hayden, 1991).

It is the intent of this study to describe and rank the elements common to secondary Technology Education program quality and success. Only through such base-line data can we gain the insight into the profession that would further lead to long range strategic planning.

CHAPTER 3

RESEARCH METHODOLOGY

This study was conducted to identify elements common to quality and success in secondary technology education programs. Research data was used to develop a ranking of elements common to quality and success in secondary Technology Education programs. The research methodology and associated procedures are described in this chapter.

Method Selection

The expert panel or Delphi survey methodology was chosen as the method of data collection. The Delphi process was originally developed in the 1950's by Olaf Helmer and Norman Dalkey who were scientists at the Rand Corporation. This consensus building research methodology was initially developed for purposes of forecasting futures (The Consummate Design Center, 1996). The Delphi technique was initially used for researching military related policy issues. Delphi studies have since seen wide application in Social Science and Educational research.

Many variations of the Delphi methodology exist, however, essential components appear to be the selection of anonymous experts, and sequential questionnaires generated from continual feedback (Lindstone & Turroff, 1975). The Delphi methodology is ideally suited for needs assessments or analysis of future directions when experts are widely scattered across geographic regions or where experts are likely to have diverse opinions. Strengths of the Delphi study instrument are the combination of written (qualitative) and numerical (quantitative) data and its ability to form consensus based expert opinions. Limitations associated with this methodology are the time involved for postage based feedback and the apparent lack of stimulation from face to face feedback. Another danger is that participants could be too homogeneous or like minded, thus producing a skewed data set (Strauss & Ziegler, 1975).

According to Strauss and Ziegler (1975), Delphi studies fall into one of three identified classifications, numeric, policy and historic.

The goal of the numeric Delphi is to specify a single or minimum range of numeric estimates or forecasts on a problem. The goal of a policy Delphi is to define a range of answers or alternatives to a current or anticipated policy problem. And, the goal of the historic Delphi is to define a range of issues that fostered a specific decision or the identification of the range of possible alternatives that could have been poised against a certain past decision.
(p. 11)

Strauss and Ziegler (1975) mention that there are four possible objectives or secondary goals for any Delphic exercise;

1. To explore or expose underlying assumptions or information leading to different judgments;
2. To seek out information which may generate a consensus of judgment on the part of the respondent group;
3. To correlate informed judgments on a topic spanning a wide range of disciplines;
4. To educate the respondent group as to the diverse and interrelated aspects of the topic. (p.11)

A modified Delphi study was selected for this study due to the nature of the research questions and the selected study population. These research questions were:

1. What are the core elements contributing to quality and success in secondary Technology Education programs?
2. What is the rank assignment regarding the importance of the elements contributing to quality and success in secondary Technology Education programs?

The study population consisted of 15 participants who were self-selected from the 36 secondary Technology Education programs receiving 1996 ITEA secondary Program Excellence Awards.

Selection of the Expert Panel

Participants in this study were self selected from the

36 secondary Technology Education programs receiving 1996 ITEA Program Excellence Awards. The Program Excellence Award is one of the highest honors given to classroom teachers. This award is presented annually in recognition of selected teachers outstanding contribution to the profession and their students. The award selection process requires that programs be nominated by an ITEA affiliate association. A written assessment procedure is required in the selection process. ITEA also requires that 60% of the technology faculty be ITEA members (ITEA, Affiliate Representative Resource Book, 1996). The written assessment instrument used by ITEA to select Program Excellence Award candidates appears in Appendix A as International Technology Education Association, Program Excellence in Technology Education, Program Self Study.

After initial identification of potential expert panel members, a screening letter was mailed to the 36 Program Excellence Award candidates on December 1, 1996. This letter is detailed in Appendix A as Study Participation Survey Form. This letter asked that potential participants express an interest in participating in the study. Participants returning a positive response provided general demographic information, information regarding the composition of their school and teaching situation such as grade range of the school, number of students at the school, school setting (rural, urban, suburban,) and specific classes or subjects taught. Additionally, participants were

asked to describe the number of years they had been teaching, the number of years in their present position, their specific teaching endorsements and their professional association memberships. Approximately 15 individuals responded positively to the Study Participation Survey Form by the December 15, 1996 cut off date. A listing of expert panel members can be found in Appendix A as Expert Panel Members.

Data Acquisition and Analysis

This study employed a three round Delphi technique. Detailed here are the procedures used to develop the survey instruments and the scope of the data gathering process.

Development of the Survey Instruments

A three round Delphi study was selected as the instrument of choice for purposes of answering the research questions. Rounds one and two of this study identified elements important to answering research question one.

1. What are the core elements contributing to quality and success in secondary Technology Education programs? A third round Delphi probe would answer research question two.
2. What is the rank assignment regarding the importance of the elements contributing to quality and success in secondary Technology Education programs?

This Delphi study model was aligned with one described by (Turoff, 1970) where the first round or probe asked that expert panel members give their comments regarding a particular set of issues. A second round instrument was developed from comments generated in the first round survey, at this time participants are asked to rank comments. The third and last round instrument sought to attain consensus ranking or stable disagreement.

The three survey instruments were mailed to expert panel members. Each survey instrument consisted of a personalized letter signed by the researcher and Dr. Scott Davis, Department of Education. Participants were given the option of returning their survey in an enclosed postage paid envelope or via FAX. The first round Delphi probe was followed up with a post card mailing reminding participants to return the survey instrument promptly. In addition to this follow-up, phone calls were made to selected study participants reminding them of the pending deadline for round one submission. Second and third round survey questionnaires included a second mailing to participants home addresses. Participants were further induced to return survey instruments on time, as a stick of gum was included in each survey mailing and crisp one dollar bills were included in the last survey mailing. The cover letters and survey instruments associated with this study are further detailed in Appendix B.

The instrument used in the first round was open ended.

Expert panel members were asked to identify five (5) program quality elements and five (5) program success elements. Participants were asked to use short concise statements. This instrument was designed to insure anonymity of responses as was detailed by Strauss and Ziegler (1975). The first round survey questionnaires were mailed to participants on January 17, 1997. Participants were not asked to sign the surveys. There was a 100% response to the first round instrument.

A synthesis of data received from the first round query resulted in 36 quality elements and 44 success elements being identified by expert panel members. Data synthesis consisted of eliminating the duplication of responses.

A further breakout of data resulted in first round data classification in the categories detailed in Table 1, and Table 2. Table 1 depicts the categories and related responses that expert panel members identified as being related to program quality elements. Table 2 depicts the categories and related related responses that expert panel members identified as being related to program success elements.

Table 1: Program Quality Elements Identified.

Category	Number of Items Identified
Quality Curriculum Elements	16
Quality Facilities and Equipment Elements	10
Quality Support Structure Elements	10

Table 2: Program Success Elements Identified.

Category	Number of Items Identified
Success Student Skill Development Elements	9
Success Personnel Elements	17
Success Support Structure Elements	18

A second round survey was developed from the responses that expert panel members generated in the first round instrument. A six page, second round survey asked participants to assign value to the categorized first round responses. A ten point range Likert summated scale was used to allow expert panel members to express their attitudes towards the developed statements. Likert scales gauge attitudes, all points on the scale are labeled according to value (Griggs & Anderson, 1997).

The second round survey was mailed to all participants on January 23, 1997. A due date of February 19, 1997 was set for completion of the second round survey instrument. Thirteen of fifteen surveys were returned in the second round.

Data collected in the second round was used to develop the third round survey instrument. The third round instrument was important in developing consensus by answering the second research question; -What is the rank assignment regarding the importance of the elements contributing to quality and success in secondary Technology Education programs?

The third and final survey instrument was developed from data collected in the second round survey. In the

third survey, expert panel members were asked to rank the significant quality and success factors identified by the second round survey data. This survey was mailed to participants on February 26, 1997, and was requested back by March 14, 1997. Fifteen of fifteen surveys were returned in the last round questionnaire.

Data Analysis

This study required that data be collected using a modified Likert type scale. Griggs and Anderson (1997) reported that a likert scale gauges attitudes. All points on a likert rating scale are labeled. Study participants were asked to select the numerical value that most closely reflected their attitude toward a particular question or statement. The research questions required that data be collected that identified the core elements contributing to quality and success in secondary Technology Education Programs and that a final rank assignment of important factors be determined. The researcher chose to use descriptive statistics for the analysis of survey data.

Griggs and Anderson (1997) stated that descriptive statistics allow us to judge how varied the responses are to a given question, what is typical, and the pattern that the responses fall into.

The researcher utilized the following statistical analysis. Mean or (mathematical average), median (midpoint response) and standard deviation (a measure of reliability).

Griggs and Anderson (1997) stated that mean and median are standard measures of central tendency, therefore are good measures of what is typical.

Results of the second and third round surveys were statistically analyzed and plotted the Delta Graph Pro software version 3.0. This software package was used to determine the mean, median and standard deviation from the second and third round surveys. Delta Graph Pro was also used to generate detailed tables of research findings. A complete analysis of the second and third round surveys is found in Chapter 4.

CHAPTER 4

RESULTS

This study was an attempt to identify and rank the elements contributing to quality and success in secondary Technology Education programs. A series of three surveys employed a 15 member panel of experts to collect survey data. The panel of experts consisted of 15 self-selected secondary Technology Education practitioners from 14 states. An analysis of the data gathered from the three survey instruments is presented in this chapter.

Data Gathering

A preliminary study screened 36 potential panelists and identified fifteen individuals from secondary Technology Education programs who agreed to participate in the study. In order to gather the data necessary to answer the research questions, the panelists were surveyed three times.

Demographic Data of Expert Panel Members

The fifteen expert panel members came from fourteen states and represented the eastern, east central, west central and western regions of the country as identified by the International Technology Education Association in the Affiliate Representative Resource Book. A map detailing the divisions of the United States according to criteria provided by the International Technology Education Association appears in Appendix A as ITEA Governance Region Map. An initial Study Participation Survey Form collected the following information:

- * Grade range of the school.
- * Number of students at the school.
- * Specific classes the expert panel member was responsible for teaching.
- * Number of years that the expert panel member had been teaching.
- * Number of years that the expert panel member had been in his/her present position.
- * Specific teaching area endorsements maintained by the expert panel member.
- * The professional memberships maintained by the expert panel member.
- * The expert panel members school location (rural, urban, suburban,), as based on the individuals definition.

Grade Range of the School.

The initial Study Participation Survey Form asked that participants identify the grade level range of their school. The results compiled from the fifteen survey forms returned are detailed in Table 3. The majority of study participants teach in schools spanning grade nine to grade twelve level.

Table 3: Grade Range of Schools, Expert Panel Members.

Grade Range of School	Number of Expert Panel Members
K-12	2
5-8	5
9-12	8

Number of Students at the School.

Expert panel members were asked to provide the total enrollment for their school. This information provided the researcher with a better understanding of local conditions (small school as compared to large school). The sizes of schools as reported by individual expert panel members is identified in Table 4.

Table 4: School Size, Expert Panel Faculty Members.

Size of School	Number of Expert Panel Faculty Members
0-250	1
251-500	3
501-750	3
751-1000	2
1001-1250	1
1251-1500	1
1751-2000	1
2001-2250	2
2251-2500	1

Specific Classes the Expert Panel Member was Responsible for Teaching.

It was difficult to plot data collected from this question. It became obvious to the researcher that there was little uniformity to as to the specific course titles reported by expert panel members. However, after synthesizing the responses the information could be represented as found in Table 5. Course titles provided, appeared to be linked to Technology Education curriculum themes.

Table 5: Specific Classes Taught by Expert Panel Members.

Course Titles (Synthesized Categories)	Number of Expert Panel Members Teaching (Courses in this Heading)
General Technology Education	13
Manufacturing Technology	7
Transportation Technology	2
Communications Technology	4
Power and Energy Technology	3
Advanced Studies in Technology	3

Number of Years that the Expert Panel Member had been Teaching.

Information was collected concerning the number of years that the expert panel member had been teaching. The results from the fifteen Study Participation Survey Forms returned are presented in Table 6.

Table 6: Years of Teaching Experience, Expert Panel Members.

Number of Years Teaching	Expert Panel Members Reporting
0-5	2
6-10	2
16-20	1
21-25	4
26-30	5
31-35	1

Number of years that the expert panel member had been in his/her present position.

Study participants were asked to indicate the number of years that they had been in their current teaching assignment. This information is reported in Table 7.

Table 7: Years in Current Teaching Position, Expert Panel Members.

Years in Current Teaching Position	Expert Panel Members Reporting
0-5	6
6-10	2
16-20	2
21-25	2
26-30	3

Specific teaching area endorsements maintained by the expert panel member.

Table 8 detailed the specific teaching area endorsements maintained by expert panel members.

Table 8: Specific Teaching Area Endorsements Maintained by
Expert Panel Members.

Endorsement	Number of Expert Panel Members
Middle School Technology Education	2
Secondary Technology Education	5
Industrial Arts - Technology Education	4
K-12 Technology Education	3
Vocational Certification	3
Special Needs	1
Industrial Science	1
Earth Science	1
Drivers Education	2
Aviation Science	1
Computer Science	1
Mathematics	1

Professional Memberships Maintained by the Expert Panel
Member.

Panelists were asked to provide a listing of the professional organizations that they maintained membership in. Table 9 provides a description of the professional affiliation of expert panel members as reported in the Study Participation Survey Form.

Table 9: Professional Association Memberships Reported by
Expert Panel Members.

Association Name	Panelist Reporting Membership
State Technology Education Associations	15
State Vocational Education Associations	4
International Technology Education Association	15
American Vocational Association	4
National Education Association	3
State Education Association	3
Epsilon Pi Tau	1
Phi Delta Kappa	1

The Expert Panel Members School Location.

Panelists were asked to select from: Rural, Urban, or Suburban in describing the location of their school. Table 10 presents school locations reported by expert panel members.

Table 10: School Location as Reported by Expert Panel Members.

School Location	Number of Expert Panel Members
Rural	4
Urban	2
Suburban	9

Synopsis of Demographic Information

Demographic Data was collected to demonstrate and define the diversity of the study population. Panelists represented schools that varied in size and location. The years of classroom teaching experience of panelists varied as did the number of years in present instructional positions. Panelists maintained a number of teaching endorsements. Panelists listed the range of technology related subjects that they taught as well as the diversity of educational teaching endorsements.

Round One Procedure

This study was conducted for purposes of identifying the core elements contributing to quality and success in

secondary Technology Education programs. The study also attempted to determine the importance of the elements contributing to quality and success in secondary Technology Education programs as based on the perceptions of an expert panel. A Delphi research model employing a panel of experts from fifteen secondary Technology Education programs was used in data collection. The first round survey asked that panelists provide five factors that are quality elements in their technology education program, and five factors that led them to achieve success in their technology education program. Participants were asked to use short, concise statements in their responses. The round one survey cover letter and survey instrument appear in Appendix B.

The first round survey was mailed to expert panel members on January 6, 1997. Panelists were asked to return the survey instrument by January 17, 1997. Follow up post cards were sent to all of the participants in the survey approximately five days after the initial survey instrument was mailed. Follow up phone calls were made to approximately 8 late responders the week of January 13, 1997. Fifteen of fifteen participants returned the round one survey.

Synthesis of Round One Results

The data collected in the first round survey was synthesized and formed the basis for the second round instrument. Based on the data, 61 quality elements and 59 success elements were identified. These elements were

reviewed for similarities and differences.

The synthesis involved the elimination of duplication of responses and the grouping of quality elements in the three categories. The researcher identified 36 of the original 61 quality elements in three distinct categories as being unique. It was determined that the quality responses from the first round survey could be grouped according to; curriculum elements, facilities and equipment elements, and support structure elements. Expert panel members identified 16 elements relating to curriculum, 10 items relating to facilities and equipment elements, and 10 items relating to support structure elements.

The 59 success elements were synthesized in the same manner as the quality elements. After examining expert panel input and eliminating the duplication of responses, a logical grouping of support structure elements, personnel elements, and student skill development elements emerged. Of the 59 original responses relating to success elements in secondary Technology Education Programs, 44 were identified as being unique. Participants identified 18 support structure elements, 17 personnel elements, and 9 student skill development elements.

The statements collected and synthesized into the 36 quality elements, and 44 success elements were grouped according to the following categories: quality curriculum elements (16) statements, quality facilities and equipment elements (10) statements, quality support structure elements

(10) statements, success support structure elements (18) statements, success personnel elements (17) statements, and success student skill development (9) statements. This information was developed into a six page round two survey that employed a ten point scale rating system.

Round Two Survey Instrument

Each expert panel member was mailed a second round survey instrument. The second round survey instrument consisted of 80 statements across six categories describing elements relating to the quality and success of secondary technology education programs. The second round survey and cover letter appear in Appendix B. The second round survey consisted of a six page questionnaire printed on bright yellow paper, a postage paid return envelope, a stick of gum for enticement, and the opportunity to FAX the survey back. Two identical sets of survey instruments were mailed to the study participants. One survey instrument was mailed on January 23, 1997. A second identical survey was mailed to the participant home addresses on January 27, 1997.

The survey instruments in these two mailings were coded to prevent duplication in responses. Participants were asked to return these surveys by February 19, 1997. On February 10, 1997 the researcher made selected phone calls in an attempt to have study participants return second round surveys. On February 21, 1997 thirteen of fifteen

surveys were returned. The researcher made the decision to proceed with the second round data that had been collected from the thirteen responses. Dalkey (1969) found Delphi reliability to be a function of group size. When the number of participants per group were thirteen or greater, questions of process reliability were satisfactorily answered. According to Dalkey group response of thirteen participants or greater developed reliabilities of 0.80.

Analysis of the data collected in the second round survey included the calculation of the mean, median and standard deviation. Delta Graph Pro Version 3.0 computer software was used to compile a statistical analysis and develop visual graphics from the data.

A ten point likert scale was employed in the survey. Expert panel members were told in the survey instrument that a ten represents the highest level of importance, where a one represents the lowest value of importance.

Statistical calculations of mean, median and standard deviation were performed for all factors that related to the quality and success of secondary Technology Education programs in the second round survey.

Data from the round two survey is displayed in tables 11 through 16. The mean, median, and standard deviation are presented for each statement that expert panel members were required to respond to.

Table 11 describes data on **quality curriculum elements**. Mean data responses ranged from a low of 7.08 to

a high of 9.69. Standard deviation scores ranged from a low of .63 to a high of 2.74. Median scores are represented in the third data column, and range from a low of 6 to a high of 10 on a ten point rating scale.

(34)

Table 11: Quality Curriculum Elements.

Element	Mean	Median	S.D.
Lab activities provide challenging opportunities for the learner.	9.62	10	0.96
Curriculum is revised annually to integrate new technology.	8.92	10	1.55
Curriculum is flexible to meet students needs.	9.23	10	0.93
Classroom facilitators follow a detailed curriculum structure.	6.31	6	2.36
Classroom activities are integrated with core subject areas.	8.77	9	1.42
Integration with other curricular areas is a part of program planning.	8.31	8	1.70
Students have extensive experience with a number of applied technological activities.	8.54	9	1.56
Core technologies are taught as elements of larger technological systems.	8.15	9	1.77
Class offerings are based on student interest inventories.	7.08	8	2.50
Classroom activities are correlated with life skills.	8.54	9	1.61
Classroom activities emphasize career exploration.	8.31	9	1.84
There is an emphasis on the process of design.	8.15	8	1.07
Industrial standards are followed in instruction.	7.23	8	2.74
Practical application of knowledge is emphasized in curricula.	9.69	10	0.63
Course offerings emphasize engineering elements.	8.00	8	0.82

Described in Table 12 are data provided by expert panel members describing **quality facilities and equipment elements**. Panelist scores were compiled and mean scores ranged from a low of 7.00 to a high of 9.54. Median scores ranged from a low of 8 to a high of 10 on a ten point rating scale. Standard deviation scores ranged from a low of 0.78 to a high of 3.03.

Table 12: Quality Facilities and Equipment Elements.

Elements	Mean	Median	S.D.
Timely equipment upgrades are critical.	8.23	9	2.52
Facilities must be versatile to accommodate a variety of technological studies.	9.38	10	0.87
Certain turn key laboratory configurations provide quality learning environments.	7.00	8	3.03
Sufficient numbers of network computers are an important part of the classroom environment.	7.77	8	2.80
Sufficient supplies are provided for student use.	9.38	10	1.04
Instructional modules provide for flexibility	7.46	8	2.85
Instructor built - developed learning materials enhance curriculum.	8.15	9	2.54
Facilities provide for both clean (design) and dusty (fabrication) activities.	8.62	10	2.75
The computer and related hardware are used as tools.	9.08	10	1.38
Facilitates are clean, bright and well lit.	9.54	10	0.78

Table 13 describes expert panel responses to **quality support structure elements**. The mean ranged from a low of 7.77 to a high of 9.85. Median responses ranged from a low of 8 to a high of 10. Standard deviation scores ranged from a low of 0.55 to a high of 1.89.

Table 13: Quality Support Structure Elements.

Element	Mean	Median	S.D.
Administration backs the program.	9.77	10	0.60
Community support for the program is important.	9.46	10	0.88
A dedicated instructor provides a positive example for students and staff.	9.85	10	0.55
Administration is flexible and empowers teachers.	9.54	10	0.78
Sufficient local budgetary support for program elements.	9.46	10	0.97
Teachers from other curricular areas support the program.	9.15	10	1.46
Industrial and private sector donations contribute to the program.	7.92	8	1.85
Grant funding support for program elements.	7.77	8	1.83
Long range planning is inherent in facility and curricular needs.	9.00	9	1.22
Student clubs and organization are active.	7.92	8	1.89

Table 14 describes responses that address **success support structure elements**. Mean scores ranged from a low of 6.92 to a high of 9.62. Median scores ranged from a low of 7 to a high of 10. Standard deviation scores ranged from a low of .96 to a high of 3.00.

Table 14: Success Support Structure Elements.

Element	Mean	Median	S.D.
Parents are involved in the program.	8.50	9	1.51
State curriculum development staff provide materials.	6.92	7	2.22
Federal funds are used to support program elements.	7.15	8	2.70
Student discipline is maintained.	9.62	10	0.96
Community support is evidenced through voter approved bond issues.	8.15	8	2.51
Collaboration with departmental personnel strengthen the program.	8.77	10	2.05
Administration encourages staff development.	9.08	10	1.12
Facilities are constantly upgraded.	8.54	10	2.70
An active program advisory council is present.	7.08	8	2.72
Program funding is adequate.	9.08	9	1.19
Program enrollment shows annual gains.	9.17	9.5	1.03
Classroom environmental enhancements (light, color, sound) enhance student learning.	9.31	10	0.95
Administration and classroom staff share a common vision.	9.38	10	1.04
Gender equity is evidenced through a female enrollment increase.	8.69	9	1.25
There is an encouraged "interdisciplinary habit" within the disciplines.	8.85	9	1.63
The school maintains a Web Site for information dissemination.	7.23	8	3.00
Alternative scheduling is utilized for blocks of instructional time.	6.92	8	2.22

Table 15 describes expert panel member responses in the area of **success personnel elements**. Mean statistical scores ranged from a low of 8.62 to a high of 9.85. Median scores ranged from a low of 8.5 to a high of 10. Standard deviation scores ranged from a low of 0.28 to a high of 1.46.

Table 15: Success Personnel Elements.

Element	Mean	Median	S.D.
Educators from many different disciplines support the program.	8.85	10	1.46
Team teaching used to strengthen the program.	8.50	8.5	1.45
A strong personal dedication drives goal setting.	9.46	10	0.78
Strong belief in the need for Technology Education.	9.85	10	0.38
Personnel use appropriate tools to enhance organizational skills.	8.92	9	1.19
Personal drive and enthusiasm is important.	9.62	10	0.77
Facilitators are knowledgeable and multi-talented.	9.54	10	0.78
Teachers are respected and liked by students.	9.00	9	1.00
Students are treated fairly and equitably.	9.46	10	0.88
The teacher is flexible and open to new ideas.	9.69	10	0.75
Innovation and creative staff are part of the program.	9.38	10	0.77
Personnel have a vision of the future.	9.85	10	0.38
Practitioner commitment to continued program improvement.	9.08	9	0.90
Staff training is a necessary element in the introduction of new curricular material.	9.15	10	1.46
Verbal, non-verbal and written communications are maintained with teaching colleagues.	8.62	9	1.56
Programs have strong leadership.	9.15	10	1.28
Personnel are committed to excellence.	9.92	10	0.28

Table 16 describes expert panel member responses relative to **success student skill development elements**. Mean statistical responses ranged from a low of 8.00 to a high of 9.77. Median responses ranged from a low of 8 to a high of 10. Standard deviation responses ranged from a low of 0.60 to a high of 1.63.

Table 16: Success Student Skill Development Elements.

Element	Mean	Median	S.D.
Portfolio writing is used as a student evaluation tool.	8.46	9	1.51
Group assessment is used.	8.00	8	1.63
Students are encouraged to be divergent thinkers.	9.77	10	0.60
Practical application of knowledge is emphasized in curricula.	9.62	10	0.65
Students are taught to be disciplined and productive citizens.	9.15	9	0.80
Assessment is used to determine student needs.	8.62	9	1.26
Instructional methodologies include cooperative learning and problem solving.	9.62	10	1.12
Students develop proficiencies in state of the art technologies.	8.15	8	1.46
Behavioral standards emphasize work ethic skill development.	9.00	10	1.29

Round Three Survey Instrument

A third and final survey instrument was developed from the responses compiled from the second round survey instrument. The first instrument was used to identify significant elements common to quality and success in secondary technology education programs. A second round instrument allowed for a scaled rating of item importance. The third round survey instrument was administered for purposes of attaining consensus and ranking program quality and success elements.

The third round instrument was mailed to expert panel members on February 29, 1997. This six page survey instrument asked participants to examine the mean rating calculated for each quality and success element from the second round survey. Expert panel members were then asked to either register their agreement by assigning a numerical score identical to the mean, or assign a different score

that most closely reflected the level of importance of each quality and success factor, a scale numbered 1 through 10 was used for this rating purpose. The third round survey and cover letter appear in Appendix B.

As with the second round survey, the third round survey employed a dual mailing. The survey instrument was duplicated on bright orange paper. The survey instrument was administered similar to the second round questionnaire. Surveys were requested back by March 14, 1997. The researcher chose to further entice expert panel members to respond quickly by enclosing crisp one dollar bills in each survey mailing. One mailing was sent to the participants school address. A second identical mailing was sent to the participants home address. On March 14, 1997 thirteen of fifteen surveys had been returned. The researcher delayed final data analysis until the missing two surveys could be mailed in. On March 20, 1997 fifteen of fifteen surveys had been returned.

The mean score from the third round survey was used to develop the final rank of elements that contribute to the quality and success of secondary technology education programs. The third round survey effectively answered the second research question concerning what the ranked assignment is regarding the importance of the elements contributing to quality and success in secondary Technology Education programs.

Data from the round three survey is displayed in

tables 17 through 22. Fifteen of fifteen expert panel members returned third round surveys. The mean, standard deviation, and rank are presented for each statement that expert panel members were required again examine. Tables 17 through table 22 present the final mean, standard deviation and rank from the three categories of quality elements and three categories of success elements. Individual elements in tables 17 through 22 have been assigned rank from statistical analysis, and are presented in a rank order.

Table 17 presents final survey data on **quality curriculum elements**. The mean score ranges from a low of 6.33 to a high of 9.89. The mean scores in the second round survey ranged from a low of 7.08 to a high of 9.69. The median scores ranged from a low of 6 to a high of 10. This is comparable to a low of 6 and a high of 10 in the second round survey. Standard deviation scores on quality curriculum elements ranged from a low of 0.28 to a high of 2.08. In the second round standard deviation scores ranged from a low of 0.63 to a high of 2.74. A final ranking of elements resulted in expert panel members placing the greatest emphasis on lab activities that provide challenging opportunities for the learner, as the number one element. Classroom facilitators following a detailed curriculum structure was the least important element in the quality curriculum element area.

Table 17: Quality Curriculum Elements, Third Round Survey Data.

Element	Mean	Median	S.D.	Rank
Lab activities provide challenging opportunities for the learner.	9.89	10	0.33	1
Practical application of knowledge is emphasized in curricula.	9.67	10	0.71	2
Curriculum is flexible to meet students needs.	9.33	9	0.71	3
Curriculum is revised annually to integrate new technology.	8.89	9	0.60	4
Classroom activities are integrated with core subject areas.	8.89	9	0.93	5
Classroom activities are correlated with life skills.	8.89	9	0.93	5
Course offerings emphasize engineering elements.	8.56	8	0.73	6
There is an emphasis on the process of design.	8.33	8	0.87	7
Integration with other curricular areas is a part of program planning.	8.33	8	1.12	8
Core technologies are taught as elements of larger technological systems.	8.33	8	1.12	8
Students have extensive experience with a number of applied technological activities.	8.00	9	2.45	9
Classroom activities emphasize career exploration.	7.89	8	1.36	10
Industrial standards are followed in instruction.	7.78	7	1.30	11
Class offerings are based on past student success and achievement.	7.22	8	1.48	12
Class offerings are based on student interest inventories.	6.44	6	1.24	13
Classroom facilitators follow a detailed curriculum structure.	6.33	6	1.58	14

Table 18 presents third round survey data on quality **facilities and equipment elements**. The mean ranged from a low of 6.73 to a high of 9.87. In the second round survey the mean ranged from a low of 7.00 to a high of 9.54. Median scores ranged from a low of 7 to a high of 10. In the second round survey median scores ranged from a low of 8 to a high of 10. Standard deviation scores ranged from a low of 0.49 to a high of 2.58. In the second round survey standard deviation scores ranged from a low of 0.78 to a high of 3.03. A ranking of elements revealed that having facilities that are clean, bright and well lit, as the most significant factor. Sufficient numbers of network computers

are an important part of the classroom environment is the least significant facilities and equipment element.

Table 18: Quality Facilities and Equipment Elements, Third Round Survey Data.

Element	Mean	Median	S.D.	Rank
Facilities are clean, bright and well lit.	9.87	10	0.52	1
Facilities provide for both clean (design) and dusty (fabrication) activities.	9.40	9	0.63	2
The computer and related hardware are used as tools.	9.33	9	0.49	3
Facilities must be versatile to accommodate a variety of technological studies.	9.33	9	0.62	4
Sufficient supplies are provided for student use.	9.20	9	0.68	5
Instructor built - developed learning materials enhance curriculum.	8.40	8	0.63	6
Timely equipment upgrades are critical.	8.27	9	1.44	7
Certain turn key laboratory configurations provide quality learning environments.	7.20	7	1.57	8
Instructional modules provide for flexibility	7.00	7	1.85	9
Sufficient numbers of network computers are an important part of the classroom environment.	6.73	7	2.58	10

Table 19 presents third round survey data on **quality support structure elements**. Mean scores ranged from a low of 7.47 to a high of 10.00. In the second round survey mean scores ranged from a low of 7.77 to a high of 9.85. Median responses ranged from a low of 8 to a high of 10. In the second round median responses ranged from a low of 8 to a high of 10. Standard deviation in the third round instrument ranged from a low of 0.00 to a high of 2.21. In the second round instrument standard deviation scores ranged from a low of 0.55 to a high of 1.89. A perfect consensus was achieved on one of the elements in the third round instrument. The most significant of ranked elements in the third round was having a dedicated instructor who provided a

positive example for students and staff. The least significant quality support structure element was having grant funding support for program elements.

Table 19: Quality Support Structure Elements, Third Round Survey Data.

Element	Mean	Median	S.D.	Rank
A dedicated instructor provides a positive example for students and staff.	10.00	10	0.00	1
Administration backs the program.	9.93	10	0.26	2
Administration is flexible and empowers teachers.	9.93	10	0.26	2
Community support for the program is important.	9.47	9	0.52	3
Teachers from other curricular areas support the program.	9.27	9	0.70	4
Sufficient local budgetary support for program elements.	9.13	9	0.52	5
Long range planning is inherent in facility and curricular needs.	8.93	9	1.03	6
Industrial and private sector donations contribute to the program.	7.80	8	2.21	7
Student clubs and organizations are active.	7.60	8	1.45	8
Grant funding support for program elements.	7.47	8	2.07	9

Table 20 presents data on **success support structure elements** from the third round survey. Mean scores ranged from a low of 6.73 to a high of 9.93. In the second round survey mean scores ranged from a low of 6.92 to a high of 9.62. Median scores ranged from a low of 7 to a high of 10. This is comparable to second round survey data of scores ranging from a low of 7 to a high of 10. Standard deviation scores in the third round ranged from a low of 0.26 to a high of 2.84. In the second round instrument standard deviation scores ranged from a low of 0.96 to a high of 3.00. Participant responses identified the statement that student discipline is maintained as the number one success support structure element. The least significant support

structure element was having the school maintain a web site for information dissemination.

Table 20: Success Support Structure Elements, Third Round Survey Data.

Element	Mean	Median	S.D.	Rank
Student discipline is maintained.	9.93	10	0.26	1
Classroom environmental enhancements (light, color, sound) enhance student learning.	9.53	10	0.52	2
Administration encourages staff development.	9.40	9	0.51	3
Departmental colleagues support program efforts.	9.40	10	1.06	4
Program enrollment shows annual gains.	9.20	9	1.08	5
Administration and classroom staff share a common vision.	9.13	9	0.99	6
There is an encouraged "interdisciplinary habit" within the disciplines.	9.07	9	1.03	7
Collaboration with departmental personnel strengthen the program.	9.00	9	1.00	8
Gender equity is evidenced through a female enrollment increase.	8.93	9	0.96	9
Facilities are constantly upgraded.	8.73	9	1.10	10
Program funding is adequate.	7.80	9	2.37	12
Community support is evidenced through voter approved bond issues.	7.73	8	2.31	13
Federal funds are used to support program elements.	7.60	7	1.40	14
State curriculum development staff provide materials.	7.13	7	1.25	15
Alternative scheduling is utilized for blocks of instructional time.	7.13	7	1.88	16
An active program advisory council is present.	6.80	7	1.26	17
The school maintains a Web Site for information dissemination.	6.73	7	2.84	18

Table 21 presents third round survey data on **success personnel elements**. Mean scores ranged from a low of 8.40 to a high of 10. In the second round survey mean scores range from a low of 8.62 to a high of 9.85. Median scores in the third round instrument ranged from a low of 9 to a high of 10. In the second round survey median scores ranged from a low of 8.5 to a high of 10. Standard deviation scores in the third round survey ranged from a low of 0.00

to a high of 1.18. In the second round survey standard deviation scores ranged from a low of 0.28 to a high of 1.46. There was evidence of a major shift toward consensus in the last data set. The top ranked success personnel elements were evidenced in two statements. The importance of personal drive and enthusiasm, and the strong belief in the need for Technology Education, both of which achieved perfect consensus. The lowest ranked success personnel element was team teaching being used to strengthen programs.

Table 21: Success Personnel Elements, Third Round Survey Data.

Element	Mean	Median	S.D.	Rank
Personal drive and enthusiasm is important.	10.00	10	0.00	1
Strong belief in the need for Technology Education.	10.00	10	0.00	1
Personnel are committed to excellence.	9.93	10	0.26	2
Facilitators are knowledgeable and multi-talented.	9.93	10	0.26	2
Personnel have a vision of the future.	9.93	10	0.26	2
The teacher is flexible and open to new ideas.	9.80	10	0.56	3
Students are treated fairly and equitably.	9.60	10	0.51	4
A strong personal dedication drives goal setting.	9.60	10	0.51	4
Programs have strong leadership.	9.40	9	0.51	5
Practitioner commitment to continued program improvement.	9.33	9	0.62	6
Innovation and creative staff are part of the program.	9.33	9	0.62	6
Staff training is a necessary element in the introduction of new curricular material.	9.13	9	0.64	7
Teachers are respected and liked by students.	9.13	9	0.64	7
Educators from many different disciplines support the program.	9.13	9	0.99	8
Personnel use appropriate tools to enhance organizational skills.	8.93	9	1.03	9
Verbal, non-verbal and written communications are maintained with teaching colleagues.	8.87	9	0.74	10
Team teaching used to strengthen the program	8.40	9	1.18	11

Table 22 presents third round survey data on **success student skill development elements**. Mean data scores ranged from a low of 8.00 to a high of 9.93. In the

second round instrument mean scores ranged from a low of 8.00 to a high of 9.77. Median responses in the third round ranged from a low of 8 to a high of 10. This is comparable to the second round instrument, where median responses were a low of 8 and a high of 10. Standard deviation ranged from a low of 0.26 to a high of 1.68. Standard deviation in the second round survey ranged from a low of 0.60 to a high of 1.63. Again in this round we can observe a movement toward consensus. The highest ranked student skill development element was that a practical application of knowledge is emphasized in curricula. The lowest ranked student skill development element was that group assessments are used.

Table 22: Success Student Skill Development Elements,
Third Round Survey Data.

Element	Mean	Median	S.D.	Rank
Practical application of knowledge is emphasized in curricula.	9.93	10	0.26	1
Instructional methodologies include cooperative learning and problem solving.	9.87	10	0.35	2
Students are encouraged to be divergent thinkers.	9.73	10	0.46	3
Students are taught to be disciplined and productive citizens.	9.40	9	0.51	4
Behavioral standards emphasize work ethic skill development.	9.20	9	0.77	5
Assessment is used to determine student needs.	8.60	9	0.83	6
Portfolio writing is used as a student evaluation tool.	8.33	8	1.68	7
Students develop proficiencies in state of the art technologies.	8.13	8	1.06	8
Group assessment is used.	8.00	8	1.13	9

Discussion

This study employed a panel of experts from fifteen nationally recognized programs of secondary technology

education in a three round Delphi study. The purpose of this study was to identify and rank those factors that contribute to the quality and success of secondary technology education programs. Presented here is a discussion of the three survey instruments.

The first round survey instrument asked that expert panel members identify five significant elements that contribute to the quality of secondary technology education programs, and five significant elements that contribute to the success of secondary technology education programs.

Data provided by participants in the first round survey instrument was successfully synthesized into a formal second round survey instrument. Data synthesis by the researcher eliminated the duplication of responses and illuminated three categories that could be used to organize quality elements, and three categories that could be used to organize success elements. In subsequent data collection the researcher noted that curriculum, facilities and equipment, program support structures, personnel and school staffing, and methods used to develop student skills are all major areas of concern to technology education practitioners.

The second survey was developed from data collected in the first round. In the second round survey expert panel members identified significant quality elements as being lab activities that provide challenging opportunities for the learner, and that a practical application of knowledge is

emphasized in the curricula. Having curriculum revised annually to integrate new technology, and insuring that classroom activities are integrated with core subject areas were also significant elements. Quality curriculum elements receiving a lower rating included the basing of class offerings on such factors as student interest inventories, and past student success and achievement. Also receiving a low rating was the statement reflecting that industrial standards be followed in instruction. Expert panel members indicated strong support for a number of other facilities and equipment quality elements. Among those elements receiving strong ratings were the following statements; Facilities are clean, bright and well lit. The computer and related hardware are used as tools. Facilities provide for both clean (design) and dusty (fabrication) activities. Sufficient supplies are provided for student use. Facilities must be versatile to accommodate a variety of technological studies.

Rated low in the second round were statements relating to equipment and packaged learning environments. The following statements received low ratings; Instructional modules provide for flexibility. Certain turn key laboratory configurations provide quality learning environments.

Expert panel members responded to ten statements concerning quality support structure elements in the second round survey. Statements receiving significant ratings were

as follows; Administration backs the program. A dedicated instructor provides a positive example for students and staff. Administration is flexible and empowers teachers. The category of quality support structure elements did not produce any ratings below eight in the second round survey.

Expert panel members endorsed a number of support structure success elements as being significant in the second round survey. Among these were the statements that student discipline is maintained, the collaboration with departmental personnel to strengthen the program, administration encouraged staff development, facilities that are constantly upgraded, program funding that is adequate, having departmental colleagues support program efforts, annual enrollment gains in their programs, the importance of environmental classroom enhancements such as light, color and sound, a common vision that is shared by administration and classroom staff, gender equity, having an encouraged interdisciplinary habit within the disciplines, and having parents involved in the program.

Rated lower were statements reflecting state involvement in the development of teaching materials, having federal funds available for programs, the participation of an active program advisory council, alternative scheduling being used to provide blocks of instructional time and the maintenance of a school web site for the dissemination of information.

Statements relating to personnel that received strong

support were having teachers who have a strong belief in the need for technology education, personal drive and enthusiasm, facilitators that are knowledgeable and multi talented, teachers who are flexible and open to new ideas, personnel who have a vision of the future and personnel who are committed to excellence. The second round administration of statements dealing with personnel, success elements, did not generate any ratings below a nine. This would seem to be an indication of the importance of the statements generated in the first round survey.

Student skill development success elements determined as significant by expert panel members were as follows; students are encouraged to be divergent thinkers, practical application of knowledge is emphasized in curricula, and, instructional methodologies include cooperative learning and problem solving.

A third round survey instrument was administered for purposes of achieving consensus on second round survey data and secondly for purposes of discerning a rank order of elements critical to the quality and success of secondary technology education programs.

In the third round survey, there was consensus on a number of significant program elements, identified as being significant in the second round survey. In the third round survey expert panel members again identified the significant quality element as being lab activities that provide challenging opportunities for the learner. Other

significant elements identified included that a practical application of knowledge is emphasized in the curricula, having curriculum revised annually to integrate new technology, curriculum is flexible to meet student needs, and insuring that classroom activities are integrated with core subject areas. The most significant element, however was having lab activities provide challenging opportunities to the learner.

Receiving the lowest rating was the statement that facilitators should follow a detailed curriculum structure.

Expert panel members developed strong facilities and equipment quality beliefs in the third round survey. Having facilities that are clean, bright and well lit, facilities that provide for clean (design), and dusty (fabrication) activities were ranked as number one and two in importance. This is again comparable to responses analyzed from the second round survey.

The following statements received low ratings; instructional modules provide for flexibility, and, that sufficient numbers of network computers are an important part of the classroom environment. These two statements were ranked nine and ten respectively.

Expert panel members significantly stated their agreement with the statement that a dedicated instructor provides a positive example for students and staff. Receiving equal second place rankings were having administration back the program and having an administration

be flexible and empower teachers. There appeared to be significant agreement with second round survey data.

Panelists did not indicate that they believed grant funding or the presence of active student clubs or organizations was important. These elements were ranked as eight and nine.

The number one ranked success support structure element in the third round survey was that student discipline is maintained. This same statement was also significantly identified in the second round survey. Expert panel members also ranked classroom environment elements high (light, color, sound,), and believe that it is important that administration encourages staff development.

Receiving low rankings (based on mean and median scores) were alternative scheduling being utilized for blocks of instructional time, having an active program advisory council present, and, having the school maintain a web site for information dissemination. These elements received rankings of sixteen, seventeen and eighteen respectively.

When ranking third round responses for success personnel elements, the researcher discovered that two elements were identified as having a ranking of number one. These significant program elements were as follows; personal drive and enthusiasm, and, personnel who have a strong belief in the need for technology education.

Receiving low rankings of ten and eleven were that

verbal, non-verbal and written communications are maintained with teaching colleagues, and using team teaching to strengthen the program.

In the third round survey expert panel members identified three highly significant student skill development success elements. These elements were emphasizing a practical application of knowledge in curricula, instructional methodologies that include cooperative learning and problem solving, and encouraging students to be divergent thinkers. Results from the third round survey demonstrated a first, second, and, third place ranking for these elements respectively. Panelists were less interested in using group assessments as this element was assigned a ranking of nine..

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was conducted for purposes of identifying elements common to quality and success in secondary technology education programs. The researcher also established a ranking of elements common to quality and success in secondary technology education programs. This chapter consists of a summary of the study, statement of the research problem, the research questions, design of the study, general discussion of the findings of the research, conclusions and recommendations.

Purpose of the Study

The purpose of this study was to determine and describe the elements common to secondary Technology Education program quality and success.

Research Questions

1. What are the core elements contributing to quality and success in secondary Technology Education programs?
2. What is the rank assignment regarding importance of the elements contributing to quality and success in secondary Technology Education programs?

The researcher determined that an attempt to answer the research questions would be of great benefit to technology education practitioners. Evidence signifying a need for research data was brought forth in a review of the current literature, and the growth of varied curriculum models as witnessed in the field.

An operational plan was developed to answer the research question. This plan is outlined as follows:

1. Review literature and current research that identifies the present status of the technology education profession, program models and current program trends.
2. Identify a group of high achieving secondary technology education practitioners who are capable of identifying and rating elements contributing to programmatic quality and success using a Delphi Study model.

3. . Report research findings so that identified elements contributing to quality and success in secondary technology education programs can be used to better the profession.

Study Design

The expert panel or Delphi survey methodology was chosen as the method of data collection. Expert panel members were identified from a listing of the 36 International Technology Education Association (ITEA), 1996 Program Excellence Award Winners. An initial survey screening letter was mailed to all 36 ITEA award winners. Approximately 15 individuals returned favorable letters indicating their intent to participate in the survey. All expert panel members were secondary technology education program area teachers. Panelists represented schools of varied sizes in urban, suburban and rural areas. Demographic data on expert panel members is presented in Chapter 4.

This study employed a three round Delphi technique. A first round questionnaire asked that panelists identify five (5) elements that contribute to program quality, and five (5) elements that contribute to program success. Data from the first round was synthesized to eliminate duplication of responses and resulted in expert panel members identifying 36 quality elements and 44 success elements. The 36 quality

elements were further synthesized into the three categories of; curriculum quality elements, facilities and equipment quality elements, and, support structure quality elements. The 44 success elements identified were synthesized into the three categories of; support structure success elements, personal success elements, and, student skill development success elements.

A second round survey instrument was developed from first round data. In the second round instrument a ten point rating scale was used to rate each statement. The rating scale provided statistical data by which the researcher could determine the importance of the statements presented across the three program quality categories and three program success categories.

Descriptive statistics were used to analyze survey data from the second round survey instrument. The mean, median and standard deviation were calculated for every survey question.

A third round survey instrument was necessary to determine if there was consensus on identified program quality and success elements. The third round survey employed a questionnaire similar to the second round survey, however, this questionnaire presented expert panel members with the mean rating of second round survey data for each survey item. Panelists were asked to again rate each item, signifying agreement by assigning the same (mean) rating, or assigning a rating of lower or greater significance. The

researcher was able to determine consensus and final ranking of significant program quality and success factors from the third round survey instrument. Those factors that had scaled ratings of nine or higher were considered to be significant.

Findings

The findings reported are based upon an analysis of the research data. Compiled research data was based upon the following survey responses. Fifteen of fifteen panelists returned the first round survey questionnaire. Thirteen of fifteen panelists returned the second and third round survey instrument. Fifteen of fifteen panelists returned the third round survey. Data received from the second and third round survey questionnaires was used to develop conclusions and develop ranked factors that contribute to quality and success in secondary technology education programs.

Expert panel member identified 36 quality elements and 44 success elements in the first round survey. The 36 quality elements were further synthesized into the three categories of curriculum quality elements, facilities and equipment quality elements, and, support structure quality elements. The 44 success elements identified were synthesized into the three categories of support structure success elements, personnel success elements, and, student skill development success elements.

A breakdown of the most important program **quality elements** (mean of nine or higher) in rank order is as follows.

- 1 A dedicated instructor provides a positive example for students and staff. (10.00) SD = 0.00
- 2 Administration backs the program. (9.93) SD = 0.26
- 2 Administration is flexible and empowers teachers. (9.93) SD = 0.26
- 3 Lab activities provide challenges for the learner. (9.89) SD = 0.33
- 4 Facilities are clean, bright, and well lit. (9.87) SD = 0.52
- 5 Practical application of knowledge is emphasized in the curricula. (9.67) SD = 0.71
- 6 Community support for program is important. (9.47) SD = 0.52
- 7 Facilities provide for both clean (design) and dusty (fabrication) activities. (9.40)
- 8 The computer and related hardware are used as tools. (9.33) SD = 0.33
- 9 Facilities must be versatile to accommodate a variety of technological studies. (9.33) SD = 0.62
- 10 Curriculum is flexible to meet student needs. (9.33) SD = 0.71
- 11 Teachers from other curricular areas support the program. (9.27) SD = 0.70

12 Sufficient supplies are provided for student use. (9.20)

SD = 0.68

13 Sufficient local budgetary support for program elements.

(9.13) SD = 0.52

A further breakdown of the most important program **success elements** (mean of nine or higher) in rank order is as follows.

1 Strong belief in the need for Technology Education.

(10.00) SD = 0.00

1 Personal drive and enthusiasm is important.

(10.00) SD = 0.00

2 Student discipline is maintained. (9.93) SD = 0.26

2 Facilitators are knowledgeable and multi-talented.

(9.93) SD = 0.26

2 Practical application of knowledge is emphasized
in curricula. (9.93) SD = 0.26

2 Personnel are committed to excellence. (9.93) SD = 0.26

2 Personnel have a vision of the future. (9.93) SD = 0.26

3 Instructional methodologies include cooperative
learning and problem solving. (9.87) SD = 0.35

4 The teacher is flexible and open to new ideas.

(9.80) SD = 0.56

5 Students are encouraged to be divergent thinkers.

(9.73) SD = 0.46

6 A strong personal dedication drives goal setting.

(9.60) SD = 0.51

- 6 Students are treated fairly and equitably. (9.60)
SD = 0.51
- 7 Classroom environmental enhancements (light,color, sound)
enhance student learning. (9.53) SD = 0.52
- 8 Programs have strong leadership. (9.40) SD = 0.51
- 8 Students are taught to be disciplined and
productive citizens. (9.40) SD = 0.51
- 8 Administration encourages staff development.
(9.40) SD = 0.51
- 9 Departmental colleagues support the program.
(9.40) SD = 1.06
- 10 Innovative and creative staff are part of the program.
(9.33) SD = 0.62
- 10 Practitioner commitment to continued program improvement.
(9.33) SD = 0.62
- 11 Behavioral standards emphasize work ethic skill
development. (9.20) SD = 0.77
- 12 Program enrollment shows annual gains. (9.20) SD = 1.08
- 13 Staff training is a necessary element in the introduction
of new curricular material. (9.13) SD = 0.64
- 13 Teachers are respected and liked by students.
(9.13) SD = 0.64
- 14 Educators from many different disciplines support the
program. (9.13) SD = 0.99
- 14 Administration and classroom staff share a common
vision. (9.13) SD = 0.99

- 15 There is an encouraged "interdisciplinary habit" within the disciplines. (9.07) SD = 1.03
- 16 Collaboration with departmental personnel strengthen the program. (9.00) SD = 1.00

Conclusions

Based on the research findings the following conclusions can be made:

1. The quality and importance of the human element in the classroom is of great importance. Expert panel members directly linked program quality to dedicated instructors who provide positive examples for students and staff. They also attributed program success to personal drive and enthusiasm, knowledgeable and multi-talented facilitators, individuals who have a strong belief in the need for technology education, personnel who are committed to excellence, personnel who have a vision of the future, and who are flexible and open to new ideas. Also cited was the importance of innovative and creative staff.
2. Environmental elements are important to the quality and success of secondary technology education programs. Facilities that are clean, bright, and well lit, and facilities that provide for a variety of activities. Furthermore, expert panel members strongly support classroom environments where discipline is maintained.

3. Support from a variety of sources was important. Programs thrive under the influence of administrative support, support from colleagues, community support, and student support demonstrated in enrollment gains. Strong leadership from the program area teacher is critical as well. Administrative support and support from teaching colleagues were identified as being a key program quality elements. Departmental support and community were identified as being key program success elements.
4. Technology teachers need to be creative people who employ a variety of curricular delivery, enrichment, and assessment strategies. This mixture contributes to individual program quality and success. The need to challenge the learner, develop practical applications of knowledge, integrate classroom activities with core subject areas, were identified quality elements. An encouraged interdisciplinary habit, along with the need for staff to continually upgrade skills and improve programs through administratively supported staff training were cited as important success elements.

Recommendations

Based on the findings of this research the following actions are recommended:

1. It would seem logical that a formal taxonomy identifying

technology education program quality and success elements be developed. This taxonomy would serve as benchmark material by which the progress of developing programs could be judged.

2. Future studies that use similar research designs should be attempted. These future studies should attempt to segregate populations into areas of same programmatic approach for closer analysis.
3. There is a need to further identify factors contributing to the quality and success of modular based technology education programs, project based technology education programs, and those programs that place emphasis on the design process.
4. The researcher is hopeful that additional studies will closely examine the mentioned research gaps that still exist.

There is a national imperative to improve the quality of education in this country. This research demonstrated that there was an awareness (on the part of selected educators), of the elements contributing to technology education program quality and success. Technology education is an emerging discipline with roots in the more traditional industrial arts education curricula. The emergence of technology education as a discipline is seen as a reaction to the need to develop technological literacy in students, expose students to a broad array of technological skills, process, and careers, and develop in students the knowledge

necessary to make informed decisions about technology and technological consequences. Few educational disciplines have undergone the transformation that has so recently besieged those educators making the transition from industrial arts programs to technology education programs. Practitioners need not only program area standards from which they can develop instruction, they also require accepted benchmarks from which they can measure program quality and success.

REFERENCES CITED

Bensen, M. J., (1990). Quality and service: Twin forces for developing excellence. The Technology Teacher, 49, 3.

Cuerta, P., (1988). A guide for change--making the transition from industrial arts to technology education. ERIC # ED305517 Document.

Cummings, P.J., Jensen, M., & Todd, R., (1987). Facilities for technology education, The Technology Teacher, 46,

Dalkey, N. C. (1969). The delphi method: An experimental study of group opinion. Santa Monica: The Rand Corporation.

Daugherty, M.K., & Wicklein, R.C., (1993). Mathematics, science and technology teachers' perceptions of technology education. Journal of Technology Education, 4, 44.

Delta Point Corporation, (1993). Delta Graph Pro 3; user's guide. Monterey, CA: Author

Dugger, W.E., Bame, A.E., & Pinder, C.A., (1985). Standards for technology education programs. South Holland, Ill.: Goodheart Willcox. p.3,7.

Graumann, P., (1993). Project-based learning: Five teacher-tested ideas. Technology and Learning, 5, 25.

Griggs, Anderson, Research, (1997). Sampling Glossary. (On Line). Available: <http://www.gar.com/glosss.htm>

Harvey, J.B. (1993). The abilene paradox: A discussion of paradigms. Presentation, Jackson Lake Lodge, Wyoming State Council on Vocational Education.

Hayden, M.A. (1991). The development of and validation of a test of industrial technological literacy. Journal of Technology Education, 3, 1. (Fall 1991), 41

Issac, S., & Michael, W.B. (1981). Handbook in research and education (4th ed.). San Diego, CA. Edits Publishers. pp. 114-115.

ITEA. (1996). Affiliate representative resource book. Reston, VA: Author.

ITEA (1996). Technology for all americans: A rationale and structure for the study of technology. Reston, VA: Author. 1.

Layton, D., (1993). Technology's challenge to science education. Buckingham, Philadelphia: Open University Press. pp. 57.

Lacroix, W.J. (1987) Characteristics for successful performance as a technology education teacher. Journal of Epsilon Pi Tau, 13, no. 2 (Summer-Fall 1987), 32

Lindstone, H.A. and Turroff, M., (1975). The delphi method: Techniques and applications. Massachusetts: Addison-Wesley Publishing Company.

Maley, D.A. (1978). The industrial arts teachers handbook. Boston, London, Sydney, Allyn and Bacon. pp. 273.

Morrison, J.L., Renfro, W.L. & Buchner, W.I., (1984). Futures research and the strategic planning process; Implications for higher education. ASHE-ERIC Higher Education Research Report #9, Association for the Study of Higher Education. 1,8-10.

Petrina, S., (1993). Under the corporate thumb: Troubles with Our MATE (Modular Approach to Technology Education). Journal of Technology Education, 5, 72,73.

Pullias, D. (1997). The future is beyond modular. The Technology Teacher, 7, 28.

Pullias, D. (1992). What is technology education? The Technology Teacher, 4, 3-4.

Purcel, D.J. (1993). The Role that technology education must play, The Journal of Technology Studies, 21, no. 2, (Summer-Fall 1993), 2.

Ritz, J.M., & Loepp, F.L. (1990). Quality in education: Putting excellence into practice, The Technology Teacher, 48, 5-7.

Savage, Ernest, (1990). Technology programs, a technology education model for Ohio, The Technology Teacher, 48, 8

SCANS: 1993). Blueprint for action: Building community coalitions: Summary of the secretary's commission on achieving necessary skills report. Washington, D.C.: U.S. Department of Labor. p.5, 7.

Skinner, B.F. (1968). The technology of teaching. New York: Meredith Corp. pp.29.

Smith, H.W. (1970) Industrial arts program for the junior high school, The Maryland plan. College Park, MD.: The University of Maryland. pp.20.

Strauss, H.J. & Ziegler, L.H. (1975). The delphi technique and its uses in social science research, Journal of Creative Behavior, 9, 11.

The Consummate Design Center, (1996) Delphi process, (On-Line). Available: <http://www.tcdc.com>

Thode, Brad & Terry, (1993, May-June). Curriculum driven facility design, Idaho style, TIES Magazine, 5, 17.

Turoff, M. (1970). The design of a policy delphi. Technological Forecasting and Social Change, 2,

Vockell, E.L. (1983). Educational Research. New York: Macmillan. pp.2.

Waetjen, W.B. (1991). A research agenda for technology education. The Technology Teacher, 51, 3-4.

Zuga, K.F. (1995). Implementing technology education: A review and synthesis of the research literature, (Information Series No. 356), Columbus: The Ohio State University, Center on Education and Training for Employment.

APPENDICES

APPENDIX A

International Technology Education Association, Program
Excellence in Technology Education, Program Self Study.

Study Participation Survey Form.

Listing of Expert Panel Members.

ITEA Governance Region Map.

International Technology Education Association Program Excellence in Technology Education

Program Self-Study

This self-study must be completed by the teachers in the program. The self study must be completed before the committee from the affiliate association reviews the program.

An adequate technology education program will help students understand and participate in the technological society that they find themselves in as citizens. This suggests that they must know about technology, be able to apply technological information and abilities to solve common problems, and be capable of assessing the impacts of technology on people, society, and the environment.

Rank your program using the following statements. A (1) is the lowest rank and a (5) is the highest.

Philosophy:

- | | LOW | | HIGH |
|---|-----|---|-------|
| 1. The program has a written philosophy that is available for administrators, parents, and students to review. | 1 | 2 | 3 4 5 |
| 2. The philosophy emphasizes the broad, general education nature of technology education. | 1 | 2 | 3 4 5 |
| 3. The philosophy indicates a need for technology education in terms of students' future roles as citizens of the society, consumer of technological products, and contributing worker in a rapidly changing technological society. | 1 | 2 | 3 4 5 |

Plans for addressing areas that need improvement:

Goals and Objectives:

	LOW	HIGH
1. The program goals and course objectives are written and available for administrators, parents, and students to review.	1	2 3 4 5
2. The program goals and course objectives are consistent with provincial, state, or national standards.	1	2 3 4 5
3. The program goals and course objectives are established from and are directly related to the stated philosophy	1	2 3 4 5
4. The program goals and course objectives emphasize helping students understand the technological nature of society.	1	2 3 4 5
5. The program goals and course objectives emphasize developing abilities to solve technological problems and meet opportunities through the use of technology.	1	2 3 4 5
6. The program goals and course objectives emphasize the need to help students develop cooperative work abilities.	1	2 3 4 5
7. The program goals and course objectives have a balanced approach to helping students learn how technology is developed, produced, used, and assessed by people and institutions.	1	2 3 4 5
8. The program goals and course objectives reflect the need to help students develop the abilities needed to be life-long learners.	1	2 3 4 5
9. The program goals and course objectives reflect the need to present technology as part of human knowledge and to integrate it with other types of knowledge.	1	2 3 4 5
10. The program goals and course objectives are used by teachers and administrators to plan, present, and evaluate instruction.	1	2 3 4 5

Plans for addressing areas that need improvement:

1. The program goals and course objectives are written and available for administrators, parents, and students to review.

2. The program goals and course objectives are consistent with provincial, state, or national standards.

3. The program goals and course objectives are established from and are directly related to the stated philosophy

4. The program goals and course objectives emphasize helping students understand the technological nature of society.

5. The program goals and course objectives emphasize developing abilities to solve technological problems and meet opportunities through the use of technology.

Content and Teaching Strategies
--

	LOW	HIGH			
1. The course content and teaching strategies are directly related to program goals and course objectives.	1	2	3	4	5
2. The course content uses approved curriculum guides or other professional resources.	1	2	3	4	5
3. The courses and content within them are organized using technological concepts such as communication, construction, manufacturing, and transportation; bio-related, information, or physical technologies; energy, information, and materials.	1	2	3	4	5
4. The course content and teaching strategies are appropriate for all students in the school.	1	2	3	4	5
5. The course content and teaching strategies include both design/problem solving processes and production (technical) processes.	1	2	3	4	5
6. The course content and teaching strategies present a broad view of technology.	1	2	3	4	5
7. The content includes developing, producing, using, and applying technology in personal and societal contexts.	1	2	3	4	5
8. The content in the various courses in the program is sequential in nature with the content in advanced courses being an extension of the content in introductory courses.	1	2	3	4	5
9. The course content and teaching strategies are documented in course outlines, unit plans, and lesson plans that are on file and available for review by teachers and administrators.	1	2	3	4	5
10. The course content and teaching strategies are periodically reviewed and revised or modified.	1	2	3	4	5

Plans for addressing areas that need improvement:

1. The course

2. The course

3. The course

4. The course

5. The course

6. The course

7. The course

8. The course

9. The course

10. The course

11. The course

12. The course

13. The course

14. The course

15. The course

16. The course

17. The course

18. The course

Evaluation

- | | LOW | | | | HIGH |
|---|-----|---|---|---|------|
| 1. An evaluation plan is used to assess student progress and program effectiveness. | 1 | 2 | 3 | 4 | 5 |
| 2. Evaluation results are used to revise course content and teaching strategies. | 1 | 2 | 3 | 4 | 5 |

Plans for addressing areas that need improvement:

Summary:

- | | LOW | | | | HIGH |
|---|-----|---|---|---|------|
| Philosophy: | 1 | 2 | 3 | 4 | 5 |
| Goals and Objectives: | 1 | 2 | 3 | 4 | 5 |
| Content and Teaching Strategies: | 1 | 2 | 3 | 4 | 5 |
| Evaluation: | 1 | 2 | 3 | 4 | 5 |

Philosophy:

Goals and Objectives:

Content and Teaching Strategies:

Evaluation:

International Technology Education Association Program Excellence in Technology Education Evaluation Sheet

This form should be used to summarize the evaluation results of the state/provincial/national affiliate review committee.

Association memberships

LOW HIGH

1 2 3 4 5

High scores are given to programs that are taught by teachers who are members of the state/provincial/ national affiliate association and the International Technology Education Association.

Philosophy and curriculum structure

LOW HIGH

1 2 3 4 5

Standards:

High scores are given programs that are developed using state or national standards for technology education.

1 2 3 4 5

Goals:

High scores are given programs that use goals that emphasize the general education focus of technology education and are directly related to state or national standards.

1 2 3 4 5

Teaching Strategies:

High scores are given programs that use a variety of strategies and incorporate problem solving, design, and group activities.

1 2 3 4 5

Effectiveness:

High scores are given programs that are designed to meet the needs of a diverse population and that attract both male and female students.

1 2 3 4 5

Assessment:

High score are gives to programs that use a variety of techniques to assess student progress and program effectiveness.

Professional Preparation and Development

LOW HIGH

1 2 3 4 5

Education:

High scores are given programs that are taught by teachers who have appropriate professional preparation and teaching certificates.

1 2 3 4 5 **Conference Attendance:**

High scores are given programs that are taught by teachers who regularly attend local, state, national, and international technology education conferences.

1 2 3 4 5 **In-service Participation:**

High scores are given programs that are taught by teachers who regularly participate in professional development activities.

Program Revision

LOW HIGH

1 2 3 4 5

High scores are given to programs that are current as indicated by recent and continuous revision.

Promoting the Program

LOW HIGH

1 2 3 4 5

High scores are given to programs that are aggressively promoted by the teachers who teach in the program.

Program Support

LOW HIGH

1 2 3 4 5

High scores are given to programs that are strongly supported by the district and school administration and by parents, students, and the community.

Summary:

1 2 3 4 5 **Association memberships**

_____ **Philosophy and curriculum structure**

_____ **Professional Preparation and Development**

_____ **Program Revision**

1 2 3 4 5 **Promoting the Program**

_____ **Program Support**

_____ **TOTAL**

Comments:

1 2 3 4 5

**Chip Miller, Delphi Study on Elements Common to Quality and Success in Secondary
Technology Education Programs.
STUDY PARTICIPATION SURVEY FORM**

Name: _____

School: _____

State: _____

Address: _____ (Street), _____ (Town),

_____ (Zip), _____ (Phone Number)

_____ I am interested in participating in this study.

_____ I am not interested in participating in this study.

Home Address: _____ (Street), _____ (Town),

_____ (Zip), _____ (Home Phone)

Questions About You and Your School:

1. Grade range of your school: _____

2. Number of students at your school: _____

3. Specific Classes that you teach: _____

4. Number of years teaching: _____

5. Number of years in present position: _____

6. Teaching area endorsements: _____

7. Professional association memberships: _____

8. School location: A. Rural B. Urban C. Suburban

-Please return this survey form in the postage paid envelope enclosed.
Enjoy a stick of gum for your effort!

THANK YOU FOR YOUR PARTICIPATION!

1. Grade range of your school: _____

2. Number of students at your school: _____

3. Specific Classes that you teach: _____

4. Number of years teaching: _____

5. Number of years in present position: _____

6. Teaching area endorsements: _____

7. Professional association memberships: _____

8. School location: A. Rural B. Urban C. Suburban

LISTING OF EXPERT PANEL MEMBERS

Lynn Kyle
Service High School
12243 W. Skyline Drive
Eagle River, AK. 99577

Suzanne Hinton Weaver
Waggener Traditional High School
330 S. Hubbards Ln.
Louisville, KY. 40207

Phil Hammel
Hunterdon Central Regional High School
84 Route 31
Flemington, NJ. 08822

Ken Kern
Caloosa High School
2000 S. Cherokee
Caloosa, OK. 74015

Kenneth A. Spencer
Hunter High School
4200 So. 5600 West
West Valley City, UT. 84120

Earl Fulton
Fleming Ruffner Magnet Center
3604 Ferncliff Ave. S.W.
Roanoke, VA. 24017

Robert Hartig Jr.
Bayside Middle School
601 Ellsworth Lane
Milwaukee, WI. 53217

Richard Leopold
Wallkill Middle School
1009 Bona Venture Avenue
Wallkill, NY. 12589

Doug Spiekermeier
Ashley High School
P.O. Box H
Ashley, ND. 58413

Ray Taylor
Summit Ridge Middle School
11809 W. Coal Mine Ave.
Littleton, CO. 80127

Michael Mino
The Gilbert School
2200 Williams Ave.
Winsted, CT. 06098

Al Burkholtz
Bloomfield Hills Middle School
4200 W. Quarton Rd.
Bloomfield Hills, MI. 48302-4042

Roger Schumaker
Byron Center High School
Byron Center Ave. S.
Byron Center, MI. 49315-9231

Richard Baker
Millard North Senior High School
1010 South 144th St.
Omaha, NE. 68154

Tony Adams
Chapel Hill High School
13172 St. Hwy. 64E
Tylar, TX. 75707-8708

ITEA Governance Region Map

APPENDIX B

Round One Survey Cover Letter and Survey Instrument.

Round Two Survey Cover Letter and Survey Instrument.

Round Three Survey Cover Letter and Survey Instrument.



Department of Education
 Agricultural and Technology Education
 Cheever Hall
 MSU • Bozeman
 Bozeman, MT 59717-0374
 Telephone (406) 994-3201
 Fax (406) 994-6696

Date:

Address:

Salutation:

I want to thank you for agreeing to participate in this study. You will recall that this study is being administered to identify elements that are common to quality and success in Secondary Technology Education Programs.

This study will employ a three round Delphi process. This process initially asks that you identify factors that you believe significantly contribute to Quality and Success in Secondary Technology Education Programs. A second round survey questionnaire will be developed from material solicited in the round one Delphi Questionnaire. The second questionnaire will require you to rank in importance, compiled statements from the entire pool of study participants. A third and last Delphi questionnaire, will attempt to achieve consensus on significant statements from round two.

We would again like to thank you for the time you have devoted to this process. Your input is important and will help all of us in the field attain a better understanding of elements critical to the Quality and Success of Secondary Technology Education Programs. We look forward to receiving your reply no later than the target date of January 17, 1997. Please promptly return the survey material so that we can compile the information in a timely manner. Your contribution to this study is appreciated. I commend you for taking time out of your busy schedule to complete this survey. Please use the enclosed postage paid envelope to mail your completed survey.

Thank you for your contribution to the Secondary Technology Education Program.

Sincerely,

This study will employ a three round Delphi process. This process initially asks that you identify factors that you believe significantly contribute to Quality and Success in Secondary Technology Education Programs. A second round survey questionnaire will be developed from material solicited in the round one Delphi Questionnaire. The second questionnaire will require you to rank in importance, compiled statements from the entire pool of study participants. A third and last Delphi questionnaire, will attempt to achieve consensus on significant statements from round two.

Lemuel "Chip" Miller, ITEA Region IV Board Member
 Candidate, MS Technology Education
 HC #30, Box #18
 Ten Sleep, WY 82442

Scott Davis, Ph.D., Montana Agricultural and Technology Education
 126 Cheever Hall
 Montana State University
 Bozeman, MT. 59717

P.S. Enjoy a stick of gum while you complete the enclosed survey.

**Delphi Study on Factors Contributing to Quality and Success
in Secondary Technology Education Programs
First Round - Participant Query.**

The purpose of this survey is to identify factors that you believe have significantly contributed to the quality and success of Secondary Technology Education Programs.

Please list below (5) factors that you believe to be quality elements in your Technology Education Program, and (5) factors that you believe led you to achieve success in your Technology Education Program. Please use brief and concise statements in the completion of this survey.

(a) Quality Elements

1a. _____

2a. _____

3a. _____

4a. _____

5a. _____

(b) Success Elements

1b. _____

2b. _____

3b. _____

4b. _____

5b. _____

Please return this page once completed in the addressed, postage paid envelope. FAX to 307-366-2304



Department of Education

Agricultural and Technology Education
Cheever Hall
MSU • Bozeman
Bozeman, MT 59717-0374

Telephone (406) 994-3201
Fax (406) 994-6696

Date:

Address:

Salutation:

We want to again thank you for agreeing to participate in this study. You will recall that this study is being administered to identify elements that are common to Quality and Success in Secondary Technology Education Programs.

This study will employ a three round Delphi process. This process initially asked that you identify factors that you believe significantly contribute to Quality and Success in Secondary Technology Education Programs. The first round Delphi survey has now been compiled and assembled into the enclosed survey. I ask that you now take a few minutes to complete the survey. A third and last Delphi questionnaire, will attempt to achieve consensus on significant statements from this second round survey.

We would again like to thank you for the time you have devoted to this process. Your input is important and will help all of us in the field attain a better understanding of elements critical to the Quality and Success of Secondary Technology Education Programs. We look forward to receiving your reply no later than the target date of February 15, 1997. Please promptly return the survey material so that we can compile the information in a timely manner. Your contribution to this study is appreciated. I commend you for taking time out of your busy schedule to complete this survey. Please use the enclosed postage paid envelope to mail your completed survey or FAX the survey back to (307) 366-2768. You may wish to note that I have done a duplicate mailing of this survey, with another survey going to your other designated address. Please send just one survey back.

Sincerely,

Lemuel "Chip" Miller
ITEA Region IV Board Member
Candidate, MS Technology Education
HC #30, Box #18
Ten Sleep, WY. 82442
(307) 366-2339

Scott Davis, Ph.D.
Technology Education
126 Cheever Hall
Montana State University-Bozeman
Bozeman, MT. 59717

P.S. Enjoy a stick of gum while you complete the enclosed survey.

Delphi Study on Factors Contributing to Quality and Success in Secondary Technology Education Programs

Please rate the following curriculum elements that contribute to the Quality of Secondary Technology Education Programs. Use the scale provided to assign value to each item. A ten (10) represents the highest level of importance while a one (1) represents the lowest value of importance.

- | | |
|--|---|
| 1. Lab activities provide challenging opportunities for the learner. | 1...2...3...4...5...6...7...8...9...10... |
| 2. Curriculum is revised annually to integrate new technology. | 1...2...3...4...5...6...7...8...9...10... |
| 3. Curriculum is flexible to meet student needs. | 1...2...3...4...5...6...7...8...9...10... |
| 4. Classroom facilitators follow a detailed curriculum structure. | 1...2...3...4...5...6...7...8...9...10... |
| 5. Classroom activities are integrated with core subject areas. | 1...2...3...4...5...6...7...8...9...10... |
| 6. Integration with other curricular areas is a part of program planning. | 1...2...3...4...5...6...7...8...9...10... |
| 7. Students have extensive experience with a number of applied technological activities. | 1...2...3...4...5...6...7...8...9...10... |
| 8. Core technologies are taught as elements of larger technological systems. | 1...2...3...4...5...6...7...8...9...10... |
| 9. Class offerings are based on student interest inventories. | 1...2...3...4...5...6...7...8...9...10... |
| 10. Class offerings are based on past student success and achievement. | 1...2...3...4...5...6...7...8...9...10... |
| 11. Classroom activities are correlated with life skills. | 1...2...3...4...5...6...7...8...9...10... |
| 12. Classroom activities emphasize career exploration. | 1...2...3...4...5...6...7...8...9...10... |
| 13. There is an emphasis on the process of design. | 1...2...3...4...5...6...7...8...9...10... |
| 14. Industrial standards are followed in instruction. | 1...2...3...4...5...6...7...8...9...10... |
| 15. Practical application of knowledge is emphasized in curricula. | 1...2...3...4...5...6...7...8...9...10... |
| 16. Course offerings emphasize engineering elements. | 1...2...3...4...5...6...7...8...9...10... |

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY. 82442

Please rate the following facilities and equipment elements that contribute to the Quality of Secondary Technology Education Programs. Use the scale provided to assign value to each item. A ten (10) represents the highest level of importance while a one (1) represents the lowest value of importance.

- | | |
|--|---|
| 1. Timely equipment upgrades are critical. | 1...2...3...4...5...6...7...8...9...10... |
| 2. Facilities must be versatile to accommodate a variety of technological studies. | 1...2...3...4...5...6...7...8...9...10... |
| 3. Certain turn key laboratory configurations provide quality learning environments. | 1...2...3...4...5...6...7...8...9...10... |
| 4. Sufficient numbers of network computers are an important part of the classroom environment. | 1...2...3...4...5...6...7...8...9...10... |
| 5. Sufficient supplies are provided for student use. | 1...2...3...4...5...6...7...8...9...10... |
| 6. Instructional modules provide for flexibility. | 1...2...3...4...5...6...7...8...9...10... |
| 7. Instructor built - developed learning materials enhance curriculum. | 1...2...3...4...5...6...7...8...9...10... |
| 8. Facilities provide for both clean (design) and dusty (fabrication) activities. | 1...2...3...4...5...6...7...8...9...10... |
| 9. The computer and related hardware are used as tools. | 1...2...3...4...5...6...7...8...9...10... |
| 10. Facilities are clean, bright and well lit. | 1...2...3...4...5...6...7...8...9...10... |

Lemuel "Chip" Miller
 Technology Education
 Montana State University
 HC 30, Box #18
 Ten Sleep, WY. 82442

PAGE TWO,

Please rate the following support structure elements that contribute to the Quality of Secondary Technology Education Programs. Use the scale provided to assign value to each item. A ten (10) represents the highest level of importance while a one (1) represents the lowest value of importance.

- | | |
|---|---|
| 1. Administration backs the program. | 1...2...3...4...5...6...7...8...9...10... |
| 2. Community support for the program is important. | 1...2...3...4...5...6...7...8...9...10... |
| 3. A dedicated instructor provides a positive example for students and staff. | 1...2...3...4...5...6...7...8...9...10... |
| 4. Administration is flexible and empowers teachers. | 1...2...3...4...5...6...7...8...9...10... |
| 5. Sufficient local budgetary support for program elements. | 1...2...3...4...5...6...7...8...9...10... |
| 6. Teachers from other curricular areas support the program. | 1...2...3...4...5...6...7...8...9...10... |
| 7. Industrial and private sector donations contribute to the program. | 1...2...3...4...5...6...7...8...9...10... |
| 8. Grant funding support for program elements. | 1...2...3...4...5...6...7...8...9...10... |
| 9. Long range planning is inherent in facility and curricular needs. | 1...2...3...4...5...6...7...8...9...10... |
| 10. Student clubs and organizations are active. | 1...2...3...4...5...6...7...8...9...10... |

Lemuel "Chip" Miller
 Technology Education
 Montana State University
 HC 30, Box #18
 Ten Sleep, WY. 82442

PAGE THREE.

Please rate the following support structure elements that contribute to the Success of Secondary Technology Education Programs. Use the scale provided to assign value to each item. A ten (10) represents the highest level of importance while a one (1) represents the lowest value of importance.

- | | |
|---|---|
| 1. Parents are involved in the program. | 1...2...3...4...5...6...7...8...9...10... |
| 2. State curriculum development staff provide materials. | 1...2...3...4...5...6...7...8...9...10... |
| 3. Federal funds are used to support program elements. | 1...2...3...4...5...6...7...8...9...10... |
| 4. Student discipline is maintained. | 1...2...3...4...5...6...7...8...9...10... |
| 5. Community support is evidenced through voter approved bond issues. | 1...2...3...4...5...6...7...8...9...10... |
| 6. Collaboration with departmental personnel strengthen the program. | 1...2...3...4...5...6...7...8...9...10... |
| 7. Administration encourages staff development. | 1...2...3...4...5...6...7...8...9...10... |
| 8. Facilities are constantly upgraded. | 1...2...3...4...5...6...7...8...9...10... |
| 9. An active program advisory council is present. | 1...2...3...4...5...6...7...8...9...10... |
| 10. Program funding is adequate. | 1...2...3...4...5...6...7...8...9...10... |
| 11. Departmental colleagues support program efforts. | 1...2...3...4...5...6...7...8...9...10... |
| 12. Program enrollment shows annual gains. | 1...2...3...4...5...6...7...8...9...10... |
| 13. Classroom environmental enhancements (light, color, sound,) enhance student learning. | 1...2...3...4...5...6...7...8...9...10... |
| 14. Administration and classroom staff share a common vision. | 1...2...3...4...5...6...7...8...9...10... |
| 15. Gender equity is evidenced through a female enrollment increase. | 1...2...3...4...5...6...7...8...9...10... |
| 16. There is an encouraged "interdisciplinary habit" within the disciplines. | 1...2...3...4...5...6...7...8...9...10... |
| 17. The school maintains a Web Site for information dissemination. | 1...2...3...4...5...6...7...8...9...10... |
| 18. Alternative scheduling is utilized for blocks of instructional time. | 1...2...3...4...5...6...7...8...9...10... |

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY. 82442

PAGE FOUR.

Please rate the following personnel elements that contribute to the Success of Secondary Technology Education Programs. Use the scale provided to assign value to each item. A ten (10) represents the highest level of importance while a one (1) represents the lowest value of importance.

- | | |
|--|---|
| 1. Educators from many different disciplines support the program. | 1...2...3...4...5...6...7...8...9...10... |
| 2. Team teaching used to strengthen the program. | 1...2...3...4...5...6...7...8...9...10... |
| 3. A strong personal dedication drives goal setting. | 1...2...3...4...5...6...7...8...9...10... |
| 4. Strong belief in the need for Technology Education. | 1...2...3...4...5...6...7...8...9...10... |
| 5. Personnel use appropriate tools to enhance organizational skills. | 1...2...3...4...5...6...7...8...9...10... |
| 6. Personal drive and enthusiasm is important. | 1...2...3...4...5...6...7...8...9...10... |
| 7. Facilitators are knowledgeable and multi-talented. | 1...2...3...4...5...6...7...8...9...10... |
| 8. Teachers are respected and liked by students. | 1...2...3...4...5...6...7...8...9...10... |
| 9. Students are treated fairly and equitably. | 1...2...3...4...5...6...7...8...9...10... |
| 10. The teacher is flexible and open to new ideas. | 1...2...3...4...5...6...7...8...9...10... |
| 11. Innovative and creative staff are part of the program. | 1...2...3...4...5...6...7...8...9...10... |
| 12. Personnel have a vision of the future. | 1...2...3...4...5...6...7...8...9...10... |
| 13. Practitioner commitment to continued program improvement. | 1...2...3...4...5...6...7...8...9...10... |
| 14. Staff training is a necessary element in the introduction of new curricular material. | 1...2...3...4...5...6...7...8...9...10... |
| 15. Verbal, non verbal and written communications are maintained with teaching colleagues. | 1...2...3...4...5...6...7...8...9...10... |
| 16. Programs have strong leadership. | 1...2...3...4...5...6...7...8...9...10... |
| 17. Personnel are committed to excellence. | 1...2...3...4...5...6...7...8...9...10... |

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY, 82442

PAGE FIVE,

Please rate the following student skill development elements that contribute to the Success of Secondary Technology Education Programs. Use the scale provided to assign value to each item. A ten (10) represents the highest level of importance while a one (1) represents the lowest value of importance.

- | | |
|--|---|
| 1. Portfolio writing is used as a student evaluation tool. | 1...2...3...4...5...6...7...8...9...10... |
| 2. Group assessment is used. | 1...2...3...4...5...6...7...8...9...10... |
| 3. Students are encouraged to be divergent thinkers. | 1...2...3...4...5...6...7...8...9...10... |
| 4. Practical application of knowledge is emphasized in curricula. | 1...2...3...4...5...6...7...8...9...10... |
| 5. Students are taught to be disciplined and productive citizens. | 1...2...3...4...5...6...7...8...9...10... |
| 6. Assessment is used to determine student needs. | 1...2...3...4...5...6...7...8...9...10... |
| 7. Instructional methodologies include cooperative learning and problem solving. | 1...2...3...4...5...6...7...8...9...10... |
| 8. Students develop proficiencies in state of the art technologies. | 1...2...3...4...5...6...7...8...9...10... |
| 9. Behavioral standards emphasize work ethic skill development. | 1...2...3...4...5...6...7...8...9...10... |

PLEASE RETURN COMPLETED SURVEY TO:

Lemuel "Chip" Miller

HC 30, Box #18

Ten Sleep, WY. 82442

FAX: 307-366-2768

-Thank you!

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY. 82442



Department of Education
 Agricultural and Technology Education
 Cheever Hall
 MSU • Bozeman
 Bozeman, MT 59717-0374
 Telephone (406) 994-3201
 Fax (406) 994-6696

Date:

Address:

Salutation:

We want to again thank you for agreeing to participate in this study. You will recall that this study is being administered to identify elements that are common to Quality and Success in Secondary Technology Education Programs.

This study will employ a three round Delphi process. This process initially asked that you identify factors that you believe significantly contribute to Quality and Success in Secondary Technology Education Programs. The second round Delphi survey has now been compiled and assembled into the enclosed survey. I ask that you now take a few minutes to complete the survey. Please examine the Expert Panel Score compiled from the second round survey and assign a value based upon your opinion.

We would again like to thank you for the time you have devoted to this process. Your input is important and will help all of us in the field attain a better understanding of elements critical to the Quality and Success of Secondary Technology Education Programs. We look forward to receiving your reply no later than the target date of March 14, 1997. Please promptly return the survey material so that we can compile the information in a timely manner. Your contribution to this study is appreciated. I commend you for taking time out of your busy schedule to complete this survey. Please use the enclosed postage paid envelope to mail your completed survey or FAX the survey back to (307) 366-2768. You may wish to note that I have done a duplicate mailing of this survey, with another survey going to your other designated address. Please send just one survey back.

Sincerely,

Lemuel "Chip" Miller
 ITEA Region IV Board Member
 Candidate, MS Technology Education
 HC #30, Box #18
 Ten Sleep, WY. 82442
 (307) 366-2339

Scott Davis, Ph.D.
 Technology Education
 126 Cheever Hall
 Montana State University-Bozeman
 Bozeman, MT. 59717

Delphi Study on Factors Contributing to Quality and Success in Secondary Technology Education Programs

Please examine the average Expert Panel Score assigned to the following curriculum, quality elements by the (15) ITEA Program Excellence Award winners participating in this study. Confirm your agreement by assigning the same numerical value or assign a different value that reflects your perception of the individual element.

EXPERT PANEL SCORE
MY FINAL VALUE IS:

- | | | |
|--|----|---|
| 1. Lab activities provide challenging opportunities for the learner. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 2. Curriculum is revised annually to integrate new technology. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 3. Curriculum is flexible to meet student needs. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 4. Classroom facilitators follow a detailed curriculum structure. | 6 | 1...2...3...4...5...6...7...8...9...10... |
| 5. Classroom activities are integrated with core subject areas. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 6. Integration with other curricular areas is a part of program planning. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 7. Students have extensive experience with a number of applied technological activities. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 8. Core technologies are taught as elements of larger technological systems. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 9. Class offerings are based on student interest inventories. | 7 | 1...2...3...4...5...6...7...8...9...10... |
| 10. Class offerings are based on past student success and achievement. | 7 | 1...2...3...4...5...6...7...8...9...10... |
| 11. Classroom activities are correlated with life skills. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 12. Classroom activities emphasize career exploration. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 13. There is an emphasis on the process of design. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 14. Industrial standards are followed in instruction. | 7 | 1...2...3...4...5...6...7...8...9...10... |
| 15. Practical application of knowledge is emphasized in curricula. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 16. Course offerings emphasize engineering elements. | 8 | 1...2...3...4...5...6...7...8...9...10... |

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY. 82442

Please examine the average Expert Panel Score assigned to the following facilities and equipment, quality elements by the (15) ITEA Program Excellence Award winners participating in this study. Confirm your agreement by assigning the same numerical value or assign a different value that reflects your perception of the individual element.

EXPERT PANEL SCORE

MY FINAL VALUE IS:

- | | | |
|--|----|---|
| 1. Timely equipment upgrades are critical. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 2. Facilities must be versatile to accommodate a variety of technological studies. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 3. Certain turn key laboratory configurations provide quality learning environments. | 7 | 1...2...3...4...5...6...7...8...9...10... |
| 4. Sufficient numbers of network computers are an important part of the classroom environment. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 5. Sufficient supplies are provided for student use. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 6. Instructional modules provide for flexibility. | 7 | 1...2...3...4...5...6...7...8...9...10... |
| 7. Instructor built - developed learning materials enhance curriculum. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 8. Facilities provide for both clean (design) and dusty (fabrication) activities. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 9. The computer and related hardware are used as tools. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 10. Facilities are clean, bright and well lit. | 10 | 1...2...3...4...5...6...7...8...9...10... |

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY 82442

PAGE TWO.

Please examine the average Expert Panel Score assigned to the following support structure, quality elements by the (15) ITEA Program Excellence Award winners participating in this study. Confirm your agreement by assigning the same numerical value or assign a different value that reflects your perception of the individual element.

EXPERT PANEL SCORE

MY FINAL VALUE IS:

- | | | |
|---|----|---|
| 1. Administration backs the program. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 2. Community support for the program is important. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 3. A dedicated instructor provides a positive example for students and staff. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 4. Administration is flexible and empowers teachers. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 5. Sufficient local budgetary support for program elements. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 6. Teachers from other curricular areas support the program. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 7. Industrial and private sector donations contribute to the program. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 8. Grant funding support for program elements. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 9. Long range planning is inherent in facility and curricular needs. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 10. Student clubs and organizations are active. | 8 | 1...2...3...4...5...6...7...8...9...10... |

Please examine the average Expert Panel Score assigned to the following support structure, quality elements by the (15) ITEA Program Excellence Award winners participating in this study. Confirm your agreement by assigning the same numerical value or assign a different value that reflects your perception of the individual element.

1. Administration backs the program.

2. Community support for the program is important.

3. A dedicated instructor provides a positive example for students and staff.

4. Administration is flexible and empowers teachers.

5. Sufficient local budgetary support for program elements.

6. Teachers from other curricular areas support the program.

7. Industrial and private sector donations contribute to the program.

8. Grant funding support for program elements.

9. Long range planning is inherent in facility and curricular needs.
 10. Student clubs and organizations are active.

Lemuel "Chip" Miller
 Technology Education
 Montana State University
 HC 30, Box #18
 Ten Sleep, WY 82442

PAGE THREE

Please examine the average Expert Panel Score assigned to the following support structure, success elements by the (15) ITEA Program Excellence Award winners participating in this study. Confirm your agreement by assigning the same numerical value or assign a different value that reflects your perception of the individual element.

EXPERT PANEL SCORE

MY FINAL VALUE IS:

- | | | |
|---|----|---------------------------------|
| 1. Parents are involved in the program. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 2. State curriculum development staff provide materials. | 7 | 1..2..3..4..5..6..7..8..9..10.. |
| 3. Federal funds are used to support program elements. | 7 | 1..2..3..4..5..6..7..8..9..10.. |
| 4. Student discipline is maintained. | 10 | 1..2..3..4..5..6..7..8..9..10.. |
| 5. Community support is evidenced through voter approved bond issues. | 8 | 1..2..3..4..5..6..7..8..9..10.. |
| 6. Collaboration with departmental personnel strengthen the program. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 7. Administration encourages staff development. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 8. Facilities are constantly upgraded. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 9. An active program advisory council is present. | 7 | 1..2..3..4..5..6..7..8..9..10.. |
| 10. Program funding is adequate. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 11. Departmental colleagues support program efforts. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 12. Program enrollment shows annual gains. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 13. Classroom environmental enhancements (light, color, sound,) enhance student learning. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 14. Administration and classroom staff share a common vision. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 15. Gender equity is evidenced through a female enrollment increase. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 16. There is an encouraged "interdisciplinary habit" within the disciplines. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 17. The school maintains a Web Site for information dissemination. | 7 | 1..2..3..4..5..6..7..8..9..10.. |
| 18. Alternative scheduling is utilized for blocks of instructional time. | 7 | 1..2..3..4..5..6..7..8..9..10.. |

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY. 82442

PAGE FOUR.

Please examine the average Expert Panel Score assigned to the following personnel, success elements by the (15) ITEA Program Excellence Award winners participating in this study. Confirm your agreement by assigning the same numerical value or assign a different value that reflects your perception of the individual element.

EXPERT PANEL SCORE
MY FINAL VALUE IS:

- | | | |
|--|----|---------------------------------|
| 1. Educators from many different disciplines support the program. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 2. Team teaching used to strengthen the program. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 3. A strong personal dedication drives goal setting. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 4. Strong belief in the need for Technology Education. | 10 | 1..2..3..4..5..6..7..8..9..10.. |
| 5. Personnel use appropriate tools to enhance organizational skills. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 6. Personal drive and enthusiasm is important. | 10 | 1..2..3..4..5..6..7..8..9..10.. |
| 7. Facilitators are knowledgeable and multi-talented. | 10 | 1..2..3..4..5..6..7..8..9..10.. |
| 8. Teachers are respected and liked by students. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 9. Students are treated fairly and equitably. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 10. The teacher is flexible and open to new ideas. | 10 | 1..2..3..4..5..6..7..8..9..10.. |
| 11. Innovative and creative staff are part of the program. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 12. Personnel have a vision of the future. | 10 | 1..2..3..4..5..6..7..8..9..10.. |
| 13. Practitioner commitment to continued program improvement. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 14. Staff training is a necessary element in the introduction of new curricular material. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 15. Verbal, non verbal and written communications are maintained with teaching colleagues. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 16. Programs have strong leadership. | 9 | 1..2..3..4..5..6..7..8..9..10.. |
| 17. Personnel are committed to excellence. | 10 | 1..2..3..4..5..6..7..8..9..10.. |

Lemuel "Chip" Miller
Technology Education
Montana State University
HC 30, Box #18
Ten Sleep, WY 82442

PAGE FIVE.

Please examine the average Expert Panel Score assigned to the following student skill development success elements by the (15) ITEA Program Excellence Award winners participating in this study. Confirm your agreement by assigning the same numerical value or assign a different value that reflects your perception of the individual element.

EXPERT PANEL SCORE

MY FINAL VALUE IS:

- | | | |
|--|----|---|
| 1. Portfolio writing is used as a student evaluation tool. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 2. Group assessment is used. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 3. Students are encouraged to be divergent thinkers. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 4. Practical application of knowledge is emphasized in curricula. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 5. Students are taught to be disciplined and productive citizens. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 6. Assessment is used to determine student needs. | 9 | 1...2...3...4...5...6...7...8...9...10... |
| 7. Instructional methodologies include cooperative learning and problem solving. | 10 | 1...2...3...4...5...6...7...8...9...10... |
| 8. Students develop proficiencies in state of the art technologies. | 8 | 1...2...3...4...5...6...7...8...9...10... |
| 9. Behavioral standards emphasize work ethic skill development. | 9 | 1...2...3...4...5...6...7...8...9...10... |

PLEASE RETURN COMPLETED SURVEY TO:

Lemuel "Chip" Miller
HC 30, Box #18
Ten Sleep, WY. 82442
FAX: 307-366-2768

-Thank you!

Lemuel "Chip" Miller
 Technology Education
 Montana State University
 HC 30, Box #18
 Ten Sleep, WY 82442

PAGE SIX.

84 471MT 1431
TH
8/97 30568-44 NULB



