THE NATIONAL SUPPLY OF AND DEMAND FOR INDUSTRIAL ARTS TEACHERS

by

Charles Daniel Miller

Dissertation submitted to the Graduate Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

in

Vocational and Technical Education

APPROVED:

William E. Dugger, Jr., Chairman

Patrick A. O'Reilly

David E. Hutchins

W. Robert Sullins

Thomas A. Hughes

December, 1979

Blacksburg, Virginia

ACKNOWLEDGEMENTS

Sincere appreciation is extended to members of the faculty committee who assisted in the development of this dissertation. A special note of indebtedness is extended to Dr. William E. Dugger who served as chairman of the committee and provided invaluable assistance throughout the writing of the dissertation.

The Standards for Industrial Arts Education Programs Project at Virginia Tech is acknowledged as the source of much of the data used during the study. Much appreciation is expressed for permission to use raw data collected by the Project. A note of thanks also goes to the state supervisors who assisted in the validation of the state supervisors' study and to all the respondents who made the extra effort which was needed to complete and return the surveys.

Lastly, and most importantly, a great debt of gratitude goes to my wife and three children who patiently endured the months of being sorely neglected. Without their support this work would not have been possible.

TABLE OF CONTENTS

Page

Acknowledgements ii

List of Tables vii

List of Figures viii

List of Charts ix

Chapter

1. Introduction 1

Description of the Problem Situation 2
Statement of the Problem 5
Research Questions 5
Significance of the Study 6
Definition of Terms 8
Limitations 12
Assumptions 13
Summary 14

2. Review of Literature 15

Introduction 15

Computer Literature Searches 16

Background 17

Supply of Industrial Arts Teachers 18

Potential Teachers Who Never Enter Training 23
Labor Market Overlap 25
Supply of Qualified Former Teachers 26
Quality of Teachers 27
Industrial Arts Teacher Training Facilities 30
Declining College Enrollments 31
Adverse publicity 32
Recruitment of Students for Teacher Education 34
Women in Industrial Arts 35

Demand for Industrial Arts Teachers 37

Shortages of Industrial Arts Teachers 38
Attempts to Solve Teacher Shortages: A Case Study . . . 40
Factors That Influence Teacher Demand 42

Teacher Turnover 43
Mobility of industrial arts teachers 45
Length of service 46
Effects of job mobility/teacher turnover 47
Salary Differentials 48
Salary Incentives 49
Growth of Industrial Arts 50
Inaccuracy of present data 50
Enrollments 52
Trends 52
Student Enrollments 55
Pupil/Teacher Ratio 58
Policy Decisions That Influence Teacher Demand 60
Existing Models for Estimating Teacher Supply and Demand 61

Summary 68

3. The Design of the Study 70

Introduction 70

Supply Model 70
Demand Model 71
Groups Surveyed 73

Collection of Data 74

Method of Data Collection 75
Instrumentation 75
Panel of experts 76

Analysis of Data 77

Analysis of Demand Model Data 77
Analysis of Supply Model Data 78
Determination of Teacher Shortage for 1977-78 78
Additional Analysis of Data 79
Proportions of male and female industrial arts teachers 79
Proportions of fully certified and less than fully certified teachers 80
Proportion of potential teachers who went into teaching 81
Teachers from other fields who gained certification 82
Mobility of industrial arts graduates 84
Proportion of undergraduate student capacity currently being utilized 84

Table of Contents, continued

Page

Summary 85

4. Results of the Study 87

Introduction 87

Survey Return Rates 88

State Industrial Arts Supervisors' Survey 88
Teacher Education Institution Survey 88

Demand for Teachers 88

Demand in 1976-77 88
Demand in 1977-78 89

Supply of Qualified Teachers in 1977-78 93

Shortage of Qualified Teachers in 1977-78 97

Annual Growth 97

Teacher Turnover Rate 99

Proportions of Male and Female Teachers 103

Proportions of Fully Certified and Less Than Fully Certified Teachers 103

Proportions of Potential Teachers Accepting Positions 108

Bachelor's Degree Awardees 108
Master's Degree Awardees 108
Other Teachers Who Gained Certification in Industrial Arts Education 108
Overall 109

Mobility of Industrial Arts Graduates 109

Utilization of Undergraduate Capacity 110

Summary 110

5. Conclusions and Recommendations 115

Introduction 115

Summary 116

Table of Contents, continued

Page

General Conclusions 118

Teacher Education Conclusions 118

Recruitment 119
Terms 120
Recommendations for Teacher Education 121

State Supervision Conclusions 122

The Role of State-Level Supervisors 123

Data Collection 123
Personnel 124

Recommendations for State Supervision 125

Summary 126

References 128

Appendices 138

A. Literature Search Strategy 139
B. List of State Supervisors 141
C. State Supervisors' Survey 145
D. Standards Project Survey of State and Territorial Industrial Arts Supervisors 151
E. List of Teacher Training Institutions Reporting Industrial Arts and Industrial Arts Education Graduates 164
F. List of Teacher Training Institutions Reporting Industrial Education, Industrial Technology (Teaching Option), and Technical Education (Occupational Education) Graduates 170
G. Teacher Training Institution Survey 174
H. Computer Printouts 180

Vita 199

Abstract

List of Tables

Table		Page
1.	Graduates of Industrial Arts Teacher Training Programs	21
2.	Industrial Arts Enrollments Compared to Total Secondary Enrollments in Virginia	54
3.	Teacher Demand in 1976-77	90
4.	Teacher Demand in 1977-78	92
5.	Calculations of Vacancies in 1977-78	94
6.	Supply of Qualified Teachers for 1977-78	96
7.	Teacher Shortages in 1977-78	98
8.	Growth in the Demand for Teachers for 1976 to 1978	100
9.	Teacher Turnover Rates	101
10.	Proportions of Male and Female Teachers	104
11.	Proportions of Fully Certified and Less Than Fully Certified Teachers	106
12.	Changes in the Use of Less Than Fully Certified Teachers	107

List of Figures

Figure Page

1. Copa and Korpi Model of Demand and Supply for Vocational Education Teachers 64

2. Boyett and Thomas Model for Estimation of Supply 66

List of Graphs

Graph Page

1. Summary of Major Supply and Demand Factors 113

Chapter 1

INTRODUCTION

The industrial arts teaching profession has been plagued with a history of teacher shortages. Today, industrial arts educators face challenges which necessitate very careful and detailed planning for the future, but accurate data necessary for planning are not available on teacher supply and demand. It is presently impossible for educational planners to project more than a rough estimate of teacher supply and demand trends because data at the national level are fragmentary (Boyett and Thomas, 1977).

The national reporting system that is presently being used to collect data on industrial arts education is based on programs that receive federal funds. States are only required to report to the federal level about programs that are managed by state education agencies and are funded by federal appropriations through the U.S. Office of Education. Although an enormous quantity of data has been collected on various aspects of education by agencies such as the U.S. Department of Health, Education, and Welfare (H.E.W.), the National Center for Education Statistics (N.C.E.S.), and the National Education Association (N.E.A.), there is almost a total lack of accurate data on the national supply of and demand for industrial arts teachers. Subsequently, educational planners in industrial arts education have been and continue to be severely limited in their ability to accurately assess the industrial arts teacher supply and demand problem.

Description of the Problem Situation

The industrial arts profession has long presented a confusing image to the general public, educators in other fields, students, college officials, and, perhaps, even to industrial arts educators. This has existed, in part, because of the differences in terminology used in the naming of programs (Gerbracht, 1950). N.C.E.S. has followed a practice of grouping industrial arts with other areas of vocational and technical education. Vocational and technical education reports often cite only gross data for a major field such as trade and industrial education where industrial arts teachers are occasionally grouped. Specific data are often unavailable on the thirty-six different teaching areas of trade and industrial education, the eight areas of vocational agriculture, the ten areas of health occupations, and the ten areas of office occupations. Similarly, data on the supply of potential industrial arts teachers from teacher education programs are often grouped with other industry-related programs (Mannion and Spencer, 1971).

Data that are collected on public vocational education programs are an important source of information that is used by the federal government for policy and program determination (Swanson, 1974). Prior to 1972, industrial arts programs were not eligible to receive federal vocational education funds and were, subsequently, not included in reports on vocational education programs. Since 1972, reports on vocational education that have included industrial arts data have been confusing and contradictory. For example, the N.E.A. (1977) reported a surplus of 1,811 beginning industrial arts teachers in 1974, a surplus of 742 teachers in 1975, and a surplus of 1,000 teachers in 1976.

Researchers such as Smith (1979), Miller (1978), Mannion and Spencer (1971), Schmitt and Pelley (1966), and agencies such as N.C.E.S., H.E.W., and N.E.A., and various state departments of public instruction have reported isolated pieces of information on factors that influence supply and demand for teachers. These sources, however, have not reported comparable information and most have had to rely on estimates alone. When data have been available on the same factors from two or more sources, wide discrepancies have been apparent. These discrepancies indicate low reliability in the information that is currently being disseminated.

When the Education Amendments of 1976, Public Law 94-482 (20 U.S.C. 2402), was passed the Commissioner of Education became legally responsible for the preparation of a listing of all areas of vocational education, including industrial arts, where there are or will be shortages of teachers. The Vocational Education Personnel Development staff (V.E.P.D.) of the Bureau of Occupational and Adult Education (B.O.A.E.) was charged with the responsibility of providing a reliable source of supply and demand information which could be used for determining teacher shortages (Federal Register, 1978). After finding that N.C.E.S. could not produce data from its data banks to meet the requirements of P.L. 94-482, the B.O.A.C. issued a contract for the purpose of collecting data to determine teacher shortages for the 1977-78 school year. The Office of Management and Budget (O.M.B.) approved the survey that collected data from the fifty-six states and territories. From these states: thirty-seven reported shortages; nine states reported no shortages; three states had no data to report; seven states did not reply to

the survey. Fifteen states reported shortages of industrial arts teachers which totaled 439 unfilled positions. An additional 5,253 unfilled vacancies were reported for other federally-funded vocational programs (Federal Register, 1978).

The shortages cited for industrial arts may be only a small portion of the actual number that occur annually in industrial arts because only a small percentage of industrial arts programs have begun to receive federal vocational education funds since 1972. Another U.S.H.E.W. (Jan. 1978) summary reported 445,498 secondary students were enrolled in federally reimbursable industrial arts courses. The same summary reported that 6,044 industrial arts teachers were employed. Therefore, since the number of teachers and student enrollments were for federally reimbursable industrial arts courses, the assumption must also follow that the 439 vacant industrial arts positions were only for teachers in federally reimbursable positions. The reports on shortages have failed to specify how a vacant position was classified. A vacancy could be considered any position which was not filled by a fully qualified teacher. It also could have meant only positions that had no one employed in them. It is also unknown if any consideration was given to positions that had been abolished because the positions could not be filled.

A new study commissioned by the U.S. Office of Education, the Standards for Industrial Arts Education at Virginia Polytechnic Institute and State University, conducted two national surveys during the spring of 1979 to build a national data base on industrial arts education. This new data base will be more comprehensive than the landmark Schmitt and Pelley (1966) study which was conducted in 1962-63. The

Standards Project surveys collected some data on the supply and demand for industrial arts teachers but not enough to provide all the answers that are needed to determine the size and nature of the teacher shortage problem.

Statement of the Problem

The Commissioner of Education, the Bureau of Occupational and Adult Education, and decision makers in industrial arts education are assigning priorities and basing decisions relative to the teacher shortage problem in industrial arts on data which grossly underestimated the magnitude of the teacher shortages. Furthermore, it is impossible to make projections of the future supplies of and demands for industrial arts teachers because accurate data are not available on all the factors which must be included in projection formulas.

Research Questions

The research questions asked and answered in this study included three primary questions:

1. What was the national demand for qualified industrial arts teachers during the 1976-77 and 1977-78 school years?
2. What was the national supply of qualified industrial arts teachers for the 1977-78 school year?
3. What was the state of balance between the supply of and demand for industrial arts teachers in 1977-78?

Other research questions which had to be answered during the course of the study before these three primary questions could be answered are listed below:

4. What was the annual growth in the national demand for qualified industrial arts teachers from 1976-77 to 1977-78?
5. What is the national teacher turnover rate for industrial arts teachers?
6. What proportion of industrial arts teachers are male and what proportion are female?
7. What proportion of industrial arts teachers are fully certified and what proportion are less than fully certified?
8. What proportion of new potential industrial arts teachers accept industrial arts teaching positions?
9. What proportions of industrial arts education graduates who accept teaching positions do so in the state where they graduate or in another state?
10. What proportion of the undergraduate industrial arts education student capacity is currently being utilized?

Significance of the Study

First, this study determined the supply of and demand for public school industrial arts teachers for the 1977-78 school year. This provides a direct comparison of the data being used by H.E.W. which identified only a portion of the teacher shortages. In states such as Pennsylvania, Michigan, and Florida, industrial arts teacher education programs have been cut back and, in some instances, closed. More cutbacks and closures are likely in the future if decisions are made on the basis of H.E.W.'s data alone.

Second, this study collected national data on supply and demand

factors which will enable researchers and educational planners to make projections of future supply and demand. Considering the lead time and expense required to establish teacher education programs, build or renovate facilities, recruit students, and graduate qualified teachers, it is evident that projections having a high level of accuracy are needed. More accurate projections that reflect the major factors which increase and decrease the supply and demand for industrial arts teachers will be possible as the result of this study.

Third, this study lends support to the notion that a national data collection procedure, other than those currently in effect, is needed specifically in industrial arts education. Regier (1972) supports the notion that a national agency is needed to collect accurate information from every state to report on the status of teacher supply and demand in all teaching areas. The differences between data collected in this study and data collected by H.E.W. illustrate the inadequacy of the procedure currently being used.

Fourth, this study is timely because several major trends in education are just beginning to be felt. The impact of these trends, such as declining public school enrollment, is being countered by other trends such as increased enrollments in industrial arts courses. This study has provided additional insight into the dynamics of the trends and other factors which affect teacher supply and demand.

Lastly, the findings of this study have potential usefulness to industrial arts educators who are or will be actively involved in the shaping of the next major piece of federal legislation that affects industrial arts education. The major problem encountered today in

industrial arts education has been identified by many as the teacher shortage. Future federal legislation will be remiss if it does not address the specific issue of teacher shortages in industrial arts and vocational education. Data collected here will be available to strengthen the arguments for increased efforts in solving the historic problem. This study has been a first step.

Definition of Terms

1. Beginning Teacher: "A person entering active employment as a full-time teacher for the first time" (N.E.A., 1977:5).

2. Demand: The total number of public school teaching positions which specify that the occupant hold certification, endorsement, license, or other qualifications in industrial arts education as a condition of employment, with less than full qualifications accepted only on an exceptional basis.

3. Former Industrial Arts Teacher: A person who had formerly held a teaching position in industrial arts but left the profession. Does NOT include those persons who left to further their education on sabbatical or leave of absence.

4. Industrial Arts:

> ...an area of education dealing with socio-economic problems and occupational opportunities, involving experience with a wide range of materials, tools, processes, products, and occupations typical of an industrial and technological society; ...a phase of the educational program concerned with orienting individuals through study and experience to the technical-industrial side of society for the purpose of enabling them to deal more intelligently with consumer goods, to be more efficient producers, to use leisure time more effectively, and to act more intelligently in regard to matters of health and safety, especially as affected by industry; ...the study of industrial

> technology, its origins, development, and advance, its technical, social, economic, occupational, cultural, and recreational nature and influences, through research, experiment, design, invention, construction, and operation with industrial materials, processes, products, and energies, for the purposes of acquainting the student with technological culture and aiding him in the discovery of his native potential therein; ...organized study of the knowledge or practice of that subcategory of the economic institution of society known as industry; ...a curriculum area in general education in which students may create, experiment, design, and plan while dealing with issues related to technology (from Good [ed.]. Dictionary of Education. 3rd Edition.).

5. Industrial Arts Education: See Industrial Arts and Industrial Arts Education Programs. Refers to that segment of industrial education which is either general education, pre-technical, exploratory, or pre-vocational in nature; does not include vocational or occupational education, trade and industrial education, industrial cooperative training, or technical education as related to specific job entry preparation.

6. Industrial Arts Education Programs: "Those education programs (A) which pertain to the body of related subject matter, or related courses, organized for the development of understanding about all aspects of industry and technology, including learning experiences involving activities such as experimenting, designing, constructing, evaluating, and using tools, machines, materials, and processes and (B) which assist individuals in the making of informed and meaningful occupational choices or which prepare them for entry into advanced trade and industrial or technical education programs" (Public Law 94-482).

7. Industrial Arts Graduate: Includes anyone who graduates from an accredited teacher training institution and meets that state's training requirements for beginning teachers of industrial arts education.

For this survey this may include BOTH bachelor's and master's degree awardees IF the graduate obtained initial qualifications to teach industrial arts at the advanced level OR completed both degrees before accepting an initial teaching position. This includes teachers from other fields or others who are re-trained to be industrial arts teachers IF a degree and certification are obtained in industrial arts education.

8. Industrial Education: "A generic term applying to all types of education related to industry including industrial arts education, vocational industrial education (trade and industrial education), and (parts of) technical education" (A.V.A., 1971).

9. Less Than Fully Certified Teachers: Refers to two categories of data collected in a survey of state industrial arts supervisors by the Standards for Industrial Arts Education Programs Project: a combination of teachers who were not certified, or were temporary or emergency certified in industrial arts education who taught in 1976-77 and 1977-78.

10. New Teacher: "A person entering or re-entering active status who was not employed as a full time teacher during the preceding school year" (N.E.A., 1977:5).

11. Normal or Fully Certified I.A. Teacher: Refers to a category of data collected in a survey of state industrial arts supervisors by the Standards for Industrial Arts Education Programs Project; the recognition, usually by a state department of education, that a person meets all of the qualifications established by the governing agency for a person to teach a specific subject at a specific grade level; a special certificate, license, or endorsement in industrial arts education.

12. Potential Teacher: A person who is newly qualified to teach industrial arts but has not been employed as a full-time teacher.

13. Qualified Industrial Arts Teacher: Refers to a teacher who holds a special certificate, license, or endorsement in industrial arts education, usually as the result of graduating from an accredited teacher education institution with a major in industrial arts education.

14. Supply: The total number of qualified industrial arts teachers, including potential teachers, available within the nation to fill teaching positions as they exist (adapted from Copa and Korpi, 1974).

15. Teaching Position: Any teaching position which specifies that a teacher hold a license, endorsement, or certification in industrial arts education in addition to the general teaching certificate that is required of all public school teachers in that state.

16. Teacher Turnover Rate: The number of persons hired between the 1976-77 and 1977-78 school years to replace those teachers who left their teaching positions for whatever reason. Can be expressed as a raw number or as a percentage of the total teaching force who left their teaching positions during or at the end of the 1976-77 school year.

17. Trade and Industrial Education: "Instruction planned to develop basic manipulative skills, safety practices, judgement, technical knowledge and related occupational information for the purpose of fitting persons for initial employment in (trade or) industrial occupations or upgrading and retraining workers employed in industry" (A.V.A., 1971).

18. Unfilled Position: Any teaching position that is unoccupied or is filled by a teacher who is less than fully qualified to hold the position.

19. Vacated Position: A position in which the existing teacher left for whatever reason, thus creating a vacancy which is available to be occupied by someone else; see Teacher Turnover Rate.

20. Vocational Education: see Vocational-Technical Education.

21. Vocational-Technical Education: "The broad range of educational experiences which are designed to prepare individuals for a career which usually requires less than a four year college degree for job entry. Synonymous with (votec) education and occupational education" (Wiens, 1973:25). Or:

> Vocational or technical training or retraining which is given in schools or classes (including field or laboratory work and remedial or related academic and technical instruction incident thereto) under public supervision and control or under contract with a state board or local educational agency, and is conducted as part of a program designed to prepare individuals for gainful employment as semiskilled or skilled workers or technicians or subprofessionals in recognized occupations and in new and emerging occupations, or to prepare individuals for enrollment in advanced technical education programs, but excluding any program to prepare individuals for employment in occupations generally considered professional or which require a baccalaureate or higher degree (A.V.A., 1971).

Limitations

1. The major limitation in conducting a national study of supply and demand of industrial arts teachers is the lack of accurate data at the state level. Respondents who were bona fide industrial arts supervisors may not have had actual data to report and therefore were forced to make estimates from their best judgement. Respondents in states where there was no industrial arts supervisor may have had to also rely on their best judgement rather than actual data. The accuracy of the

finding of the study is dependent upon the accuracy of the data that were reported.

2. The study was restricted to the 1976-77 and 1977-78 school years.

3. The study was restricted to public schools in the United States, the District of Columbia, and Puerto Rico.

Assumptions

1. The Industrial Teacher Education Directory was assumed to be the most complete listing of institutions that prepare industrial arts teachers in the United States. It was also assumed that not every institution listed an industrial arts program and that some institutions that should have been included in the survey from the directory were not included because no reference was made to industrial arts or other related types of terminology in their reports of degrees awarded. An examination of directories over a period of several years shows that the number of institutions listed varies very little from year to year. Any institutions that had industrial arts education programs and were not listed may have been different from the others. Therefore, the findings of this study are generalizable to all industrial arts teacher education institutions in the United States except those not listed in the directory.

2. It was assumed that no systematic bias existed between states and institutions that reported data on their returned surveys and those that reported no data, other than in the presence of data on industrial arts education at the state or institution level. Therefore, measures of central tendency such as the mean could be substituted for missing

data on selected variables in order to estimate data for other variables.

Summary

The industrial arts teaching profession has a history of teacher shortages. Educational planners and decision makers are seriously limited in their ability to solve the teacher shortage problem without accurate, comprehensive data on the supply of and demand for industrial arts teachers at the national level. Previous data have only touched the surface of the problem. This chapter outlined the reasons why the existing data are incomplete and discussed the basic questions regarding supply and demand which were addressed in the study. The definitions which were used, the basic assumptions that were made, the limitations of the study, and the potential significance of the study were also discussed.

Chapter 2

REVIEW OF LITERATURE

Introduction

Many factors, some of which are unique and seldom understood, have led to the long-standing shortages of industrial arts teachers (Wiens, 1973). Topics discussed in this chapter focus on the supply of teachers, factors that influence supply, the demand for teachers, and factors that influence demand. The mathematical formulas used to calculate annual supply and demand, available data, and data-collection procedures are examined in light of basic pitfalls in planning for the future. Projections tend to be cast into doubt because many of the underlying assumptions of educational planners and forecasters are based on inaccurate data and distorted perspectives. Where data and perspectives have been accurate, future policy changes make their basic assumptions and predictions invalid (Wiens, 1973).

The most critical factor, other than changes in policies, to contend with in making supply and demand projections for industrial arts is obtaining sufficient accurate data. Mannion and Spencer (1971:25) indicated that "statistical data and studies regarding trends and enrollment within the ...field appear, with one exception, to be desolate and void." The exception was a study conducted by Schmitt (1966) in 1962-63. The study by Mannion and Spencer was the second exception; the study currently being conducted by the Standards for Industrial Arts Education Project will be the third exception.

Computer Literature Searches

Because of the likely prospect that very little had been written specifically about the shortage of industrial arts teachers, two comprehensive computer-assisted literature searches were initiated during this study to aid in the identification of relevant literature. A search of the Comprehensive Dissertation Abstracts through August 1978 resulted in the identification of only one dissertation that specifically addressed the shortage of industrial arts teachers. The descriptors used in that search strategy are listed in Appendix A, part 1. A computer-assisted search of the literature in Resources in Education (R.I.E.) and Current Index to Journals in Education (C.I.J.E.) was conducted through the Educational Resources Information Center (E.R.I.C.) system for the period from 1966 to August 1978. A manual search of R.I.E. and C.I.J.E. was conducted to identify materials submitted after July 1978. Also searched were materials listed in the Abstracts of Instructional and Research Materials in Vocational and Technical Education (A.I.M./A.R.M.) for the period from 1967 to August 1978. Only eighteen articles relevant to this study were found in the E.R.I.C. search and only six were found in the A.I.M./A.R.M. search. The descriptors that were used in that search are listed in Appendix A, part 2. When these searches failed to produce many sources of information the search strategy was broadened to include the overall field of vocational education and additional topics such as enrollment trends. The descriptors used in those searches are listed in Appendix A, parts 3 and 4. This process yielded a large number of documents, although many of them subsequently proved to be of little relevance to the study.

Background

During the 1950s and 1960s the expanding school age population and increasing federal interest and influence in education created a great demand for new teachers in all fields of education and teacher training institutions expanded accordingly, with stimulation from federal monies. By the 1970s the shortage of teachers in most fields had been turned into a surplus. The surplus had been created for two basic reasons: the birthrate had begun a period of decline, and teacher turnover had dropped because inflation and recession had made teachers reluctant to leave their positions. A large reserve pool of certified teachers was created in most fields and projections that were made in the early 1970s suggested the serious oversupply would continue. As a result of these projections and the impact of inflation and recession, public funds at all levels were reduced and in some instances quotas were imposed on schools of education to reduce the enrollments in teacher training programs. From 1972 to 1975 the enrollments in teacher training programs dropped from a third to about twenty percent of all undergraduates and the total number of graduates dropped by approximately 100,000 per year (Lewin and Associates, Inc., 1977).

Although there has not been a national surplus of industrial arts teachers for the past two decades, the surpluses in other fields must be kept in mind, along with the measures which have been taken to reduce those surpluses, to place the current supply and demand picture for industrial arts education in proper perspective.

The national supply of and demand for industrial arts teachers is influenced by several factors which affect all teaching fields. The

major factors that have been included in most recent supply and demand studies were identified several decades ago in studies by Van Houten (1932), Elliff (1935), and Bailey (1939). Their work was built upon nine previous supply and demand studies that were conducted between 1910 and 1930.

Supply of Industrial Arts Teachers

The major factors that affect the supply of teachers are: the annual number of graduates from teacher training programs; the number of teachers who are retained as teachers annually; the number of teachers who are employed in a given year or years; the number of former teachers who return to the teaching profession annually; the number of potential teachers or new graduates who wished to teach but were unable to obtain a teaching position in previous years; and the annual number of experienced teachers who become certified to teach additional subjects.

There are only a few recent sources of information regarding the national supply of industrial arts teachers. One such source is the Industrial Teacher Education Directory which has been jointly published for the last sixteen years by the American Council on Industrial Arts Teacher Education (A.C.I.A.T.E.) and the National Association of Industrial and Technical Teacher Educators (N.A.I.T.T.E.). The directory lists the number of degrees that are granted each year with majors in industrial arts, vocational education, and technical education. A serious drawback with the data reported is a lack of distinction between industrial arts graduates who acquire teaching credentials and those who do not. In some instances institutions do not distinguish between

industrial arts education, industrial education, and various vocational programs. The 1977-78 directory (Dennis, 1977) which covered the period from July 1976 through June 1977 listed 148 institutions that awarded a total of 4,157 students with bachelor's degrees in industrial arts or industrial arts education. Eighty-seven institutions graduated a total of 897 students with master's degrees in industrial arts or industrial arts education. The directory also lists sixty institutions that awarded bachelor's degrees to 1,852 students in industrial education and forty-eight institutions that awarded 722 students with master's degrees in industrial education. There is no way to determine from this source how many of the graduates in industrial education were certificated or endorsed as industrial arts teachers.

A second source of information on the national supply of industrial arts teachers is a study that was conducted by Miller (1978). Miller submitted questionnaires to all state supervisors of industrial arts education and received responses from forty-two states on the status of the supply of industrial arts teachers. Some of the states that did not respond did not have a state supervisor responsible for industrial arts programs. Miller considered his figures to be approximations because some states may have included trade and industrial education teachers and other vocational teachers in their numbers. The number of industrial arts teachers produced in 1976-77 in the forty-two states was estimated in Miller's study to be between 4,126 and 4,266 teachers. The 4,157 graduates listed in Industrial Teacher Education Directory in that year falls within Miller's estimate.

Two states, Colorado and Maine, indicated in Miller's (1978) study

that they had a surplus of industrial arts teachers. Twenty states indicated some degree of teacher shortage but the seriousness of the shortages varied from state to state. The industrial arts teacher shortage in Georgia has resulted in the closing of a number of programs and other programs have been retarded in growth (Clendenning, 1978). Miller quoted the state supervisor of industrial arts in Louisiana as saying: "We in Louisiana are in desperate need of industrial arts teachers" (1978:23). The teacher shortage in Louisiana obviously had not improved much, if any, since Wommack (1967) reported an undersupply of industrial arts teachers by eleven percent statewide in the 1966-67 school year.

In the fall of 1978, Smith (1979) conducted a very simple survey of 143 university placement officers and fifty state supervisors for the American Industrial Arts Association's (A.I.A.A.) recruitment committee which he chaired. The shortage of industrial arts teachers was determined to be severe in twenty-one states, moderate in another twenty states, and very modest or non-existent in nine states. The questionnaire asked for the respondent's opinion of the seriousness of the shortages on an eleven point scale of extreme shortage (-5) to extreme oversupply (+5). The number of teachers that were needed to balance the shortages was not determined.

In 1971, Mannion and Spencer developed a series of projections for industrial arts to the year 1980. Because data on the annual numbers of graduates from industrial arts teacher education programs were not available prior to 1945 they had to make estimates. Table 1 contains their estimates on the approximate number of industrial arts graduates, along with data and estimates reported by various persons and agencies since

Table 1

Graduates of Industrial Arts Teacher Training Programs

Year	Industrial Arts Teacher Education Graduates	Annual Change
1910	150[1]	
1915	200[1]	6%
1920	300[1]	10%
1925	400[1]	3%
1930	500[1]	5%
1935	600[1] to 1,200[5]	4% to 28%
1940	1,200[1,5]	0% to 20%
1945	1,200[5] to 2,750[1]	0% to 26%
1948	2,321[5]	-5% to 31%
1949	3,768[5]	62%
1950	3,957[5] to 4,890[2]	5% to 15%
1952	3,161[2]	-10% to -18%
1954	2,201[2]	-15%
1955	3,962[5]	80%
1956	2,655[2]	-33%
1958	3,991[2]	25%
1960	3,785[2] to 4,154[5]	-3% to 2%
1962	3,325[2]	-6% to -10%
1964	3,435[2]	2%
1966	3,432[2]	0%
1968	4,388[2]	13%
1970	4,400[1]	1%
1972	5,809[3]	32%
1973	5,847[3]	0.7%
1974	4,880[3]	-16.5%
1975	4,175[3]	-14.4%
1977	4,157[4]	-0.2%

Sources: [1]Estimated by Mannion and Spencer, 1971; [2]National Education Association, 1969:14; [3]National Education Association, 1977:7,16,30; [4]Industrial Teacher Education Directory (Dennis, 1977); [5]Estimated by Gerbracht, 1950.

1910. Several of the dates have numbers reported from two sources; wide differences exist in the figures. The figures, however inconsistent they may be, indicated rather high annual increases in the number of graduates until 1952. There was a sharp decline at that point for a short period of time. Gerbracht (1950) projected an astounding increase in graduates for 1955; however, figures for 1956 indicate this did not occur. The number of graduates declined in the early sixties but increased heavily during the later part of the decade. A substantial decrease in the number of graduates occurred during the 1970s. The number appears to have remained at that level in recent years. These data are suspect, however. Industrial arts graduates have been continually grouped with other allied industrial-related collegiate majors and programs (Mannion and Spencer, 1971).

Some of the estimates by Mannion and Spencer contradicted data from Gerbracht's (1950) study of the 1948-49 supply of industrial arts teachers. Both estimates are used in Table 1 to illustrate the range of data given on the supply of teachers.

Gerbracht estimated 1,220 industrial arts teachers were produced annually from 1939 to 1949. He cited an earlier study that identified 1,197 graduates for 1941, a figure that closely matches the 1940 estimate used by Mannion and Spencer. Gerbracht determined that there were 2,321 graduates in 1948 and 3,767 in 1949. He stated that the high number of graduates for these two years was the result of the heavy influx of men who returned to college following World War II. He predicted a balance between supply and demand in 1952 and a serious oversupply beginning with the 1953 graduating class if the trends at that time continued. Although

the impact of Gerbracht's study was not evident in any of the literature reviewed, one could speculate that his study may have contributed to the sixteen percent decline in the number of graduates in industrial arts education in 1952 and the additional fifteen percent decline which occurred in 1953. Since the number of graduates in 1955 was approximately the same as it was in 1950, a more logical conclusion could be that recruitment of men into the military during the Korean War caused the drop in the number of graduates during the early 1950s. A similar decline was not evident in the estimates made by the N.E.A. (1977), however, when the war in Vietnam escalated in the late 1960s. A downward trend in the number of graduates can be detected in the estimates made by the N.E.A. for the years since 1973, although the accuracy of these estimates may be highly suspect for the reasons cited in Chapter 1.

Potential Teachers Who Never Enter Training

One of the major weaknesses of many supply and demand studies is their failure to account for the percentage of newly trained teachers who never actually enter the teaching profession. The reason is, once again, the lack of data on the attrition of potential teachers. This is especially important for industrial arts teachers, as Miller (1978:23) pointed out:

> One of the most evident findings (of the study) was that many industrial arts teachers do not go into teaching. Because they are well qualified for a hundred other jobs in business and industry, they are recruited for other jobs at salaries larger than paid to teachers.

The percentage of industrial arts education graduates who go into teaching was unknown prior to this study. This is not surprising when one

considers the fact that an accurate determination of the number of industrial arts graduates has not been available.

Estimates of the percentage of potential industrial arts teachers who enter the teaching profession have been made. However, the N.E.A. (1977:6) states that "the precise number (of teacher training graduates) who will actively seek employment in teaching is impossible to estimate." The N.E.A. report that contained this remark then proceeded to estimate there were 4,175 industrial arts graduates in 1976, but only 3,400 of the graduates of the class should be considered the supply of beginnning teachers for that year, a reduction of 18.2 percent. About thirty years earlier, Gerbracht (1950:44) cited a similar percentage:

> Over the ten-year period from 1939 to 1948 about 81 per cent of industrial arts graduates were placed in industrial arts teaching positions. In 1948, while the number of graduates was larger than the 1939 to 1948 average, about the same percentage (83) of graduates were placed.

He estimated that eighty-seven percent of the students in industrial arts teacher training programs in 1949 were planning to teach when they graduated.

In 1960, the N.E.A. estimated only 72.5 percent of the newly qualified potential teachers actually entered teaching (Pavalko, 1970). In 1964, the N.E.A. (1964) estimated that twenty-six percent of the graduates of teacher training programs did not immediately enter the teaching profession. Maul (1965) estimated that an average of 73.9 percent of industrial arts education majors entered the teaching profession. Ressler (1966) estimated that nationally approximately thirty percent of the industrial arts graduates who are qualified to teach never actually accepted a teaching position. Wommack (1967) determined that

only 59.8 percent of the industrial arts graduates in Louisiana from 1961-62 through 1965-66 taught industrial arts in the state, but failed to determine what percentage accepted teaching positions outside the state.

Labor Market Overlap

Evans (1971:235) states: "Any study of supply and demand for vocational teachers (which includes industrial arts teachers under P.L. 94-482) must consider the labor market for this field." He identified several areas of labor market overlap for teachers, administrators, and other educational personnel in vocational education. The first overlap occurs in programs that exist outside regular public vocational education such as: Manpower Development and Training Act programs, Job Corps, Office of Economic Opportunity programs, Opportunities Industrialization Centers, vocational programs in state and federal prisons, private trade schools, business and industry training programs, armed forced occupational programs, baccalaureate-level technical programs, and others. As Evans (1971:239) points out, these personnel come from many of the same sources, and shortages or surpluses of personnel in one market affect the others. Because of the diverse nature of these programs there is disagreement over who should pay the cost of teacher training and who should forecast supply and demand.

The second area of overlap involves teachers who are available to teach under certain conditions. It is in this area of overlap that much confusion is created in data that are reported on industrial arts education. Evans estimated there were about 50,000 industrial arts teachers

in this potential labor pool. The number of vocational teachers increased by 40,000 between 1964 and 1966. Evans used these figures to support his contention that "state departments of vocational education 'lower' standards when needed, to allow enough of these people into the fold to solve educational manpower shortages temporarily" (1971:239).

Another type of labor market overlap that exists is with teachers who teach non-industrial arts as well as industrial arts courses. Because they typically meet qualifications in both areas, this type of teacher is able to shift completely into one or the other, depending upon supply and demand at the time. Another pool of potential industrial arts teachers comes from full time employees in industry, industrial training employees, and others from business and industry. Evans (1971: 240) states that this pool becomes available only after "shortages in vocational teaching become severe enough that salaries and working conditions are considerably improved."

Supply of Qualified Former Teachers

There is a large number of industrial arts teacher education graduates who could return to teaching or take an initial teaching position. The size of this potential labor pool for industrial arts teachers is unknown at the national level. Former teachers reentering teaching in 1960-61 represented 18.3 percent of the reserve pool of unemployed teachers in 1960 (N.E.A., 1977). Wommack (1967) found more than eighteen percent of the newly hired industrial arts teachers in Louisiana in the 1966-67 school year were returning to the teaching profession following a period of absence. Franklin describes the kinds

of people who typically make up this reserve pool:

> Each of these persons falls into one of the following labor force categories: (1) unemployed, (2) in the labor reserve, (3) employed in a nonteaching job, or (4) never actively sought employment. Only very limited data exist on which to base rough estimates of the first two of these components, while no information at all is available on the last two (1978:52).

Industrial arts teachers would more than likely come from the third category.

Quality of Teachers

In planning for the future not only quantity but quality of instruction must be taken into consideration. In a presentation at the 1978 Southeastern Industrial Arts Conference, Clendenning (1978) identified the "good teacher shortage" as the number one problem in industrial arts. His comment reflects a need not only for sufficient numbers of qualified industrial arts teachers, but for sufficient numbers of good industrial arts teachers.

A balance between supply and demand, having enough teachers to replace those who leave and fill new positions that are created, insures that a qualified teacher can be obtained whenever needed. However, a balanced condition does not necessarily promote quality in education. Gerbracht pointed out that:

> anything which leads either to mediocrity of the people who become teachers or to the mediocrity of the job they do with children as a result of outside pressures leads inevitably to deterioration of the society. Conversely, that which leads to greater competence among the nation's teachers aids the progress and the welfare of the society (1950:9).

Boyett and Thomas (1977:7) found that school district administrators in Florida considered ten applicants per position vacancy to be the minimum

desirable number they would like to review. Boyett and Thomas indicate the ratio of applicants per vacancy can serve as a rough index of supply. The N.E.A. (1977) also uses measures of quantity to draw conclusions regarding quality. For example, there were 94,050 open teaching positions nationwide in 1976 and the N.E.A. indicated 687,450 beginning teachers should have been available "to raise the quality of public school programs and staffing ...to minimum levels" (1977:5). This would require approximately 7.3 beginning teachers for every teaching vacancy that occurs each year. This high number of new teachers on the job market would potentially produce a much greater ratio of applicants per position than the school administrators in Florida felt was necessary.

Although an adequate supply of industrial arts teachers would allow for better selection of teachers at the point of employment, an oversupply of teachers could have the opposite effect on the quality of teachers who remain employed as teachers. Gerbracht explained how this could happen:

> many of the more competent teachers will leave teaching in search of more rewarding fields. And further, competent people are not as likely to enter training for a field which promises employment only to a small percentage of those who graduate. Thus it is that the school child may lose when the teaching field is oversupplied (1950:9).

Not only would the school child lose in an oversupply situation, but the newly qualified teacher would lose time, money, and effort if they spent four years preparing for entry into a career field that was oversupplied. The cost to the taxpayer for teacher education programs when there is no demand cannot be justified. In some instances, however, teacher training programs have been allowed to continue in fields which

are overcrowded, perhaps at the expense of training programs in fields such as industrial arts which have a shortage of teachers.

An inadequate supply of teachers obviously has an adverse impact on the profession and the children who are enrolled in classes and those who are unable to do so because of the absence of teachers. Because of the limited number of applicants for any given industrial arts teaching position, school officials are often unable to employ certified teachers, let alone the best qualified. They are forced to employ whomever they can find. As a result, students are exposed to inferior teachers who are "poor career role models" and the profession is given a bad image (Clendenning, 1978). Boyd (1966:12) also notes that a limited supply of teachers hurts the profession and deprives the school child:

> There is nothing that will 'kill' a program quicker than a weak teacher. A limited supply of teachers leads to the assignment of poorly qualified people to many positions and the entire program suffers, and in turn boys and girls are deprived of the type of education they have a right to expect.

Several things which are detrimental to the industrial arts teaching profession happen when there is a shortage of industrial arts teachers: 1) teaching positions remain unfilled and students who wish to enroll in classes are not able to do so; 2) positions are filled with persons having some preparation to teach industrial arts, such as having courses or a minor in industrial arts but not enough coursework to be certified; 3) positions are filled with someone who has some of the necessary tool skills but no training as a teacher; 4) positions are filled with people who are qualified to teach vocational subjects such as agriculture, trade and industrial education, and technical education but have not been trained in industrial arts education and, subsequently, do not have the

same philosophical views, methodological orientations, or the same diversified skills of the certified industrial arts teacher. The extent to which each of the four situations just described exist is not known nationally, but isolated pieces of information from various states indicate that these situations do exist.

Wommack (1967) found that the undersupply of industrial arts teachers in Louisiana led to a reduction in the quality of programs offered. In addition to the eleven percent of industrial arts positions that annually remained unfilled by anyone, more than twelve percent of the teachers who were employed to teach industrial arts were not certified in industrial arts education. Of the new teachers who were employed to teach, 32.4 percent held temporary certificates, fifteen percent had no college credit in industrial arts courses, and fourteen percent did not have a four-year degree.

A measure of quality can be determined by the credentials which teachers hold. The only source of published data available on the qualifications of industrial arts teachers came out of the Schmitt and Pelley study in the 1962-63 school year. Schmitt and Pelley (1966) found that 94.4 percent of the industrial arts teachers surveyed had a regular or standard teaching certificate in 1962-63. They also found that 59.5 percent of the sample held a bachelor's degree and 34.9 percent had a master's degree.

Industrial Arts Teacher Training Facilities

The capacity of teacher training facilities can serve as an indicator of the potential ability of institutions to supply new teachers.

No assessment of the status of industrial arts teacher training facilities has been made in recent decades. In 1949, forty teacher training centers out of the sixty-four surveyed by Gerbracht (1950) had construction underway or had plans for the construction of new industrial arts facilities in the foreseeable future. "When this building program is completed," stated Gerbracht (1950:62), "about six thousand (industrial arts) teachers (will be produced) annually." The national capacity at that time was about five thousand graduates per year. From all indications the industrial arts profession was undergoing a massive building program at that time. In some states, Virginia for example, some of the facilities which were acquired at that time have not changed substantially; others have been replaced; and some are no longer in existence because their programs have been terminated.

Declining College Enrollments

An important factor in determining the future supplies of industrial arts teachers which is related to the capacity of teacher training facilities is the number of undergraduate students who are enrolled. Wommack (1967) noted a 21.5 percent decline in the number of industrial arts majors registered in the four teacher training institutions in Louisiana from 1961-62 through 1965-66. More recently, Miller (1978:24) referred to a national "temporary slump in enrollment" in industrial arts teacher education programs and cautioned teacher educators not to "dismantle the structure that took years of hard work in building quality teacher education programs ...." He indicated that a careful look at the situation is imperative in order to get some idea of what planning should

be done to prevent serious consequences later (1978:23).

During the 1973-74 school year, 8,005 bachelor's degrees, 2,613 master's degrees, and 205 doctor's degrees were awarded in industrial arts, vocational, and technical education. One year later, 7,456 bachelor's degrees, 2,629 master's degrees, and 211 doctor's degrees were awarded. During this one-year period there was a decline in undergraduate degrees of 6.86 percent (Baker, 1977). The N.E.A. (1977) estimated that 5,847 potential industrial arts teachers graduated in 1973, a 0.7 percent gain over the previous year. In 1974 the number of graduates dropped 16.5 percent to 4,880 and in 1975 dropped 14.4 percent below that figure to 4,175 graduates.

The declining college enrollments are affecting all teaching fields, not just industrial arts. A manpower study conducted in Indiana in 1976 noted that the number of bachelor's degrees that were granted in education in Indiana colleges and universities rose sharply until 1973. By 1974 the number of degrees had actually begun a sharp decline. Surveys of high school students in the state found that fewer high school seniors were choosing elementary or secondary teaching as a career aspiration (Indiana ..., 1976). A nationwide sample drawn from college freshmen found that fewer college freshmen were choosing elementary or secondary teaching as probable careers. The percentage had dropped from 19.3 percent of the freshmen surveyed in 1970 to 6.5 percent of the freshmen surveyed in 1975 (Austin, 1970).

Adverse publicity. Publicity given to teacher surpluses, or projected surpluses of teachers in some instances, may have had an

undesirable side effect of contributing to teacher shortages in some teaching areas such as industrial arts. In the late 1960s, teacher surpluses were projected to reach 312,000 graduates in 1972 and 412,000 by 1979 (Regier, 1972). The number of graduates actually peaked at 317,254 in 1972 and declined by 29.6 percent in 1976 to 233,470 (National Education Association, 1977). In reference to the publicity about teacher surplus, Miller made the following comment:

> In some respects our educational organizations on the national level have done industrial (arts) education teachers an injustice. They have mentioned the number of teachers who are certified and cannot find jobs. They fail to mention, or the newspapers fail to print, the need for industrial arts and vocational education teachers. As you know, we do need industrial arts teachers nationwide. College enrollments are dropping in some places, however. If this continues, some of the best programs for the preparation of industrial arts teachers will be phased out or abandoned long before they can help in restoring the national balance in teachers (1978: 23).

Publicity about job shortages for teachers may also reduce the numbers of graduates willing to invest time and resources in applying for a scarce position vacancy (N.E.A., 1977). The data needed to determine migration patterns of industrial arts graduates are not available, therefore, the effects of publicity or the absence of publicity on recruitment and teacher placement cannot be determined. The professional organizations need to examine the problems of teacher distributions and limitations in information flow. There is a need "for teachers to shift from the Northeast, where schools are being closed, to the South and Southwest, where schools are being built and there is need for more teachers than a specific state can produce" Miller (1978:23).

Recruitment of Students for Teacher Education

Another factor that influences the number of undergraduate students who are enrolled in industrial arts teacher education programs is the effectiveness of recruiting.

> The age-old problem of recruiting and training quality teachers in the area of industrial arts education has been of great concern to professionals for years. The future of industrial arts, as well as its role within the American school system, depends to a great extent upon contributions which will be made by future industrial arts educators (Mannion and Spencer, 1971:24).

Regiers (1972), in a discussion of ways in which the oversupply of teachers can be reduced in the future, made some suggestions which, if reoriented, could assist industrial arts teacher educators in obtaining undergraduate students. First, information about job opportunities should be provided to high school students and students in their first two years of college. The second suggestion was to provide "more teacher-related and in-school experiences during the four-year or five-year teacher education programs" (1972:15). A third recommendation Regier made was to review grade-point requirements for admission and continuation in undergraduate programs, but he warned that the use of grade points as a screening process should be kept to a minimum.

In a study in Arkansas, Jarhman (1964) concluded that undergraduate industrial arts students tended to have the same amount of interest toward industrial arts whether or not their previous school curriculum included industrial arts. He found, from the student's perspective, that visitations were a better recruiting device than career days, mailed publicity, films, slides, radio, television, or news releases. The important information for recruitment was found to be: the nature

of the job (most important), required training and qualifications, sources of information about related jobs, earnings, employment outlook, and location of jobs (least important).

In a study of 310 industrial arts majors in seven Ohio teacher education institutions, Ressler (1966) found former high school industrial arts teachers to be more influential than parents, friends, or counselors in the students' decision to major in industrial arts. Ressler also identified some of the characteristics of the teachers who had encouraged students to major in industrial arts. Typically, they were fifty or more years of age; had a good deal of teaching experience, almost all of which was just in industrial arts; held permanent teaching certificates; usually had contacts with higher education institutions, particularly in connection with student teaching; and, were active in industrial arts clubs, field trips, and conventions. Boyd (1966:13) also described the industrial arts teacher as the most influential part of a recruitment program. He assessed the teacher as being well-respected by the students and influential over parents as well.

Women in Industrial Arts

An additional important aspect of the industrial arts teacher shortage that should be addressed by teacher educators and educational planners is the gross under-representation of women in the industrial arts teaching force. Women make up the majority of teachers in elementary schools. From a sample of 1,553 teachers in 1970-71, the N.E.A. (1972) determined that women made up 65.7 percent of the total teacher force in the country (Regier, 1972). Slightly less than half of teachers

in secondary schools are women, yet they are still extremely rare in the industrial arts classroom. In the 1965-66 school year, there were 734,159 public secondary school teachers, 338,219 or forty-six percent of whom were women. In that year industrial arts teachers comprised 5.1 percent of the total number of teachers in the nation. Of all male public secondary teachers, 9.3 percent were industrial arts teachers. The percentage of industrial arts teachers who were women was so small that it was not reported in any fashion in this particular report (Simon and Vance, 1969). A N.E.A. (1972) study, which followed the persistent practice of grouped data on industrial arts and vocational education together, reported that 10.9 percent of the total sample were male industrial arts or vocational education teachers. When the percentage of females was determined, however, the data only indicated that 0.6 percent of the vocational education teachers were female; no breakdown was given for industrial arts education.

The barriers to women in all professions have been removed by law, but the social and psychological barriers to women in untraditional work roles cannot simply be legislated away. Some progress has been made in preparing women as industrial arts teachers; even more progress has been made in enrolling girls in secondary industrial arts programs. The relatively small number of females in public secondary school industrial arts programs may be a major factor in the difficulty in recruiting women for industrial arts teacher education programs. Schmitt and Pelley (1966) found that most girls who took industrial arts courses in 1962-63 took a crafts class. Schmitt and Pelley (1966) found that about 163,176 students out of about 4,000,000 students enrolled in

industrial arts nationally were enrolled in crafts courses, or about five percent of the total. Data on the percentage of females who were enrolled in all industrial arts courses was not given. Since only about sixteen percent of the four million students in industrial arts were enrolled in crafts courses and girls accounted for only 27,715 or about sixteen percent of those students, the total percentage of females in industrial arts at that time must have been quite small, possibly less than one percent.

The Standards for Industrial Arts Education Programs Project which conducted a survey of 2235 public secondary schools in the spring of 1979 will provide data on the current proportion of girls in industrial arts courses at the secondary level across the nation. Those data, which are scheduled to be released in 1980-81, should show a tremendous increase in the number of females who are enrolled in industrial arts classes.

Demand for Industrial Arts Teachers

There are three areas that are critical to any study of the demand for industrial arts teachers, according to Ressler (1966). The first, the number of persons being prepared to teach, has already been discussed. The other two areas, the number of teachers indicated by school officials as being needed and the number of temporarily or emergency certified teachers in industrial arts education, are among the topics discussed in this section.

Gerbracht (1950), who conducted the only national study of the supply and demand of industrial arts teachers, used two classifications

of teacher demand. The first classification, called emergency demand, contained: (1) the number of qualified teachers needed to fill positions not filled by anyone in the previous year; (2) the number of qualified teachers needed to replace unqualified teachers who had held industrial arts positions the previous year; and (3) the number of qualified teachers needed to fill newly created teaching positions brought about by the expansion of industrial arts offerings, minus the number of positions curtailed because of reductions in offerings. The second classification, called annual demand, included: (1) positions created each year by deaths, retirements, teachers leaving the profession, and teachers transferring to other areas of teaching; and (2) positions brought about by the annual expansion of industrial arts offerings. The annual expansion of industrial arts offerings can be viewed as the long-term trend of continued growth in enrollments in industrial arts, especially in new course offerings. The elements described by Gerbracht and Ressler are discussed in considerable detail in the following sections of this chapter.

Shortages of Industrial Arts Teachers

The industrial arts teaching profession has a history of teacher shortages. In 1949, Gerbracht (1950) estimated that: (1) there were 330 unfilled positions in the thirty-four states that responded to his questionnaire; (2) in these states an additional 579 industrial arts positions were filled by teachers who were uncertified to teach industrial arts; (3) 659 new teaching positions were created during the 1948-49 school year; (4) 368 positions were vacated due to deaths and retirements; (5) 288 teachers resigned from the teaching profession; (6) 131

teachers resigned from industrial arts positions to accept other teaching positions; and (7) 450 positions were created by the annual expansion of industrial arts offerings. In Gerbracht's scheme, item seven is not reporting the same positions as number three. The total demand for additional industrial arts teachers in June 1949 was estimated to be 2,836 teachers for the thirty-four states that returned questionnaires. Gerbracht's figures must be viewed with caution, however, because he estimated the figures for items one and six from only sixteen states and estimated from an even smaller number of returns for all the other items. In the conclusion of the study, Gerbracht predicted an oversupply of industrial arts teachers by 1953 because the number of graduates from industrial arts teacher training institutions appeared likely to exceed the annual demand for new teachers by that time. An oversupply of teachers in industrial arts did not materialize then, nor has it materialized since.

In 1966, Time quoted the Ohio State Superintendent of Instruction as describing the shortage of high school industrial arts teachers as "horrendous" ("Bigger ...," 1966). Wommack (1967) found 70.3 percent of the school systems in Louisiana in the 1966-67 school year did not have enough industrial arts teachers to fill existing positions. Over eleven percent of the total industrial arts teaching positions in the state were unfilled in the fall semester of that year. Regier (1972) included industrial arts as one of several teaching areas that had teacher shortages in 1970-71.

Miller summarized the current demand picture for industrial arts teachers in the following:

> The industrial arts teacher is almost unique ...this teacher is in demand. The demand may not exist in every state, but the number of teachers needed in some states more than makes up for those states with an in-balance situation. If you are an industrial arts teacher and you want to teach, you can teach. There is a job for you (1978:23).

From an informal survey of state industrial arts supervisors in 1978, Miller identified twenty states (out of forty-two that responded) that expected shortages of industrial arts teachers in the 1978-79 school year. Supervisors anticipated the number of unfilled positions to be somewhere between 838 and 888 in 1978-79. The total number of new industrial arts teachers supervisors thought would be needed in 1978-79 was between 3,939 and 4,086. London predicted this kind of situation when he stated in 1967 that "the situation is serious, and unless vigorous efforts are made to provide more teachers, many programs will be closed" (1967:42).

The "unofficial" data that Miller (1978:23) collected could be misleading. In Virginia, for example, the figure of thirty for "teacher shortages" was the number of positions that were not filled by anyone and did not include the forty-one positions that were filled by teachers who did not hold state certification in industrial arts education. Other reports on teacher shortages in Virginia list the number of shortages of industrial arts teachers at seventy-one (U.S.D.H.E.W., 1978).

Attempts to Solve Teacher Shortages: A Case Study

The State Department of Education and teacher education institutions in Virginia made numerous attempts through the years to solve the problem of industrial arts teacher shortages. The 1972-73 annual report from the state superintendent of education made reference to "two conferences for teacher educators (that) were held during the year to intensify efforts

to overcome the industrial arts teacher shortage ..." (Annual Report ..., 1973:121). The 1973-74 annual report noted that "four one-day conferences for teacher educators were held to improve plans for reducing the shortage of industrial arts teachers ..." (Annual Report ..., 1974:115). The same report named teacher education programs that could provide the quantity and quality of industrial arts teachers as a major need for the state. The annual report for the 1974-75 school year gave rise to optimism that a solution to the teacher shortage problem was close at hand when it reported the following:

> Through cooperative efforts with teacher education institutions progress is being made to reduce the shortage of teachers in industrial arts which has presented a continuing problem for several years. Based on requests from school divisions there was a need for 20 additional teachers after the 1974-75 school session began. Efforts to eliminate the problem included the following activities which were planned cooperatively and were conducted with industrial arts teacher educators: a public service television announcement emphasizing the need for teachers; more active recruiting programs on college campuses; development of a plan for improved articulation between community colleges and the teacher education institution; and improvement of teacher education facilities and equipment (Annual Report ..., 1975:95).

The annual report for the 1975-76 school year indicated that

> strengthening teacher education continues to be a significant concern during the year (and that) ...each college is implementing a plan which will contribute to the elimination of the teacher shortage by 1980 ... (Annual Report ..., 1976:46).

In 1977-78, 106 additional teachers were hired but the state still had a shortage of seventy-one teachers. The number of schools offering industrial arts had increased from 399 in 1976-77 to 441 in 1977-78. The shortage of seventy-one teachers may not have included the total need for industrial arts teachers in the state because less than 100 of

138 school divisions in Virginia offered industrial arts programs. The reasons for such a large number of school divisions not offering industrial arts courses are not known, but the impact of the long-termed industrial arts teacher shortage in Virginia may have prevented school divisions from expanding their offerings in industrial arts or from starting new programs where none had previously existed. Thirty years ago, Gerbracht (1950:23) indicated that "the imminent expansion of industrial arts offering ...has, presumably, been retarded as a result of the shortage of qualified teachers in the past." This statement appears to still be true today in states like Virginia that continue to have a shortage of fully qualified industrial arts teachers.

Factors That Influence Teacher Demand

Gerbracht (1950) and Boyett and Thomas (1977) indicate the types of data needed to make estimates of total demand for teachers include: (1) the number of positions filled the previous year; (2) the number of new positions to be filled in the coming year; and (3) the number of replacements anticipated for the next year. Van Houten (1932) separated teacher replacements into two categories, teachers who leave the profession and teachers who must be replaced because they are underqualified. He separated the number of new positions into three categories: (1) establishment of new schools; (2) reorganization of grade levels or addition of grade levels to the secondary curriculum; and (3) addition of teachers due to increased enrollments or addition of courses. Van Houten also identified several factors which tend to reduce teacher demand: (1) teachers who return to teaching after a temporary or sustained absence;

(2) economic, political, or other climates which induce teachers to remain in service longer than usual; (3) decrease in enrollments, construction nearing an end, organizational changes nearing an end, lowered birthrate, and increase in the teacher/pupil ratio. "Prediction of the number of beginning teachers needed," according to Van Houten (1932:112), "requires a study of the foregoing factors (identified above) and a search for trends that are sufficiently constant to render an estimate reasonably reliable." Two such trends that must be included in any estimation of future teacher demand are school enrollments and teacher/pupil ratios. Gerbracht (1950:5) added a dimension of teacher demand that was not addressed in earlier studies: that information is needed about delays in planned extensions of services and reductions of services that have been caused by the shortage of qualified teachers. Gerbracht also included in the total demand outlook the potential demand for teachers that exists in schools that presently do not offer industrial arts programs.

Teacher Turnover

One way to view teacher turnover, or "teacher dropout," is to perceive it as evidence of "the failure of teaching to hold those who enter the career" (Regier, 1972:20). Regardless of how one views teacher turnover, it is the single greatest contributor to the demand for new teachers.

Elsbree (1928) conducted a survey of principals and another of teachers in New York to determine the causes of teacher turnover. Principals gave higher salaries as the reason for teachers leaving in eighteen

percent of the cases. The other reasons principals gave for leaving were, in descending order: marriage, to be at or near home, dismissal, opportunity for advancement, and opportunity for further study. Salary was identified even more strongly as a primary cause for teacher transiency in a study conducted by Van Houten (1932). Teachers gave higher salary as the reason for leaving a teaching position in over forty-six percent of the cases, more than twice as frequently as they cited the next highest cause. The other top reasons identified were, in descending order: opportunity for advancement, opportunity to teach subjects preferred, to be at home, to be near home, opportunity for further study, improved working conditions, leave of absence for study, different types of students, and location in or near a large city.

Studies of teacher turnover conducted by the Kentucky Department of Education (1966) found salary to be a major reason for teachers who left the state. The study also identified the following reasons, besides salary, that teachers gave for leaving:

> future outlook for improvement in working conditions too discouraging; lack of time for planning, preparing, and evaluating teacher activities; lack of teaching aids, materials, and equipment; spouse's move; lack of opportunity for advancement; inadequate financial support of schools; and salary schedule not related to merit (Regier, 1972: 19-20).

The N.E.A. conducted several surveys on teacher turnover during the last two decades. During the period from 1961-62 to 1969, teacher turnover ranged from eleven percent to 13.6 percent nationally. The teacher turnover rate for industrial arts teachers averaged 14.6 percent in Louisiana during the first half of that decade (Wommack, 1967). Another national survey conducted during this period established the annual

turnover rate at 13.5 percent and an annual retirement rate of 1.5 percent. By the 1970-71 school year, the turnover rate was approximately eight percent (Regier, 1972). The rate dropped to six percent in 1972 for the following reasons given by Frankel and Gerald (1978:50-51):

> Eight percent is the historical turnover rate. However, enrollment decreases combined with increased numbers of college graduates prepared to teach in the early 1970s led to significant changes in the job market for teachers. As a result from 1972 on a teacher turnover of 6 percent has been used ...

The six percent national annual turnover rate is expected to hold through 1986. There are no current national turnover rates that have been established specifically for industrial arts teachers. That is a big deficiency in the data base related to industrial arts education in the United States.

Mobility of Industrial Arts Teachers. The fact that many industrial arts teachers are highly mobile is illustrated in the following example of a local industrial arts supervisor's plight in a Louisiana parish in 1978:

> He has been looking for teachers to fill his parish (county) needs for some time. This year he was lucky enough to recruit a sufficient number (from as far away as New York). His biggest problem, however, is the fact that next year most of those teachers will be enticed into industry at higher salaries. They will stay in the same town they were teaching in, but in a different type of professional capacity--one that will pay more (Miller, 1978:23).

Becker, in a discussion of the concept of commitment, made a point which, when reversed, any indicate why industrial arts teachers may respond so readily to market conditions:

> We can explain the fact that men ordinarily settle down to a career in a limited field, and do not change jobs and careers

> with the alacrity of the proverbial economic man under changing market conditions, by referring to a process whereby they become committed to a particular occupation (1966:33).

Perhaps many industrial arts teachers make a commitment to the technologies that are studied during the teacher training program and not to the teaching profession per se. To paraphrase Becker (1966:33), the industrial arts teacher sees several career options open to him, each having something to commend it, but chooses one that best serves his purposes which may not be teaching. Wommack described the primary reason why sufficient numbers of teachers are either not entering or not remaining in industrial arts teacher education programs.

> At the same time that an ever-increasing school enrollment has created a need for more teachers, an expanding economy has created job opportunities which are more attractive to young men than teaching. Too often, teaching salaries are not competitive with those paid by industry. Many of the 250 higher education institutions in the United States which have industrial arts education curricula have broadened their offerings to prepare young men for the higher-paying technical jobs. Growth in the technical programs has been at the expense of the teacher education program (1967:1-2).

It was estimated in 1966 that a million teachers had been lured away from teaching by higher salaries alone ("Bigger ...," 1966). The total must be much higher today.

Length of service. The average length of time that a teacher remains in the classroom is an important factor in the determination of annual demands for teachers (Van Houten, 1932 and Gerbracht, 1950). The most frequently estimated (median) length of service determined by Gerbracht 1948-49 was ten years. In 1962-63, Schmitt and Pelley (1966: 17) found the mean number of years of teaching experience for industrial

arts teachers was 9.5 years. Their study divided teaching experience into seven categories. The categories and the percentage of teachers in the sample who fall into each category were: 1) one year, about nine percent; 2) two to three years, about fifteen percent; 3) four to five years, about fifteen percent; 4) six to ten years, twenty-two percent; 5) eleven to fifteen years, about seventeen percent; 6) sixteen to twenty years, about seven percent; and 7) twenty-one or more years, over fifteen percent. In statistics reported by the National Center for Education Statistics, the mean years of teaching experience for the 1965-66 school year for all elementary and secondary teachers was 11.8 years, while the length of service for secondary teachers was ten years and for all male teachers was nine years (Simon and Grant, 1970:40). The nine years of teaching experience for all male teachers reported corresponds closely with the 9.5 years of service for industrial arts teachers reported by Schmitt and Pelley. The idea that many potential and beginning teachers view teaching as a temporary profession was substantiated by a study of beginning teachers in 1966 which reported that sixty-five percent of beginning teachers expected to leave the teaching profession within five years (Mason, 1966). Wommack (1967) indicated the turnover rate over a five-year period for new teachers in Louisiana was consistently higher than for experienced teachers.

Effects of job mobility/teacher turnover. Van Houten described the impact of teacher turnover in the 1930's in the following way.

> The rate of turnover ...has always been found higher than is consistent with the best interests of education in the United States. Such a condition is detrimental in an economic way since it causes a waste of money spent in

> training teachers either at their own or at public expense. It is detrimental educationally in that the welfare of the children is not properly safeguarded. It is detrimental socially in that an educational program necessary for the welfare of the state is made difficult of execution (1932:1).

Regier also considered teacher turnover to be a serious matter; his views are consistent with those of Van Houten and Elsbree:

> Not only do many teachers leave soon after beginning to teach, but often the best ones drop out most rapidly, leaving a disproportionate number of the less capable to fill the ranks of those who become career teachers (1972: 20).

Regier did not speculate as to the impact of teacher turnover in areas such as industrial arts that have a shortage of teachers, but teacher turnover could have a more serious effect under such circumstances. High rates of unemployment and a tight economy may be influential in reducing teacher turnover. When there are plenty of jobs available in business, industry, or government teachers can find jobs outside of teaching where job challenge and salary are viewed more positively (Regier, 1972). When jobs are unavailable in business and industry the salary and challenges of teaching are more attractive and some former teachers and qualified graduates who never taught seek to enter or reenter teaching.

Salary Differentials

Teaching salaries differ widely from school division to school division within states and between states. For example, beginning salaries in Virginia vary more than $2,000 per year between poor rural school divisions and middle class suburban school divisions. During the last twenty years, average teacher salaries in Virginia have been

lower than the national average teacher salary. During this same period of time the state has had a perpetual shortage of industrial arts teachers. Miller (1978) found teachers often leave a teaching position in one state and take a similar one in another state because salaries are higher in the other state. The following examples illustrate this:

> Minnesota does not have a teacher shortage. They hire teachers prepared in the Dakotas and Iowa. An Iowa shortage does not exist because that state recruits heavily from Missouri, and the distance is not that great. (Missouri anticipated a shortage of fifty teachers in 1978-79.) Nevada relies entirely on other states to furnish it with industrial arts teachers. Florida has a large number of out-of-state teachers recruited over the years (1978:23).

Salary Incentives

Salary incentives of various types have been used as a means of attracting and keeping a greater number of teachers. Overtime, extra teaching on evenings and weekends, has been described by Evans (1971) as a means of raising total salaries, thereby making the teaching position more attractive. A research study during the early 1960s proposed the idea of combating teacher shortages in mathematics and science by modifying teacher salary schedules to reflect the marketplace. When teachers were in short supply the salary schedule would increase to become more attractive (Regier, 1972). Johannsen (1969) also proposed an increase to the base teacher salary based on the supply and demand for teachers.

Differentiated staffing was proposed by Storm (1970:TE6) as "a way of alleviating the teacher shortage (in vocational and technical education) and (as) an answer to the problems of teacher salaries." He saw

differentiated staffing as a way to give outstanding educators salaries equal to or greater than administrative personnel. Schaefer (1970) rejected this approach as a viable means of improving the supply and demand picture for industrial arts. The lack of any recent enthusiasm for differentiated staffing lends support to Schaefer's views.

The more common types of salary incentives used are optional twelve month contracts, extended day (after school) contracts, and extended month (eleven month) contracts. Johannsen (1969) proposed the twelve month contract and supplemental pay for extended day contracts, but also suggested: (1) recognition of industrial experience on the teaching experience portion of the salary schedule; (2) delegation of special responsibility with corresponding salary addendum; (3) extra work weeks before and after the regular school year; and (4) full credit for outside teaching experience (no maximum number of years to be "transferred in").

Growth of Industrial Arts

Inaccuracy of present data. Government agencies and the N.E.A. have periodically reported industrial arts enrollment figures needed to determine growth in industrial arts education. The accuracy of these data must be questioned; enrollments are likely to have been underestimated.

Mannion and Spencer (1971:23) explain another reason for confusing and conflicting data on industrial arts programs:

> Courses which have been designated and offered under the general education nature of industrial arts have increasingly been changed to pre-vocational categories. Industrial arts classes and vocational classes, which are now often taught at

> the same school, by the same instructor, using the same facilities, can no longer be clearly identified and classified by older, established criteria. Results relating to this fact have shown a continual increase in secondary level vocational enrollments along with corresponding decreases in industrial arts general education programs.

This shift to pre-vocational education has been brought about by federal legislation which allows vocational funds to be allocated for industrial arts courses that are identified as pre-vocational in nature. This federal legislation included overall program definitions but the content of individual courses remains loosely described for many vocational and industrial arts programs. Agricultural education adopted program standards in the late 1970s. The industrial arts education profession began the development of standards on October 1, 1979 with the award of a three-year U.S.O.E. contract to the Industrial Arts Education Program Area of the Division of Vocational-Technical Education at Virginia Polytechnic Institute and State University. The Standards for Industrial Arts Education Programs Project, as it is known, was charged with the responsibility of assisting the profession with the development of standards which may remove much of the ambiguity in industrial arts programs.

The present problem of inaccurate, misleading data on industrial arts programs will continue until some systematic data collection system is developed to collect data specifically on industrial arts education. The data base collected by the Standards Project will supply new data on the enrollments nationwide but this data base is incomplete in some areas. There is a need for data to be collected annually but there appear to be no plans from any organization or agency to initiate annual

data collection at this time.

Enrollments. The data that are available indicate that industrial arts enrollments are increasing. In a comparison between the number of students in industrial arts and the total enrollments in grades 7-12, the National Center for Education Statistics reported industrial arts courses had enrollments of 1,762,242 or 25.5% of the total enrollment in the 1948-49 school year; 3,361,699 or 28.7% of the total enrollment in the 1960-61 school year; and 5,726,138 or 30.8% of the total enrollment in the 1972-73 school year (Grant and Lind, 1977). Schmitt and Pelley (1966) determined there were 3,905,650 students enrolled in industrial arts courses and 40,428 industrial arts teachers employed in the 1962-63 school year. Mannion and Spencer (1971) estimated industrial arts student enrollments to be in excess of 5.5 million students or 27.5% of the total secondary school enrollment in the 1971-72 school year. Using fragmentary data from various sources, they projected the total number of industrial arts students to increase to 6.6 million or 30% of the total secondary school enrollments by 1980. Data reported above for 1972-73 indicated that the rate of increase was slightly more rapid than Mannion and Spencer had anticipated.

Trends. Schmitt (1976:37) reported changing patterns in enrollments and course offering in industrial arts education; the most significant of which was a 46.6 percent increase in industrial arts enrollments from 1962-63 to 1972-73. Public school enrollments during this period only increased 36.6 percent. The number of schools that offered industrial arts also appeared to broaden in course offerings which may have been a

reaction to larger schools being built during this period. Large schools provide a potential for a broader course offering and more diverse opportunities for students.

When the state of Virginia first gave sponsorship to industrial arts in the 1930-31 school year there were seven schools that offered industrial arts courses, twenty industrial arts teachers employed, and 3,269 students were enrolled. In the 1977-78 school year, there were 1,085 industrial arts teachers employed and 115,471 students enrolled (Hughes, 1978). Enrollments of students in industrial arts courses in Virginia, shown in Table 2, indicates there has been a slow, but steady increase in percentage of the total student population enrolled in industrial arts courses. The percentage for the 1972-73 school year, for example, was 20.5 percent, but the national percentage of enrollment in industrial arts was 30.8 percent of the total secondary student population. One explanation for Virginia having only two-thirds of the national proportion of students in industrial arts can be found in the long-standing shortage of qualified teachers. It should be noted, however, that part of the lower percentages could be explained by Virginia's inclusion of the sixth grade in the secondary school category. This would result in a lower percentage if the national figures were based on seventh grade to twelfth grade. The state superintendent of education in Virginia described the situation industrial arts educators faced and continue to face in the state:

> The shortage of teachers endorsed in Industrial Arts Education continued to plague school divisions. Five colleges and universities in Virginia awarded degrees in industrial arts education, to 56 persons during the year, less than half the number needed by school divisions to begin the school session. Despite

Table 2

Industrial Arts Enrollments Compared to Total Secondary Enrollments in Virginia

School Year	Ind. Arts Enrollments		Public Secondary Enrollments (6-12)	Percentage of Secondary Students in Ind. Arts Courses
	Pre-vocational O&E Courses	Total		
1967-68[a]	0	62,656	365,961	17.12
1968-69[b]	0	65,314	380,701	17.15
1969-70[c]	0	66,942	394,376	16.97
1970-71[d]	0	74,858	404,509	18.51
1971-72[e]	0	84,401	413,630	20.40
1972-73[f]	0	86,041	419,670	20.50
1973-74[g]	8,871	90,912	423,723	21.45
1974-75[h]	29,927	95,706	429,775	22.27
1975-76[i]	37,969	93,434	436,044	21.43
1976-77[j]	42,964	96,012	438,953	21.87

Sources:

[a]Annual Report ...: 1967-68, 1968.
[b]Annual Report ...: 1968-69, 1969.
[c]Annual Report ...: 1969-70, 1970.
[d]Annual Report ...: 1970-71, 1971.
[e]Annual Report ...: 1971-72, 1972.
[f]Annual Report ...: 1972-73, 1973.
[g]Annual Report ...: 1973-74, 1974.
[h]Annual Report ...: 1974-75, 1975.
[i]Annual Report ...: 1975-76, 1976.
[j]Annual Report ...: 1976-77, 1977.

> efforts to secure graduates from institutions in North Carolina, West Virginia, Pennsylvania, and Tennessee 40 teachers were needed when the 1970-71 session began. Several schools had to reduce or eliminate industrial arts offerings becuase of this teacher shortage (Annual Report ..., 1971:163-164).

The demand for teachers would have been much greater if Virginia's enrollments had been at the national average. In 1972-73, for example, the state's industrial arts enrollments would have been over 129,000 instead of the 86,041 students who were enrolled. Using the 1977-78 figures for the state, it may be estimated that the average teacher load is about 106 students per teacher (115,471 students for 1,085 teachers). Using this teacher load, Virginia would have needed an additional 407 teachers if the enrollments were up to the national average.

Student Enrollments

The number of new teaching positions to be filled and the number of existing positions that are to be abolished each year are based on several factors: (1) student enrollments, (2) pupil-teacher ratios, (3) the proportion of the student population who are enrolled in specific programs, (4) educational and governmental policy decisions, and (5) trends in education.

The total student population in any given geographic area is dependent upon several things: birthrate, mortality rate, immigration, emigration, the rate of retention in the community, status of non-public schools, economic growth, and others (Washburn, 1977). Student enrollment data can provide only a rough estimate of long-term teacher demand; surveys should be conducted to estimate short-term teacher needs

(Swanson, 1974). The following discussion of enrollment trends illustrates the impact declining student enrollments has had on the demand for teachers. The states that are used in the examples are states reporting shortages of industrial arts teachers.

Nationwide, elementary school enrollments peaked in 1970 and secondary enrollments peaked in 1974 (Washburn, 1977). The current enrollment declines are expected to continue well into the 1980s. The National Center for Education Statistics (1975) projects that student enrollments will decline nationally ten to fifteen percent by that time. The school age population between the ages of five and thirteen is projected to decline seven percent from 1976 to 1986; the population between the ages of fourteen to seventeen is projected to decline eighteen percent in the same ten-year period. By 1986, it is projected there will be fourteen percent fewer instructional staff in public secondary school positions than there were in 1976. The number of public high school graduates is expected to decline by the same percentage. The instructional staff in public elementary schools is expected to increase by twelve percent over the same period, with a low enrollment having been reached during the early 1980s and enrollments increasing again from that point (Frankel, 1978).

Washburn (1977) noted in his study of the effects of declining enrollments in Illinois that vocational education enrollments are increasing although school enrollments nationally are declining. The increase in vocational enrollments has thus far outweighed the decrease in overall enrollments, keeping the demand for vocational teachers high. The study is of interest because, even with declining enrollments,

Illinois had a shortage of 115 industrial arts teachers in 1976-77 (U.S.D.H.E.W., 1978b) and an anticipated shortage of over 100 industrial arts teachers in 1978-79 (Miller, 1978). The vocational planners and chief administrative personnel in the school districts of Illinois surveyed by Washburn in 1976 reported the following: (1) the decline in student enrollments had not significantly affected vocational course offerings; (2) districts were able to offer new vocational programs even with declining secondary enrollments; and (3) declining enrollments did not affect financial support for vocational programs, funding to improve or offer new vocational courses, funds to acquire or renovate facilities, or funds to support vocational transportation costs (Washburn, 1977).

A college-level manpower study was conducted in 1976 to provide information related to the supply and demand situation for elementary and secondary school teachers in Indiana. The Indiana State Commission for Higher Education, the sponsoring agency, desired to obtain an assessment of future employment opportunities for teachers in the face of declining student enrollments. The study covered the five-year period between 1971 and 1975 in order to show the changes that had taken place over that relatively short period of time, primarily as a result of a declining or leveling in enrollments. The study revealed the overall number of teaching jobs had not begun to decline, but a surplus of teachers was being created because the majority of teachers were not close to retirement age and few positions were vacated. Indiana had recently experienced a decline of 9.2 percent in the number of elementary teachers. Ten out of sixteen specialty areas also experienced declines in the number of teachers employed. This decline is felt the most by

entry-level teachers who are employed straight out of college. There had been a forty percent reduction in the number of new teachers hired during the five-year period. The teacher surplus that had resulted in the decline of the number of new teachers who were hired was expected to be more severe for secondary teachers than elementary teachers. The study went on to indicate

> there are some teaching specialty areas, particularly in the industrial arts, vocational and agricultural areas, and some areas of mathematics and advanced science where the prospects of job applicants will be good (Indiana State Commission for Higher Education, 1976:26).

The U.S.D.H.E.W. (1978b) reported that the state of Indiana had a shortage of forty-eight industrial arts teachers during FY1976. The shortage for 1978-79 was expected to be somewhere between sixty-five and eighty teachers (Miller, 1978).

Pupil/Teacher Ratio

An important element to be examined along with student enrollments is the ratio of students to teachers. If student enrollments go up and the ratio remains the same, more jobs are available for teachers. During recent years there has been a steady, although small, decline in the number of students per teacher. The effects of small changes in the teaching load can, however, make large changes in total teacher demand. For example, if an absolute upper limit of twenty-five pupils per class and a four-period instructional day were established, the number of teachers needed in the work force would double (Reiger, 1972). A study conducted by the N.E.A. found the average pupil/teacher ratio for the fall of 1968 for both elementary and secondary teachers to be twenty-

four students per teacher. Elementary teachers averaged twenty-five pupils each; secondary teachers averaged twenty-one pupils each. In the fall of 1969, the overall ratios had increased to twenty-six and twenty-two respectively (Simon and Grant, 1972). The National Center for Education Statistics projected the public secondary school pupil/teacher ratio to drop from 18.5 in 1976 to as low as 16.5 by 1986. This projection is based on the assumption that the pupil/teacher ratio will follow the 1966-67 trend through 1986 (Frankel and Gerald, 1978).

The following study illustrates what the pupil/teacher ratio means in terms of demand for teachers. The Indiana State Commission for Higher Education (1976) recommended two sets of projections to be made to take into consideration trends in pupil/teacher ratios. One set assumed the current pupil/teacher ratio to remain constant; another set assumed the pupil/teacher ratio to decline at a rate of 0.3 students per teacher per year. This rate of decline was found to be very close to the actual rate of decline from 1971 to 1975 in Indiana. Enrollments at the secondary level in Indiana are projected to drop from 348,560 students in 1970-71 to 325,000 students by 1980-81. The number of secondary teachers was projected to decrease from 16,135 teachers employed in 1970-71 to 15,258 teachers in 1980-81, assuming that the pupil/teacher ratio is held relatively constant at 21.6 which was obtained in 1970-71. If the ratio were to be allowed to decline at the 0.3 rate down to a ratio of 19.5, the number of teachers that would be needed in 1980-81 would probably increase to 16,667. The maximum number of teachers is expected to reach 17,013 in 1978-79, so the 1980-81 estimate shows an overall decline which should start before this decade is over, the reduced pupil/teacher

ratio not withstanding.

Policy Decisions That Influence Teacher Demand

There have been and will continue to be decisions made at the national, state, local, and institutional levels that will influence the demand for industrial arts teachers. Swanson indicated the impact of these decisions can be considerable:

> It is possible that enrollment data reflect policy decisions to emphasize or de-emphasize certain categories more than they reflect student demand ...for example, ...vocational educator's greatest expansion is occuring in junior high school, below ninth grade. Is this a reflection of actual student demand? Is it a reflection of the recent emphasis on career education? (1974:18)

Federal funds can have an impact on school programs in general and in the types of industrial arts courses that are offered. An example of the expansion that Swanson indicated may be a response to the federally supported career education movement can be seen in the course offerings in Virginia. Table 2 (p. 54) shows that no students were enrolled in pre-vocational "O and E" (orientation and exploration) courses prior to 1973-74. In 1973-74 industrial arts became eligible to receive federal funds for courses that were pre-vocational in nature. By the 1976-77 school year, 44.7 percent of the total enrollments in Virginia fell into the pre-vocational O&E category.

State-level policies can influence the supply of industrial arts teachers by establishing the types of programs sponsored and the amount of expenditures allocated per student, and in the recruitment and certification of teachers. An example of a state policy that may have an impact in industrial arts can be seen in the move in Florida toward

requiring undergraduate industrial arts education majors to participate in a year-long internship after completing the regular four-year program. Another option considered in Florida was requiring graduates to be employed in a school position for one year before granting certification in industrial arts education. Problems regarding the mechanics of implementing these kinds of requirements are yet to be resolved, but the present timetable calls for these requirements to be in effect by July 1, 1981 (Heggen, 1978). The impact these requirements will have on the supply of industrial arts teachers in Florida is unknown, but this action may reduce the supply of teachers because the comparative ease of becoming certified in other states might draw teachers away.

Existing Models for Estimating Teacher Supply and Demand

Mathematical models have frequently been used in supply and demand studies to illustrate the relationships among, and effects of various factors that influence supply and demand. These models can also be used to determine the need for new teachers for a given year. One such model, or formula, was developed by the U.S. Office of Education in the early 1930s and was used in studies such as Bailey's 1939 study of the supply of teachers for Vermont. The complete formula Bailey (1939) used, which is illustrated below, included sixteen variables to estimate the demand for new teachers:

$$a + b + c + d + e + f \pm g \pm h \pm i \pm j \pm k - l - m - n - o + p = X.$$

The alphabetic codes, "a" through "X", represent the following variables:

a. The number of teachers who have been or will be retired during the year.

b. The number of teachers who died or stopped teaching because of illness.

c. The number of teachers who stopped teaching (not on leave of absence) to continue their professional preparation.

d. The number of teachers who married and stopped teaching.

e. The number of teachers needed for new education services.

f. The number of teachers who resigned or were dismissed.

g. The increase or decrease in the number of teaching positions because of an increase or decrease in the school population or increases in the average daily attendance.

h. The increase or decrease in the number of teaching positions caused by changes in the size of classes per teacher or in the teaching load.

i. The difference between the number taking leave of absence (+) and the number returning from leave of absence (-).

j. The difference between the number of teachers who left to teach in another state (+) and those employed from other states (-).

k. The difference between the number of teachers who entered another occupation or profession (+) and the number employed from another occupation or profession (-).

l. The number of teachers recruited through examinations, cadet teaching and other sources.

m. The number of teachers eliminated because of the withdrawal or curtailment of services.

n. The number of teachers who returned to teaching having some occupation other than teaching in the meantime.

o. The number of unemployed teachers whose preparation is acceptable in quality, quantity, professional nature, and recency and who can be absorbed each year.

p. A margin of safety consisting of enough teachers in excess of the number actually needed to care for emergencies and unforeseen developments and also to replace incompetents when necessary. (This variable would be zero when there is a surplus of teachers.)

X. The number of teachers with acceptable preparation needed from institutions of higher education to supply the needs for the ensuing year (Bailey, 1939:41-2).

The sixteen variables Bailey used included both supply and demand variables. The formula identified the number of teacher needed to be graduated during a particular year in order to meet the demand for the following year. These same variables, although sometimes combined or reclassified as new terms, have been used in most subsequent supply and demand studies.

Copa and Korpi (1974) developed a different type of mathematical model for estimating the supply of vocational teachers in Minnesota. Their model, shown in Figure 1, was based on a formulative method used by Goldstein and Swerdloff (1967). In the Copa and Korpi model, "demand for year X" represented all teaching positions that required a certified vocational teacher, regardless of whether the positions were filled or not. All those variables that tend to increase or decrease demand are simply labeled as "growth or decline." The "demand for year X+1" is a function of the previous year's demand, plus or minus growth or decline. The supply half of the model is much more detailed and includes two major

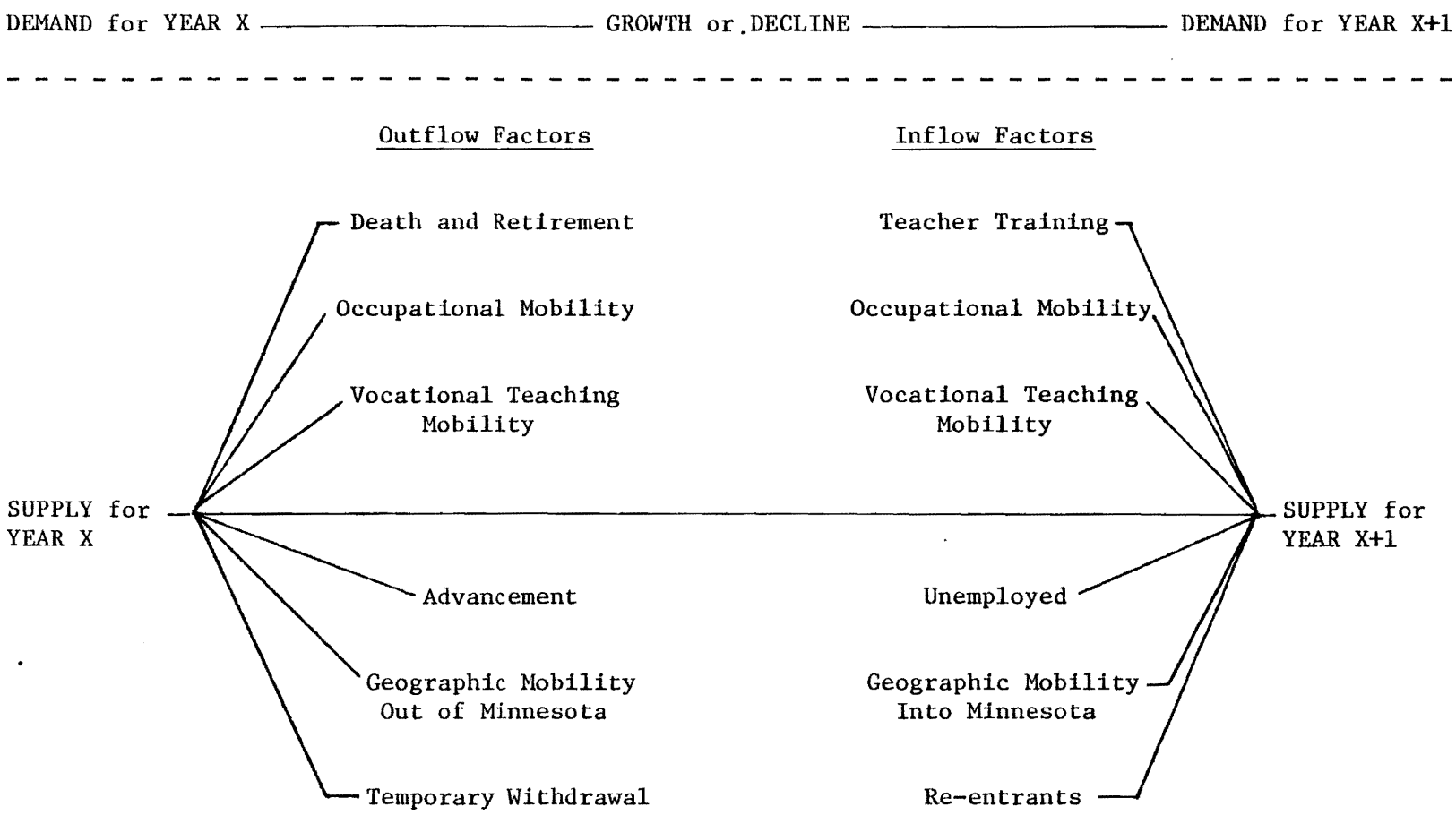


Figure 1

Copa and Korpi Model of Demand and Model of Supply
for Vocational Education Teachers
(From Copa and Korpi, 1974:11)

categories of variables that affect the "supply for year X+1," outflow factors and inflow factors. The outflow factors are those factors which decrease the supply of teachers that existed in year "X," such as: death, retirement, occupational mobility out of teaching, vocational teaching mobility into other teaching fields, advancement, geographic mobility of teachers out of the state, and temporary withdrawal. These variables, with two exceptions, are the same as Bailey's variables "b," "a," "k," "j," "c," and "i" respectively. Copa and Korpi omitted the number of teachers who resigned or were dismissed but included vocational teaching mobility and advancement. The inflow factors include: teacher training, occupational mobility into teaching, vocational teaching mobility into other teaching fields, unemployed teachers, geographic mobility of teachers into the state, and re-entrants into teaching positions. Bailey's model did not take into consideration mobility of teachers from one teaching field to another, a factor that may be more important in industrial arts than other teaching fields because of similarities in skills required in other vocational areas.

Boyett and Thomas (1977) modified Copa and Korpi's model, as illustrated in Figure 2, to determine the supply and demand of vocational teachers in Florida. Their supply model is represented by the following formula: the supply of teachers for a given year (X+1) is equal to the supply of teachers from the previous year (X), plus the inflow factors, minus the outflow factors. This may be represented by the following equation:

$$SM_{(X+1)} = (S_X) + (INFLO) - (OUTFLO)$$

or

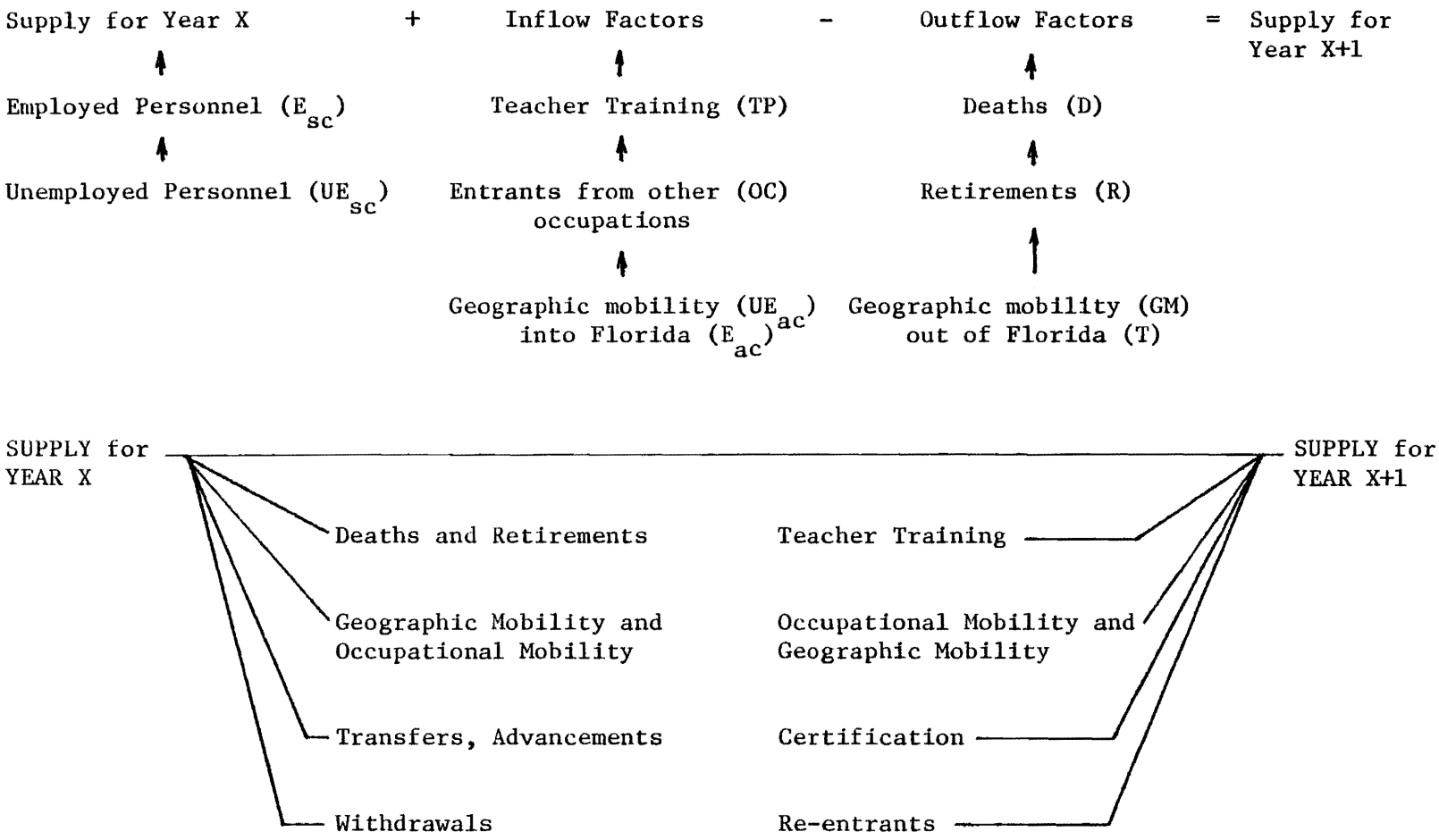


Figure 2

Boyett and Thomas Model for Estimation of Supply
(From Boyett and Thomas, 1977:3)

$$SM_{(X+1)} = (E_{sc} + UE_{sc}) + (TP + OC + E_{ac} + UE_{ac}) - (D + R + T + GM)$$

where,

$SM_{(X+1)}$ = estimated supply for a given year

S_X = supply for the previous year = $(E_{sc} + UE_{sc})$

INFLO = inflow factors = $(TP + OC + E_{ac} + UE_{ac})$

OUTFLO = outflow factors = $(D + R + T + GM)$

D = number of deaths of teachers

R = number of retirements of teachers

E_{sc} = persons employed, with state certification

UE_{sc} = persons unemployed, with state certification

E_{ac} = persons employed, with out-of-state certification

UE_{ac} = persons unemployed, with out-of-state certification

TP = graduates of teacher education training programs within the state

OC = entrants from other occupations who hold temporary teaching certificates

T = transfers out of teaching positions

GM = geographic mobility out of state.

This model would probably give a false estimation of the supply of and demand for teachers. The total number of graduates from teacher training programs in the state is added into the inflow factor. Provisions are not made for the percentage of graduates who do not accept teaching positions. An additional factor affects the supply of teachers from teacher education programs within the state, namely, the number of persons who become certificated, or endorsed industrial arts teachers but do not accept teaching positions. The factor "TP" can be corrected by

subtracting the number of certificated or endorsed graduates who do not plan to teach from the total number of graduates. The formula for the corrected "TP" factor is:

$$TP_c = TG - LP$$

where,

TP_c = total number of graduates from teacher education training programs within the state who plan to teach in the state

TG = total number of graduates from teacher education training programs within the state

LP = total number of graduates from teacher education training programs within the state who do not plan to teach in the state.

Summary

This chapter dealt with two major themes: the supply of industrial arts teachers and the demand for industrial arts teachers. Briefly, the supply outlook for industrial arts has always been bad and, in spite of declining enrollments in public schools, the supply of teachers from teacher training programs has failed, and will continue to fail to meet current demands for teachers. Two important reasons for the undersupply of teachers are the decline in the number of undergraduate majors in industrial arts education and the large percentage of industrial arts education majors who do not go into teaching after they graduate, but seek higher paying jobs in industry and elsewhere instead. The demand for industrial arts teachers is influenced by several factors, among which are: the vacant positions held over because of the teacher

shortages, growth of industrial arts enrollments, and teacher turnover. There has been a trend over the last several decades of industrial arts enrollments annually including a larger percentage of the total secondary school enrollment. Each year, a sizeable number of teaching positions remain unfilled or are filled with someone other than qualified industrial arts teachers. The exact number of positions that fall into each of these categories is unknown. Industrial arts teachers have been and will continue to be highly mobile in their careers, a factor which increases the teacher turnover rate. The turnover of teachers is the single largest factor which contributes to the annual demand for new industrial arts teachers. The imbalance between supply and demand has created several problems for the profession. It is public school children who ultimately are deprived the most from the reduction in the quantity and quality of instruction which is the result of continued shortages of teachers.

Chapter 3

THE DESIGN OF THE STUDY

Introduction

This study has two major dependent variables, the supply of industrial arts teachers and the demand for industrial arts teachers. Once values for these two variables had been determined they were used to describe the state of balance between the supply of and demand for industrial arts teachers. This chapter identifies the variables, the methods and instruments used to collect data, and the procedures used in analyzing the data. In addition, other data which were collected to answer various research questions described in the first chapter are identified, as are the procedures that were used in the analysis of the data.

Supply Model

The supply model used to determine the supply of teachers for the 1977-78 school year combined elements of all three of the models presented in the previous chapter. The basic equation remained essentially the same.

$$S_{(X + 1)} = S_X + (INFLO) - (OUTFLO).$$

When an initial survey was developed and sent to a panel of experts to be validated, the expanded model that Boyett and Thomas (1977) used was found to be too detailed for the current level of data collection in the various state departments of education. A discussion of the validation process may be found in a later section of this chapter.

The expanded formula that was subsequently used is illustrated in the following:

$$S_{(X+1)} = (E_{clm} + E_{clf} + U_{cl}) + TGINSTA + TGOUTSTA + TGOTHER - OUTFLO$$

where,

$S_{(X+1)}$ = supply of industrial arts teachers for 1977-78

E_{clm} = number of certified male teachers employed in 1976-77

E_{clf} = number of certified female teachers employed in 1976-77

U_{cl} = number of 1976-77 industrial arts graduates who were unable to obtain an industrial arts position in 1977-78

TGINSTA = number of industrial arts graduates from 1976-77 who were hired in 1977-78 in the state where they graduated

TGOUTSTA = number of industrial arts graduates from 1976-77 who were hired in 1977-78 outside the state where they graduated

TGOTHER = number of industrial arts teachers who were initially hired in 1977-78 from sources other than new graduates

OUTFLO = teacher turnover from the 1976-77 to the 1977-78 school year.

Demand Model

The model used in this study to determine the 1977-78 demand for industrial arts teachers was taken from Copa and Korpi (1974). It may be defined simply as the demand for 1977-78 since data were collected for that year after the fact instead of being projected as Copa and Korpi had used the model. Their model which is given below was used to determine the annual growth rate in the demand for industrial arts teachers.

DEMAND IN 1976-77 (+ or -) GROWTH/DECLINE = DEMAND IN 1977-78

The fully expanded formula used in this study is described below in

three parts: 1) demand in 1976-77; 2) demand in 1977-78; and, 3) growth or decline.

1) Demand in 1976-77 (represented by the variable, DEM7677)

$$DEM7677 = E_{clm} + E_{clf} + E_{ulmt} + E_{ulft} + E_{ulmn} + E_{ulfn} + V_1$$

where,

E_{clm} = certified male teachers employed in 1976-77

E_{clf} = certified female teachers employed in 1976-77

E_{ulmt} = emergency or temporary certified male teachers employed in 1976-77

E_{ulft} = emergency or temporary certified female teachers employed in 1976-77

E_{ulmn} = non-certified male teachers employed in 1976-77

E_{ulfn} = non-certified female teachers employed in 1976-77

V_1 = vacant positions in 1976-77.

2) Demand in 1977-78 (represented by the variable, DEM7778)

$$DEM7778 = E_{c2m} + E_{c2f} + E_{u2mt} + E_{u2ft} + E_{u2mn} + E_{u2fn} + (V_{2a} \text{ or } V_{2b})$$

where,

E_{c2m} = certified male teachers employed in 1977-78

E_{c2f} = certified female teachers employed in 1977-78

E_{u2mt} = emergency or temporary certified male teachers employed in 1977-78

E_{u2ft} = emergency or temporary certified male teachers employed in 1977-78

E_{u2mn} = non-certified male teachers employed in 1977-78

E_{u2fn} = non-certified female teachers employed in 1977-78

V_{2a} = vacant positions in 1977-78, reported in Standards Project

survey of state industrial arts supervisors

V_{2b} = vacant positions in 1977-78, calculated from values given in a survey of state industrial arts supervisors in this study.

The variable, V_2, was given two values in the demand model for 1977-78. The variable, V_{2b}, was calculated from four questions on the supervisor's survey, including a question on the number of abolished positions which is a hidden demand for teachers. The variable, V_{2b}, is described in the following equation:

$$V_{2b} = OUTFLO + NEWJOBS + ABOLISH - INFLO$$

where,

$$TOUTFLO = (E_{clm} + E_{clf} + E_{ulmt} + E_{ulft} + E_{ulmn} + E_{ulft}) \times TURNOVER$$

NEWJOBS = new positions initially opened in 1977-78

INFLO = new positions and turnover positions filled in 1977-78 by qualified teachers

ABOLISH = positions abolished because schools could not obtain qualified industrial arts teachers

TURNOVER = teacher turnover rate (percentage) for the period between 1976-77 and 1977-78.

The TOUTFLO factor was calculated from the number of industrial arts teachers who were employed in 1976-77 times the teacher turnover rate for that year.

Groups Surveyed

The two groups who were surveyed to collect data for the supply and demand models were the department heads of industrial arts education teacher education programs across the United States and the state

industrial arts supervisors. The institutions that had industrial arts teacher education programs were identified from the Industrial Teacher Education Directory, 1978-79 (Dennis, 1978). The directory listed 148 institutions which were cited as having "industrial arts education" or "industrial arts" graduates. All of these institutions were included in the survey, as well as an additional 57 institutions that listed graduates under the headings of "industrial education" and "technical education." In all, 205 institutions were surveyed. These four headings were identified as the only headings in the directory which made reference to industrial arts education. These headings were initially verified through a check of institutions that were known to prepare industrial arts education teachers. Surveys that were returned were listed under each of these headings.

The second group of persons to be surveyed were the state and territory industrial arts supervisors, or the state level supervisor responsible for industrial arts education in states that had no supervisor. The group surveyed consisted of supervisors from all fifty states, the District of Columbia, and the territory of Puerto Rico, totaling fifty-two. The list of supervisors is included as Appendix B.

Collection of Data

Data used during this study were obtained from a survey of department heads of institutions that prepare industrial arts education teachers and two surveys of state industrial arts supervisors. One of the surveys of state industrial arts supervisors was conducted by the Standards for Industrial Arts Education Project during April and May of

1979, just prior to this study's survey of the same group. Since much of the data needed had just been collected and were available in raw form, the survey conducted in this study was greatly reduced. The questions which were used from the Standards Project survey are given in Appendix D; the survey used in this study is given in Appendix C; the teacher education institution survey is given as Appendix G.

Method of Data Collection

Mailing address labels for the department heads of the teacher training institutions were obtained from the Industrial Teacher Education Directory. The survey instrument, cover letter, directions, and definitions of terms were mailed to each subject, along with a pre-addressed, stamped envelope for the return of the survey. Three weeks later a new survey and pre-addressed envelope were sent to all non-respondents; four weeks later the same procedure was repeated; and three weeks after that a third follow-up letter and new survey package were sent to the non-respondents, along with a pre-addressed, stamped envelope. The names and addresses for state supervisors were obtained from the Standards for Industrial Arts Education Project. A similar mailing and follow-up procedure was followed for that group, with a telephone follow-up being used as the last stage of follow-up. A non-response survey which had been planned in the event that an eighty percent response was not obtained did not have to be implemented because the final response rates exceeded this figure. Response rates are discussed in the next chapter.

Instrumentation

The three survey instruments consisted of open-ended, fill-in-the-

blank questions which called for data that should have been available to the respondents through their respective data and record-keeping services. The section on analysis of data contains references to the specific survey questions as they were applied to the research questions. The Standards Project's State and Territorial Supervisor's Survey was developed by the project staff during 1978-79 with input from a national advisory committee which consisted of eighteen members who are prominent in industrial arts, vocational education, and other areas of education. The survey was further refined through an exhaustive clearance process required in order to obtain approval from the United States Office of Education to conduct the survey.

Panel of experts. A panel of eight state industrial arts supervisors were solicited to validate an initial state supervisor's survey instrument. The supervisors who validated the instrument have an asterisk beside their names in the list in Appendix B. The validation package is illustrated in Appendix I which also contains a summary of the responses from the seven supervisors who completed and returned the surveys. Since most of the supervisors did not have any data for many of the initial questions, the survey had to be completely revised. For example, instead of computing the teacher turnover rate from various factors, a figure for the teacher turnover rate was requested. Instead of asking for data on six sources of teachers, three were requested, with four of the earlier sources being included in an "other" category. Another possible concern was the response burden of the initial survey. It took about an hour which was determined to be too long in light of the numbers of surveys

that supervisors routinely received. The revised survey required less than fifteen minutes to complete if data were available.

Analysis of Data

The following descriptions of the analysis of survey data are outlined according to the demand model, supply model, and other research questions. The variables not defined previously are defined where they are used in the analysis of data.

Analysis of Demand Model Data

The data used to calculate demand came from the Standards Project's and this study's surveys of state and territorial industrial arts supervisors. The data for the demand variables used in the demand model, defined on page 71, were substituted into the following equations to determine the demand for industrial arts teachers in 1976-77 and 1977-78, with growth or decline being determined from these figures. The final equation was:

$$GRODEC = DEM7778 - DEM7677$$

where,

$GRODEC$ = growth or decline from 1976-77 to 1977-78

$$DEM7778 = E_{c2m} + E_{c2f} + E_{u2mt} + E_{u2ft} + E_{u2mn} + E_{u2fn} + (V_{2a} \text{ or } [OUTFLO + NEWJOBS + ABOLISH - INFLO])$$

$$DEM7677 = E_{c1m} + E_{c1f} + E_{ulmt} + E_{ulft} + E_{ulmn} + E_{ulfn} + V_1$$

The demand in 1977-78 was calculated twice, once using vacancies reported on the Standards Project survey and once using data from this study's survey on abolished positions, teacher turnover, new positions, and newly hired teachers. Both values were used to determine growth in demand.

If there had been sufficient data the figure found using this study's data would have been a better figure because it included factors not addressed in the Standards Project's determination of teacher shortages.

Analysis of Supply Model Data

The supply model data were obtained from all three surveys and applied to the following equation:

$$S_{(X+1)} = (E_{clm} + E_{clf} + U_{cl}) + (TGINSTA + TGOUTSTA + TGOTHER) - (OUTFLO).$$

Only the variables, E_{clm}, E_{clf}, and U_{cl}, were used because they represented the fully qualified teachers who were employed or available for positions in 1976-77. Other teachers who were employed as industrial arts teachers, but did not meet certification requirements in industrial arts education, were not included in the supply of teachers for 1977-78. The variables, TGINSTA, TGOUTSTA, and TGOTHER, represented the number of newly hired industrial arts teachers for 1977-78. The factor, OUTFLO, which incorporated the teacher turnover rate, was used to represent the number of fully certified teachers who left their industrial arts positions at the end of the 1976-77 school year. The mean for all surveys for the turnover rate was used for the variable, TURNOVER, on the surveys that did not contain a response on that question. The equation for OUTFLO was: $OUTFLO = (E_{clm} + E_{clf}) \times TURNOVER$.

Determination of Teacher Shortage for 1977-78

The final determination of the industrial arts teacher shortages for 1977-78 was made by subtracting the supply for 1977-78 from the demand for 1977-78. The equation for that calculation is given below.

SHORTAGE = DEM7778 - $S_{(X + 1)}$.

Since the variable DEM7778 had two values as the result of using two values for the number of vacancies (V_{2a} and V_{2b}), two figures were computed for the shortage in 1977-78. Both figures take into consideration teacher certification and abolished positions to make a more accurate representation of the shortage of industrial arts teachers for the 1977-78 year than the figure being used by the U.S. Office of Education.

Additional Analysis of Data

Some of the data previously used in the supply and demand models and additional data collected on the three surveys provided the means for answering the following research questions.

Proportions of male and female industrial arts teachers. The proportions of male and female teachers in the general population of industrial arts teachers were determined for the 1976-77 and 1977-78 school years from the Standards Project's survey data. The proportions, by sex and year, were calculated in the following manner:

MALEPRO1 = MALE7677/TOT7677

MALEPRO2 = MALE7778/TOT7778

FEMAPRO1 = FEMA7677/TOT7677

FEMAPRO2 = FEMA7778/TOT7778

where,

MALEPRO1 = proportion of male teachers for 1976-77

MALEPRO2 = proportion of male teachers for 1977-78

FEMAPRO1 = proportion of female teachers for 1976-77

FEMAPRO2 = proportion of female teachers for 1977-78

$$MALE7677 = E_{c1m} + E_{c1mt} + E_{u1mn}$$

$$MALE7778 = E_{c2m} + E_{c2mt} + E_{u2mn}$$

$$FEMA7677 = E_{c1f} + E_{c1ft} + E_{u1fn}$$

$$FEMA7778 = E_{u2f} + E_{u2ft} + E_{u2fn}$$

$$TOT7677 = E_{c1m} + E_{c1f} + E_{u1mt} + E_{u1ft} + E_{u1mn} + E_{u1fn}$$

$$TOT7778 = E_{c2m} + E_{c2f} + E_{u2mt} + E_{u2ft} + E_{u2mn} + E_{u2fn}.$$

The E subscript variables were defined previously. The proportions were calculated for the total number of teachers who were employed in those school years regardless of their certification status.

Proportion of fully certified and less than fully certified teachers. The proportions of fully certified and less than fully certified industrial arts teachers were determined for the 1976-77 and 1977-78 school years from the Standards Project's survey data. The state supervisors who validated this study's supervisor's survey indicated the categories of emergency, temporary, and non-certified may not be distinguishable in many states. Since all of these categories were perceived in this study to be classifications of teachers who were not wholly prepared to teach industrial arts education, these data were grouped into a category called less than fully certified. Subsequently, these categories of teachers were not included in the determination of teacher supply for 1977-78. The calculation of the proportions in the two categories was done in the following way:

$$CERTPRO1 = (E_{c1m} + E_{c1f})/TOT7677$$

$$CERTPRO2 = (E_{c2m} + E_{c2f})/TOT7778$$

$$UNDCERT1 = 1 - CERTPRO1$$

UNDCERT2 = 1 - CERTPRO2

where,

CERTPRO1 = proportion of fully certified teachers in 1976-77

CERTPRO2 = proportion of fully certified teachers in 1977-78

UNDCERT1 = proportion of less than fully certified teachers in 1976-77

UNDCERT2 = proportion of less than fully certified teachers in 1977-78.

Proportion of potential teachers who went into teaching. The number of 1976-77 graduates in industrial arts education was obtained from the teacher training institution survey for use as part of the source of teachers for the 1977-78 school year. As indicated earlier, the total number of graduates with bachelor's and master's degrees is not a realistic figure for the supply of new industrial arts teachers because many of them never go into teaching. The proportion of those who went into teaching was determined for: recipients of bachelor's degrees, recipients of master's degrees, a combination of bachelor's and master's degrees, teachers who gained certification without obtaining a degree, and a combination of all three categories to get the total proportion of all new potential teachers for 1977-78 who went into teaching. The equation for the calculation of the proportion of 1976-77 graduates with bachelor's degrees who accepted teaching positions in 1977-78 (ACC7677B) was:

$$ACC7677B = (Q_{2a1} + Q_{2b1})/Q_{1b}$$

where,

Q_{2a1} = graduates with bachelor's degrees who accepted teaching

positions in the state where they obtained their degree

Q_{2b1} = graduates with bachelor's degrees who accepted teaching positions outside the state where they obtained their degree

Q_{1b} = graduates with bachelor's degrees in 1976-77.

The equation for the calculation of the proportion of 1976-77 graduates with master's degrees who accepted their initial industrial arts teaching position in 1977-78 (ACC7677M) was:

$$ACC7677M = (Q_{2a2} + Q_{2b2})/Q_{1c}$$

where,

Q_{2a2} = graduates with master's degrees who accepted their initial teaching positions in the state where they obtained the degree

Q_{2b2} = graduates with master's degrees who accepted their initial teaching positions outside the state where they obtained the degree

Q_{1c} = graduates with master's degrees in 1976-77.

The proportion for a combination of bachelor's and master's degrees (ACC7677) was determined as follows:

$$ACC7677 = (Q_{2a1} + Q_{2b1} + Q_{2a2} + Q_{2b2})/(Q_{1b} + Q_{1c}).$$

Teachers from other fields who gained certification. Another source of new industrial arts teachers which the study sought to quantify was teachers from other teaching fields who gained certification in industrial arts education. Those who gained certification and obtained a degree were counted under the appropriate degree category. Those who did not obtain a degree were identified separately on the teacher training

institution survey. The proportion of those teachers who obtained industrial arts teaching positions (MOBILITY) was determined in the following way:

$$\text{MOBILITY} = (Q_{7a} + Q_{7b})/Q_6$$

where,

Q_{7a} = teachers from other fields who gained certification in industrial arts education who held industrial arts positions in the state where they became certified in industrial arts

Q_{7b} = teachers from other fields who gained certification in industrial arts education who held industrial arts positions outside the state where they became certified

Q_6 = teachers from other fields who gained certification in industrial arts education in 1976-77.

The total proportion for all new potential teachers for 1977-78 who accepted industrial arts teaching positions (TOTALACC) was calculated as:

$$\text{TOTALACC} = (Q_{2a1} + Q_{2a2} + Q_{2b1} + Q_{2b2} + Q_{7a} + Q_{7b})/(Q_{1b} + Q_{1c} + Q_6).$$

The percentage of all the new potential teachers who were available and accepted industrial arts teaching positions in public schools was a rather complete figure to represent the supply of new teachers for 1977-78. Since presumably not all states suffered from teacher shortages, questions related to localized oversupply were included on the teacher training institution survey. The number of potential teachers who were unable to obtain a position, U_{c1}, and the number of graduates who were unwilling to move from their existing locations to obtain an industrial arts teaching position, Q_3, were reported. Though these numbers are quite small in comparison to the total, they described a potential source

of teachers.

Mobility of industrial arts graduates. Some new information was obtained from the surveys in regard to the mobility of industrial arts education graduates. Data from the teacher training institution survey and the state supervisor's survey allowed for the separate determination of the proportions of graduates who accepted teaching positions in the state where they graduated and those who accepted positions outside the state where they graduated. The equation for the determination of those who remained in state from the teacher training institution survey (INSTATE1) was calculated as:

$$INSTATE1 = (Q_{2a1} + Q_{2a2} + Q_{7a})/(Q_{2a1} + Q_{2a2} + Q_{2b1} + Q_{2b2} + Q_{7a} + Q_{7b}).$$

The same determination from the state supervisor's survey data (INSTATE2) was calculated as:

INSTATE2 = TGINSTA/(TGINSTA + TGOUTSTA).

The proportion of graduates who accepted positions out of state was determined from the teacher training institution survey (OUTSTA1) in the following manner:

OUTSTA1 = 1 - INSTATE1.

The same proportion was determined from the state supervisor's survey data as:

OUTSTA2 = 1 - INSTATE2.

Proportion of undergraduate student capacity currently being utilized. The last aspect of the supply of industrial arts teachers to be addressed in this study was the present capacity of teacher education undergraduate programs and their present enrollments. The review of

literature presented some evidence to suggest that the reasons for the teacher shortages in industrial arts were graduates not going into education and high rates of teacher turnover for those who did go into teaching. Both of these issues have been extensively addressed in this study. The current enrollment trends suggested another cause, that of insufficient enrollments. This was touched upon in the study only to provide more insight into the possible causes of the shortages so that planners who are attempting to solve the problem may see the problem more fully. The proportion of capacity currently being utilized (UTILIZED) was calculated as

$$\text{UTILIZED} = Q_{8b}/Q_{8a}$$

where,

Q_{8b} = undergraduate students presently enrolled in industrial arts education

Q_{8a} = undergraduate students who presently could be enrolled in industrial arts education with present facilities.

Summary

Three surveys were utilized in this supply and demand study to determine the magnitude of the teacher shortage in industrial arts education for 1977-78. The two groups surveyed were the department heads of 205 teacher education institutions that prepared industrial arts education teachers, and the state or territorial industrial arts supervisor from all fifty states, the District of Columbia, and Puerto Rico. Part of the data that were used were collected by the Standards for Industrial Arts Education Project at Virginia Polytechnic Institute and State University.

This chapter described the methods used to collect and analyze data to determine supply and demand. Analytical procedures used to determine factors such as the teacher turnover rate, the sex and certification of teachers, annual growth in the demand for teachers, the proportion of graduates who go into teaching, the mobility of graduates in state and out of state, and the current utilization of undergraduate industrial arts teacher education facilities were also described and discussed.

Chapter 4

RESULTS OF THE STUDY

Introduction

The research questions addressed in this study included the following:

1. What was the national demand for qualified industrial arts teachers during the 1976-77 and 1977-78 school years?
2. What was the national supply of qualified industrial arts teachers for the 1977-78 school year?
3. What was the state of balance between the supply of and demand for industrial arts teachers in 1977-78?
4. What was the annual growth in the national demand for qualified industrial arts teachers from 1976-77 to 1977-78?
5. What is the national teacher turnover rate for industrial arts teachers?
6. What proportion of industrial arts teachers are male and what proportion are female?
7. What proportion of industrial arts teachers are fully certified and what proportion are less than fully certified?
8. What proportion of new potential industrial arts teachers accept industrial arts teaching positions?
9. What proportions of industrial arts education graduates who accept teaching positions do so in the state where they graduate or in another state?
10. What proportion of the undergraduate industrial arts education student capacity is currently being utilized?

Survey Return Rates

State Industrial Arts Supervisors' Survey

Of the fifty-two state industrial arts supervisors' surveys that were sent out, forty-seven (90.4%) were returned. Fourteen of these surveys had no data in addition to the data returned on the Standards Project survey; three surveys that were returned blank to the Standards Project were also returned without data. Data that were received by the Standards Project from three additional states that did not respond to this study were also used. In total, forty-seven states supplied some data that were used in the study.

Teacher Education Institution Survey

Of the 205 surveys that were sent to industrial arts teacher education institutions; 182 (or 88.8%) were returned; 175 (or 85.4%) of the surveys were returned with two or more of the questions answered. Two surveys contained no data; four institutions had no industrial arts teacher education program; one institution did not have a teacher education program during the period under study.

Demand for Teachers

A determination was made for only a portion of the demand for industrial arts teachers in 1976-77 and 1977-78 because of the lack of data on many of the surveys.

Demand in 1976-77

The demand for teachers in 1976-77 included vacancies as well as certified and less than fully certified teachers who were employed in

that year, as indicated in the formula:

$$DEM7677 = E_{clm} + E_{clf} + E_{ulm} + E_{ulf} + V_1.$$

The variables, E_{ulm} and E_{ulf}, contained both the male/female teachers who held emergency-temporary certification or were uncertified. Twenty-nine states provided enough data to determine teacher demand in 1976-77. Table 3 shows that 38,020 teachers were needed in those states. The totals for the variables used in the calculations were:

1) E_{clm} - 44,075 certified male teachers were employed in forty states;

2) E_{clf} - 435 certified female teachers were employed in thirty-three states, with six additional states reporting that no females were employed;

3) E_{ulm} - 995 less than fully certified male teachers were employed in twenty states, with seventeen additional states reporting that no less than fully certified male teachers were employed in 1976-77;

4) E_{ulf} - thirteen female teachers with less than full certification were employed in four states, with thirty-one states reporting that no female teachers with less than full certification were employed in 1976-77.

Demand in 1977-78

Teacher demand for 1977-78 was calculated using two values for the number of vacant positions in that year, V_{2a} and V_{2b}. The formula for those calculations was:

$$DEM7778 = E_{c2m} + E_{c2f} + E_{u2m} + E_{u2f} + (V_{2a} \text{ or } V_{2b}).$$

The variable E_{c2m} contained the sum of E_{u2mt} plus E_{u2mn}; the variable E_{u2f} contained the sum of E_{u2ft} plus E_{u2fn}. The demand for 1977-78 using

TABLE 3

Teacher Demand in 1976-77

State	Fully Certified		Less than Fully Certified		Vacancy in 76-77	Demand in 76-77
	Males 76-77 Ec1m	Females 76-77 Ec1f	Males 76-77 Eu1m	Females 76-77 Eu1f	V1	DEM7677
ALABAMA	140	4	23	0	0	167
ALASKA	210	8	40	.	.	.
ARIZONA	814	2	.	.	10	.
ARKANSAS	100	0	0	0	3	103
CALIFORNIA	6945	101	0	0	84	7130
COLORADO	960	9	0	0	0	969
CONNECTICUT	.	.	.	.	.	.
DELAWARE	190	0	0	0	0	190
WASH. D.C.	105	3	0	0	5	113
FLORIDA	1169	23	70	0	0	1262
GEORGIA	581	9	6	0	40	636
HAWAII	220	1	2	0	.	.
IDAHO	260	0	.	.	0	.
INDIANA	2200	3	0	0	89	2292
IOWA	1051	2	12	.	16	.
KENTUCKY	565	3	0	0	6	574
LOUISIANA	560	7	.	.	35	.
MAINE	420	6	12	0	.	.
MARYLAND	.	.	.	.	.	.
MASS.	.	3	350	0	.	.
MICHIGAN	3365	29	0	0	.	.
MINNESOTA	1540	3	0	0	0	1543
MISSISSIPPI	268	.	6	0	10	.
MISSOURI	1275	8	0	0	42	1325
MONTANA	225	0	0	0	2	227
NEBRASKA	.	.	.	.	4	.
NEVADA	18	0	0	0	0	18
NEW HAMP.	326	.	0	0	.	.
NEW JERSEY	2700	8	60	0	0	2768
NEW MEXICO	307	0	2	0	5	314
NEW YORK	4314	70	65	1	60	4510
N. CAROLINA	583	15	5	10	12	625
N. DAKOTA	191	1	0	0	4	196
OHIO	2925	8	26	0	0	2959
OKLAHOMA	455	4	0	0	5	464
OREGON	950	1	0	0	5	956
PENN.	3022	25	30	0	50	3127
PUERTO RICO	569	18	76	0	9	672
RHODE ISL.	.	.	.	.	.	.
S. DAKOTA	.	.	.	.	.	.
TENNESSEE	460	5	52	1	10	528
TEXAS	2229	44	14	1	265	2553
UTAH	458	1	12	0	0	471
VERMONT	204	1	0	0	0	205
VIRGINIA	971	8	132	0	12	1123
WASHINGTON	.	.	.	.	0	.
WYOMING	230	2	.	.	3	.
Totals	44075	435	995	13	786	38020
Valid cases	40	39	37	35	37	29
Missing cases	7	8	10	12	10	18

V_{2a} (DEM7778a) which was the vacancies reported on the Standards Project data is illustrated in Table 4. For the twenty-nine states that reported sufficient data to make the calculations the demand was for 36,254 teachers. The totals for the variables included in the formula were:

1) E_{c2m} - 48,940 certified male teachers were employed in forty-three states;

2) E_{c2f} - 519 certified female teachers were employed in thirty-five states, with five states reporting that no certified female teachers were employed;

3) E_{u2m} - 638 less than fully certified male teachers were employed in eighteen states, with eighteen additional states reporting that no less than fully certified male teachers were employed;

4) E_{u2f} - fifteen female teachers with less than full certification were employed in four states, with thirty-one states reporting that no female teachers with less than full certification were employed;

5) V_{2a} - 801 vacant positions were reported in twenty-nine states, with nine states reporting no vacant positions in 1977-78.

Teacher demand using V_{2b}, vacancies calculated from four variables on the supervisors' survey, which are shown in Table 4, was demonstrated to be 26,599 teachers in twenty-one states. The remaining twenty-six states lacked sufficient data to make a determination of demand using the formula for V_{2b}. The formula for V_{2b} was:

$$V_{2b} = \text{TOUTFLO} + \text{NEWJOBS} + \text{ABOLISH} - \text{INFLO}.$$

The totals for the five variables used in the formula, shown in Table 5, were:

1) TOUTFLO - 3,410 positions were vacated because of teacher

TABLE 4

Teacher Demand in 1977-78

State	Fully Cert		Less Than Fully Cert		Vacancy in	Demand in	Vacancy in	Demand in
	Male 77-78 Ec2m	Female 77-78 Ec2f	Male 77-78 Eu2m	Female 77-78 Eu2f	77-78 V2a	77-78 DEM7778a	77-78 V2b	77-78 DEM7778b
ALABAMA	185	6	23	0	0	214	0	214
ALASKA	220	8	40	.	.	.	.	.
ARIZONA	823	1	.	.	8	.	.	.
ARKANSAS	100	0	0	0	5	105	3	103
CALIFORNIA	7146	136	0	0	61	7343	146	7428
COLORADO	950	10	0	0	0	960	0	960
CONNECTICUT	1215	6	.	.	.	.	.	.
DELAWARE	190	0	0	0	1	191	0	190
WASH. D.C.	100	3	0	0	3	106	.	.
FLORIDA	1233	20	35	0	10	1298	35	1323
GEORGIA	581	10	7	0	30	628	18	616
HAWAII	225	1	4	0	1	231	.	.
IDAHO	249	0	.	.	0	.	0	.
INDIANA	2240	.	0	0	75	.	46	.
IOWA	1051	5	15	.	22	.	.	.
KENTUCKY	575	2	0	0	4	581	0	577
LOUISIANA	530	10	.	.	50	.	165	.
MAINE	420	6	10	0	.	.	2	438
MARYLAND	.	.	.	0	.	.	.	.
MASS.	2000	5	.	0	.	.	.	.
MICHIGAN	3284	24	0	0	.	.	.	.
MINNESOTA	1510	1	0	0	0	1511	.	.
MISSISSIPPI	274	.	0	0	12	.	8	.
MISSOURI	1255	11	0	0	47	1313	21	1287
MONTANA	228	1	0	0	2	231	.	.
NEBRASKA	.	.	.	.	6	.	.	.
NEVADA	20	0	0	0	0	20	13	33
NEW HAMP.	326	.	0	0	.	.	0	.
NEW JERSEY	2800	15	40	0	0	2855	0	2855
NEW MEXICO	303	0	2	0	6	311	6	311
NEW YORK	4289	88	47	1	50	4475	12	4437
N. CAROLINA	580	18	8	12	16	634	.	.
N. DAKOTA	186	1	0	0	6	193	11	198
OHIO	2900	12	33	0	15	2960	.	.
OKLAHOMA	461	5	0	0	8	474	.	.
OREGON	950	2	0	0	8	960	21	973
PENN.	3032	25	20	0	40	3117	.	.
PUERTO RICO	548	19	76	0	8	651	.	.
RHODE ISL.	.	.	.	.	.	.	.	.
S. DAKOTA	.	.	.	.	.	.	.	.
TENNESSEE	456	6	57	1	12	532	13	533
TEXAS	2087	42	27	1	270	2427	22	2179
UTAH	436	1	10	0	0	447	5	452
VERMONT	220	1	0	0	0	221	0	221
VIRGINIA	1049	12	184	0	20	1265	26	1271
WASHINGTON	1472	4	.	.	0	.	.	.
WYOMING	241	2	.	.	5	.	0	.
Totals	48940	519	638	15	801	36254	573	26599
Valid cases	43	40	36	35	38	29	27	21
Missing cases	4	7	11	12	9	18	20	26

turnover during or after the 1976-77 school year in forty-one states;

2) NEWJOBS - 600 new positions were initially opened and filled with qualified teachers in 1977-78 in twenty-five states, with five additional states reporting no new positions;

3) ABOLISH - 200 positions were abolished in fifteen states in 1977-78 because qualified teachers could not be obtained, with fourteen additional states reporting no abolished positions;

4) INFLO - 2,130 new and vacated positions were filled by qualified teachers in twenty-eight states;

5) V_{2b} - 573 vacancies were calculated for twenty-seven states.

The values for V_{2a} and V_{2b}, shown in Table 4, match in only six states. The values for V_{2b}, which included abolished positions and excluded less than fully certified teachers, are different in nineteen states, with the values for V_{2b} being higher in nine states and lower in ten states. In the twenty-five states where V_{2a} and V_{2b} were both determined the vacancies were 672 and 571 respectively. The three states having the greatest discrepancy between the two values were California, Louisiana, and Texas. The calculated value for V_{2b} appears to be the conservative figure of the two, but the difference could have resulted solely from inconsistencies and/or inaccuracies in data reported. The value for V_{2b} would more than likely have been larger because the calculations took other factors into consideration in addition to positions which were not occupied.

Supply of Qualified Teachers in 1977-78

The formula used to calculate the supply of qualified teachers

TABLE 5

Calculation of Vacancies in 1977-78

State	Teachers Who Left Prof in 76-77 TOUTFLO	Used an Estimate Turnover Rate ESTIMATE	New IA Position in 77-78 NEWJOBS	Newly Hired in 77-78 INFLO	Positions Abolished in 77-78 ABOLISH	Teacher Vacancy in 77-78 V2b
ALABAMA	21	.	2	23	0	0
ALASKA	28	1	.	.	.	.
ARIZONA	87	1	.	.	.	.
ARKANSAS	10	.	5	15	3	3
CALIFORNIA	140	.	236	230	0	146
COLORADO	125	.	10	135	0	0
CONNECTICUT	.	.	.	.	.	.
DELAWARE	10	.	0	10	0	0
WASH. D.C.	12	1	.	.	.	.
FLORIDA	100	.	90	175	20	35
GEORGIA	101	.	8	102	11	18
HAWAII	24	1	.	.	.	.
IDAHO	27	.	6	33	0	0
INDIANA	33	.	10	43	46	46
IOWA	114	1	.	.	.	.
KENTUCKY	15	.	8	23	0	0
LOUISIANA	162	.	5	40	38	165
MAINE	66	.	3	68	1	2
MARYLAND	.	.	.	.	.	.
MASS.	38	1	.	.	.	.
MICHIGAN	363	1	.	.	.	.
MINNESOTA	165	1	.	.	.	.
MISSISSIPPI	20	.	12	28	4	8
MISSOURI	125	.	11	120	5	21
MONTANA	24	1	.	.	.	.
NEBRASKA	.	.	.	.	.	.
NEVADA	10	.	15	12	0	13
NEW HAMP.	32	.	3	35	0	0
NEW JERSEY	150	.	25	175	0	0
NEW MEXICO	30	.	0	28	4	6
NEW YORK	180	.	12	180	0	12
N. CAROLINA	59	.	12	.	4	.
N. DAKOTA	29	.	12	34	4	11
OHIO	147	.	0	.	30	.
OKLAHOMA	69	.	7	76	.	.
OREGON	75	.	12	70	4	21
PENN.	329	1	.	.	.	.
PUERTO RICO	71	1	.	.	.	.
RHODE ISL.	.	.	.	.	.	.
S. DAKOTA	.	.	.	.	.	.
TENNESSEE	35	.	6	34	6	13
TEXAS	212	.	25	235	20	22
UTAH	21	.	10	26	0	5
VERMONT	6	.	0	6	0	0
VIRGINIA	125	.	45	144	0	26
WASHINGTON	.	.	.	.	.	.
WYOMING	20	.	10	30	0	0
Totals	3410	14	600	2130	200	573
Valid cases	41	14	30	28	29	27
Missing cases	6	33	17	19	18	20

available in 1977-78 was:

$$S_{(x+1)} = (E_{clm} + E_{clf} + U_{cl}) + TGINSTA + TGOUTSTA + TGOTHER - OUTFLO.$$

Table 6 contains the totals for six of the variables in the right side of the equation, along with the values for $S_{(x+1)}$. The variable, U_{cl}, which was the number of 1976-77 graduates who were unable to obtain an industrial arts teaching position in 1977-78, was found to be about seventy-five graduates from the teacher education institution survey (162 institutions responding). The supply of qualified teachers was determined to be 24,130 (plus the seventy-five graduates above) for the twenty-three states that had sufficient data to make the calculation. The variables E_{clm} and E_{clf} were discussed previously; the totals for the other variables were:

1) TGINSTA - 1,404 graduates from 1976-77 were hired in the state where they graduated in twenty-seven states, with one additional state reporting there were no 1976-77 in-state graduates hired in 1977-78;

2) TGOUTSTA - 542 graduates from 1976-77 were hired outside the state where they graduated in twenty-four states, with two additional states reporting there were no 1976-77 out-of-state graduates hired in 1977-78;

3) TGOTHER - nine states initially hired seventy-one qualified teachers other than 1976-77 graduates in 1977-78. In addition, fifteen states reported that no one in this category was hired;

4) OUTFLO - in forty states it was calculated that 3,316 qualified, practicing teachers left the industrial arts teaching profession during or at the end of the 1976-77 school year. The variable, OUTFLO, was calculated in the following manner:

TABLE 6

Supply of Qualified Teachers in 1977-78

State	Fully Cert Male 76-77 Ec1m	Fully Cert Female 76-77 Ec1f	Hired in state 77-78 TGINSTA	Hired Out of state 77-78 TGOUTSTA	Other Grads hired 77-78 TGOTHER	Teacher Outflo in 77-78 OUTFLO	Cert Supply in 77-78 SX1
ALABAMA	140	4	23	0	0	14	153
ALASKA	210	8	.	.	.	23	.
ARIZONA	814	2	.	.	.	87	.
ARKANSAS	100	0	10	5	0	10	105
CALIFORNIA	6945	101	216	25	0	141	7146
COLORADO	960	9	85	40	10	126	978
CONNECTICUT	.	.	.	.	.	.	.
DELAWARE	190	0	4	6	0	10	190
WASH. D.C.	105	3	.	.	.	12	.
FLORIDA	1169	23	85	70	20	93	1274
GEORGIA	581	9	46	56	0	100	592
HAWAII	220	1	.	.	.	24	.
IDAHO	260	0	.	.	.	28	.
INDIANA	2200	3	40	2	1	33	2213
IOWA	1051	2	.	.	.	113	.
KENTUCKY	565	3	.	.	.	15	.
LOUISIANA	560	7	20	14	6	170	437
MAINE	420	6	68	0	0	64	430
MARYLAND	.	.	.	.	.	.	.
MASS.	.	3	.	.	.	.	.
MICHIGAN	3365	29	.	.	.	363	.
MINNESOTA	1540	3	109	.	.	165	.
MISSISSIPPI	268	.	23	5	0	20	.
MISSOURI	1275	8	100	20	0	127	1276
MONTANA	225	0	.	.	.	24	.
NEBRASKA	.	.	.	.	.	.	.
NEVADA	18	0	0	8	4	10	20
NEW HAMP.	326	.	26	.	.	32	.
NEW JERSEY	2700	8	165	10	0	144	2739
NEW MEXICO	307	0	26	2	0	30	305
NEW YORK	4314	70	.	.	.	175	.
N. CAROLINA	583	15	.	.	.	57	.
N. DAKOTA	191	1	8	10	16	30	196
OHIO	2925	8	.	.	.	147	.
OKLAHOMA	455	4	66	10	0	68	467
OREGON	950	1	25	45	0	75	946
PENN.	3022	25	.	.	.	326	.
PUERTO RICO	569	18	.	.	.	63	.
RHODE ISL.	.	.	.	.	.	.	.
S. DAKOTA	.	.	.	.	.	.	.
TENNESSEE	460	5	20	10	4	31	468
TEXAS	2229	44	92	115	0	223	2257
UTAH	458	1	25	1	0	22	463
VERMONT	204	1	2	2	2	6	205
VIRGINIA	971	8	56	80	8	.	1025
WASHINGTON	.	.	40	.	.	.	.
WYOMING	230	2	24	6	0	19	243
Totals	44075	435	1404	542	71	3316	24130
Valid cases	40	39	27	24	24	40	23
Missing cases	7	8	20	23	23	7	24

$$OUTFLO = (E_{clm} + E_{clf}) \text{ X TURNOVER.}$$

The variable, TURNOVER, is discussed in a latter section.

Shortage of Qualified Teachers in 1977-78

Teacher shortages in 1977-78 were determined in only nineteen states because of the lack of complete data in the other twenty-eight states. Shortages were calculated using the following equation:

$$\text{Shortage} = \text{DEM7778} - S_{(x+1)}.$$

Since two values were calculated for teacher demand in 1977-78, DEM7778a and DEM7778b, two values which are given in Table 7, were calculated for shortages, SHORTa and SHORTb respectively. Shortages (SHORTa) calculated from data obtained by the Standards Project (DEM7778a) totaled 950 positions in nineteen states. Three of the nineteen states showed a balanced condition and three had a negative value which would indicate a surplus of teachers. Shortages (SHORTb) were calculated from the supervisors' survey data, DEM7778b, for seventeen of the same states and two additional ones. Shortages here totaled 815, with fourteen states indicating shortages, one indicating a balance, and four indicating surpluses. Only five states matched on the values for the two shortage figures; seven states were within six positions for the two figures; figures for the other states fluctuated, as would be expected from the differences in the values for DEM7778 that were observed.

Annual Growth

The annual growth or decline in the demand for teachers during the one year period between 1976-77 and 1977-78 was calculated using the following equation:

TABLE 7

Teacher Shortages in 1977-78

State	Supply in 77-78 SX1	Demand in 77-78 DEM7778a	Demand in 77-78 DEM7778b	Shortage in 77-78 SHORTa	Shortage in 77-78 SHORTb
ALABAMA	153	214	214	61	61
ALASKA	.	.	.	.	.
ARIZONA	.	.	.	.	.
ARKANSAS	105	105	103	0	-2
CALIFORNIA	7146	7343	7428	197	282
COLORADO	978	960	960	-18	-18
CONNECTICUT	.	.	.	.	.
DELAWARE	190	191	190	1	0
WASH. D.C.	.	106	.	.	.
FLORIDA	1274	1298	1323	24	49
GEORGIA	592	628	616	36	24
HAWAII	.	231	.	.	.
IDAHO	.	.	.	.	.
INDIANA	2213	.	.	.	.
IOWA	.	.	.	.	.
KENTUCKY	.	581	577	.	.
LOUISIANA	437	.	.	.	.
MAINE	430	.	438	.	8
MARYLAND	.	.	.	.	.
MASS.	.	.	.	.	.
MICHIGAN	.	.	.	.	.
MINNESOTA	.	1511	.	.	.
MISSISSIPPI	.	.	.	.	.
MISSOURI	1276	1313	1287	37	11
MONTANA	.	231	.	.	.
NEBRASKA	.	.	.	.	.
NEVADA	20	20	33	0	13
NEW HAMP.	.	.	.	.	.
NEW JERSEY	2739	2855	2855	116	116
NEW MEXICO	305	311	311	6	6
NEW YORK	.	4475	4437	.	.
N. CAROLINA	.	634	.	.	.
N. DAKOTA	196	193	198	-3	2
OHIO	.	2960	.	.	.
OKLAHOMA	467	474	.	7	.
OREGON	946	960	973	14	27
PENN.	.	3117	.	.	.
PUERTO RICO	.	651	.	.	.
RHODE ISL.	.	.	.	.	.
S. DAKOTA	.	.	.	.	.
TENNESSEE	468	532	533	64	65
TEXAS	2257	2427	2179	170	-78
UTAH	463	447	452	-16	-11
VERMONT	205	221	221	16	16
VIRGINIA	1025	1265	1271	240	246
WASHINGTON	.	.	.	.	.
WYOMING	243	.	.	.	.
Totals	24130	36254	26599	950	815
Valid cases	23	29	21	19	19
Missing cases	24	18	26	28	28

GRODEC = DEM7778 - DEM7677.

The variable, DEM7778, assumed the two values associated with the variables, DEM7778a and DEM7778b. Values associated with the growth or decline in demand (GRODECa) using Standards Project data (DEM7778a) were calculated for twenty-eight states. These data, which are shown in Table 8, varied from a growth of 213 filled teaching positions to a decline of 126 teaching positions over the previous year. Twelve states showed declining demand while sixteen states showed growth in demand. Values associated with growth and decline (GRODECb) using the supervisors' survey (DEM7778b) were calculated for twenty states. These data, which are also shown in Table 8, varied from a growth of 298 filled teaching positions to a decline of 374 positions over the previous year. Thirteen of the twenty states for which data were available for GRODECa and GRODECb had values within five positions on the two variables. The other seven states varied more, one by 248 positions.

Teacher Turnover Rate

The average teacher turnover rate which was calculated from data from thirty states was found to be 10.7 percent from 1976-77 to 1977-78. The lowest turnover rate reported in Table 9 was 1.5 percent in Indiana; the highest turnover reported was in Nevada with 55.6 percent. The number of teachers reported in Nevada was only eighteen in 1976-77. Nevada did not have a bona fide industrial arts supervisor at the time of this study. This fact and other undocumented sources of information discovered during the study suggest the number of teachers was actually several times higher than that reported. Fortunately, the numbers of

TABLE 8

Growth in the Demand for Teachers from 1976 to 1978

State	Demand in 76-77 DEM7677	Demand in 77-78 DEM7778a	Demand in 77-78 DEM7778b	Growth in Demand 76-78 GRODECa	Growth in Demand 76-78 GRODECb
ALABAMA	167	214	214	47	47
ALASKA	.	.	.	.	.
ARIZONA	.	.	.	.	.
ARKANSAS	103	105	103	2	0
CALIFORNIA	7130	7343	7428	213	298
COLORADO	969	960	960	-9	-9
CONNECTICUT	.	.	.	.	.
DELAWARE	190	191	190	1	0
WASH. D.C.	113	106	.	-7	.
FLORIDA	1262	1298	1323	36	61
GEORGIA	636	628	616	-8	-20
HAWAII	.	231	.	.	.
IDAHO	.	.	.	.	.
INDIANA	2292	.	.	.	.
IOWA	.	.	.	.	.
KENTUCKY	574	581	577	7	3
LOUISIANA	.	.	.	.	.
MAINE	.	.	438	.	.
MARYLAND	.	.	.	.	.
MASS.	.	.	.	.	.
MICHIGAN	.	.	.	.	.
MINNESOTA	1543	1511	.	-32	.
MISSISSIPPI	.	.	.	.	.
MISSOURI	1325	1313	1287	-12	-38
MONTANA	227	231	.	4	.
NEBRASKA	.	.	.	.	.
NEVADA	18	20	33	2	15
NEW HAMP.	.	.	.	.	.
NEW JERSEY	2768	2855	2855	87	87
NEW MEXICO	314	311	311	-3	-3
NEW YORK	4510	4475	4437	-35	-73
N. CAROLINA	625	634	.	9	.
N. DAKOTA	196	193	198	-3	2
OHIO	2959	2960	.	1	.
OKLAHOMA	464	474	.	10	.
OREGON	956	960	973	4	17
PENN.	3127	3117	.	-10	.
PUERTO RICO	672	651	.	-21	.
RHODE ISL.	.	.	.	.	.
S. DAKOTA	.	.	.	.	.
TENNESSEE	528	532	533	4	5
TEXAS	2553	2427	2179	-126	-374
UTAH	471	447	452	-24	-19
VERMONT	205	221	221	16	16
VIRGINIA	1123	1265	1271	142	148
WASHINGTON	.	.	.	.	.
WYOMING	.	.	.	.	.
Totals	38020	36254	26599	295	163
Valid cases	29	29	21	28	20
Missing cases	18	18	26	19	27

TABLE 9

Teacher Turnover Rate

State	Turnover Rate (%)	State	Turnover Rate (%)
ALABAMA	9.8	MONTANA	.
ALASKA	.	NEBRASKA	.
ARIZONA	.	NEVADA	55.6
ARKANSAS	10.0	NEW HAMPSHIRE	9.8
CALIFORNIA	2.0	NEW JERSEY	5.3
COLORADO	13.0	NEW MEXICO	9.8
CONNECTICUT	.	NEW YORK	4.0
DELAWARE	5.3	NORTH CAROLINA	9.5
WASH., D.C.	.	NORTH DAKOTA	15.5
FLORIDA	7.8	OHIO	5.0
GEORGIA	16.9	OKLAHOMA	14.8
HAWAII	.	OREGON	7.9
IDAHO	10.8	PENNSYLVANIA	.
ILLINOIS	.	PUERTO RICO	.
INDIANA	1.5	RHODE ISLAND	.
IOWA	.	SOUTH CAROLINA	.
KANSAS	.	SOUTH DAKOTA	.
KENTUCKY	2.6	TENNESSEE	6.7
LOUISIANA	30.0	TEXAS	9.8
MAINE	15.0	UTAH	4.7
MARYLAND	.	VERMONT	2.7
MASSACHUSETTS	.	VIRGINIA	10.0
MICHIGAN	.	WASHINGTON	.
MINNESOTA	.	WEST VIRGINIA	.
MISSISSIPPI	7.3	WISCONSIN	.
MISSOURI	9.9	WYOMING	8.2

teachers and turnover positions were quite small and, subsequently, did not affect the average turnover rate appreciably.

The turnover rate in Louisiana, a state which has been reported as having longstanding teacher shortage problems, was 30.0 percent. The literature reviewed during this study and reported in Chapter 2 lends strong support to this figure being the highest in the nation rather than the one reported for Nevada.

The 10.7 percent average turnover rate was used to estimate the number of positions that were vacated in eleven additional states that had no data on turnover but had data on the number of teachers employed in 1976-77. The total number of positions vacated for the forty-one states, variable TOUTFLO in Table 5 on page 94, was estimated to be 3,410 teachers, with 3,316 being fully qualified and the remaining ninety-four being less than fully qualified.

The total number of industrial arts teachers was not determined in this study or the Standards Project study because of missing data, but this study determined there were at least 45,518 teachers employed in forty-one states in 1976-77 and at least 50,112 teachers employed in forty-three states in 1977-78. Using a more conservative figure of 10.0 percent for the national teacher turnover rate it can be estimated that at least 5,011 teachers left the profession in 1977-78, with a more likely possibility that 5,500 to 6,000 teachers left because of the large number of states that reported partial data or no data on the number of teachers employed.

Proportions of Male and Female Teachers

The proportions of male and female industrial arts teachers, shown in Table 10, were found to be almost the same for 1976-77 and 1977-78. The equations used in the calculations were:

$$\text{MALEPRO1} = (E_{c1m} + E_{u1m})/(E_{c1m} + E_{c1f} + E_{u1m} + E_{u1f})$$

$$\text{MALEPRO2} = (E_{c2m} + E_{u2m})/(E_{c2m} + E_{c2f} + E_{u2m} + E_{u2f})$$

$$\text{FEMAPRO1} = (E_{c1f} + E_{u1f})/(E_{c1m} + E_{c1f} + E_{u1m} + E_{u1f})$$

$$\text{FEMAPRO2} = (E_{c2f} + E_{u2f})/(E_{c2m} + E_{c2f} + E_{u2m} + E_{u2f}).$$

In 1976-77, males comprised 99.0 percent of the teachers in thirty-two states. In 1977-78, males comprised 98.9 percent of the teachers in thirty-one states. The number of female teachers was 427 in thirty-three states in 1976-77 and 498 in thirty-two states in 1977-78. Five states had fewer female teachers in 1977-78 than 1976-77; fifteen states had more female teachers in 1977-78 than 1976-77. For the twenty-five states that had data for both years the number of females increased by 15.2 percent. The percentage of females in the teaching force remained quite small, only 1.1 percent in thirty-one states in 1977-78.

Proportions of Fully Certified and Less Than Fully Certified Teachers

In 1976-77 and 1977-78, teachers with full certification comprised 97.8 percent of the teaching force in thirty-two states. The remaining 2.2 percent of the teachers were either temporarily certified or held no certification, endorsement, or license in industrial arts education. The equations used to determine these percentages were:

$$\text{CERTPRO1} = (E_{c1m} + E_{c1f})/(E_{c1m} + E_{c1f} + E_{u1m} + E_{u1f})$$

$$\text{CERTPRO2} = (E_{c2m} + E_{c2f})/(E_{c2m} + E_{c2f} + E_{u2m} + E_{u2f})$$

TABLE 10

Proportions of Male and Female Teachers

State	Male Tchr in 7677	Female Tchr in 7677	Prop Male Tchr in 7677	Prop Female Tchr in 7677	Male Tchr in 7778	Female Tchr in 7778	Prop Male Tchr in 7778	Prop Female Tchr in 7778
ALABAMA	163	4	.	.02	208	6	.97	.03
ALASKA	250	.			260	.		
ARIZONA	814	.			823	.		
ARKANSAS	100	0	1.00	.00	100	0	1.00	.00
CALIFORNIA	6945	101	.99	.01	7146	136	.98	.02
COLORADO	960	9	.99	.01	950	10	.99	.01
CONNECTICUT	.	.			1215	.		
DELAWARE	190	0	1.00	.00	190	0	1.00	.00
WASH. D.C.	105	3	.97	.03	100	3	.97	.03
FLORIDA	1239	23	.98	.02	1268	20	.98	.02
GEORGIA	587	9	.98	.02	588	10	.98	.02
HAWAII	222	1	1.00	.00	229	1	1.00	.00
IDAHO	260	.			249	.		
INDIANA	2200	3	1.00	.00	2240	.		
IOWA	1063				1066			
KENTUCKY	565	3	.99	.01	575	2	1.00	.00
LOUISIANA	560	.			530	.		
MAINE	432	6	.99	.01	430	6	.99	.01
MARYLAND								
MASS.	350	3			2000	5		
MICHIGAN	3365	29	.99	.01	3284	24	.99	.01
MINNESOTA	1540	3	1.00	.00	1510	1	1.00	.00
MISSISSIPPI	274	.			274	.		
MISSOURI	1275	8	.99	.01	1255	11	.99	.01
MONTANA	225	0	1.00	.00	228	1	1.00	.00
NEBRASKA								
NEVADA	18	0	1.00	.00	20	0	1.00	.00
NEW HAMP.	326	.			326	.		
NEW JERSEY	2760	8	1.00	.00	2840	15	.99	.01
NEW MEXICO	309	0	1.00	.00	305	0	1.00	.00
NEW YORK	4379	71	.98	.02	4336	69	.98	.02
N. CAROLINA	588	25	.96	.04	588	30	.95	.05
N. DAKOTA	191	1	.99	.01	186	1	.99	.01
OHIO	2951	8	1.00	.00	2933	12	1.00	.00
OKLAHOMA	455	4	.99	.01	461	5	.99	.01
OREGON	950	1	1.00	.00	950	2	1.00	.00
PENN.	3052	25	.99	.01	3052	25	.99	.01
PUERTO RICO	645	18	.97	.03	624	19	.97	.03
RHODE ISL.	.	.			.	.		
S. DAKOTA	.	.			.	.		
TENNESSEE	512	6	.99	.01	513	7	.99	.01
TEXAS	2243	45	.98	.02	2114	43	.98	.02
UTAH	470	1	1.00	.00	446	1	1.00	.00
VERMONT	204	1	1.00	.00	220	1	1.00	.00
VIRGINIA	1103	8	.99	.01	1233	12	.99	.01
WASHINGTON	.	.			1472	.		
WYOMING	230	.			241	.		
Totals	45070	427			49578	498		
Mean	.	.	.990	.010	.	.	.989	.011
Minimum	.	.	.959	.000	.	.	.951	.000
Maximum	.	.	1.000	.041	.	.	1.000	.049
Valid cases	41	33	32	32	43	32	31	31
Missing cases	6	14	15	15	3	15	16	16

UNDCERT1 = 1 - CERTPRO1

UNDCERT2 = 1 - CERTPRO2.

The proportions of teachers in each category for both years are given in Table 11.

A breakdown of the numbers of less than fully certified teachers for both years is given in Table 12. Seven states had ninety-three fewer teachers with less than full certification in 1977-78; seven states had eighty-five more teachers with less than full certification in 1977-78; three states had the same number of teachers with less than full certification in both years; seventeen states had no teachers with less than full certification employed in either year.

In 1976-77 there were 995 male teachers employed in twenty states to teach without full certification in industrial arts education. An additional seventeen states reported that no teachers with less than full certification, license, or endorsement were employed. Four states reported employing thirteen female teachers with less than full certification, license, or endorsement. Thirty-one states reported that no female teachers with less than full certification were employed.

In 1977-78 there were 638 male teachers employed in eighteen states to teach without full certification. An additional eighteen reported that no teachers without full certification were employed. Massachusetts, which reported 350 male teachers employed without full certification in 1976-77, did not report any data for 1977-78. The difference between the 995 teachers in 1976-77 and 638 teachers in 1977-78 could be largely explained by the absence of data from Massachusetts. In the thirty-four states that reported data for both years only a difference of eight fewer

TABLE 11

Proportions of Fully Certified and Less Than Fully Certified Teachers

State	LESS THAN FULLY CERTIFIED				LESS THAN FULLY CERTIFIED			
	Male Tchr in 7677 Eu1m	Female Tchr in 7677 Eu1f	Prop Fully Cert	Prop Less Than Fully Cert	Male Tchr in 7778 Eu2m	Female Tchr in 7778 Eu2f	Prop Fully Cert	Prop Less Than Fully Cert
ALABAMA	23	0	.86	.14	23	0	.89	.11
ALASKA	40	.			40	.		
ARIZONA	.	.			.	.		
ARKANSAS	0	0	1.00	.00	0	0	1.00	.00
CALIFORNIA	0	0	1.00	.00	0	0	1.00	.00
COLORADO	0	0	1.00	.00	0	0	1.00	.00
CONNECTICUT	.	.			.	.		
DELAWARE	0	0	1.00	.00	0	0	1.00	.00
WASH. D.C.	0	0	1.00	.00	0	0	1.00	.00
FLORIDA	70	0	.94	.06	35	0	.97	.03
GEORGIA	6	0	.99	.01	7	0	.99	.01
HAWAII	2	0	.99	.01	4	0	.98	.02
IDAHO	.	.			.	.		
INDIANA	0	0	1.00	.00	0	0		
IOWA	12	.			15	.		
KENTUCKY	0	0	1.00	.00	0	0	1.00	.00
LOUISIANA	.	.			.	.		
MAINE	12	0	.97	.03	10	0	.98	.02
MARYLAND	.	.			.	.		
MASS.	350	0			.	0		
MICHIGAN	0	0	1.00	.00	0	0	1.00	.00
MINNESOTA	0	0	1.00	.00	0	0	1.00	.00
MISSISSIPPI	6	0			0	0		
MISSOURI	0	0	1.00	.00	0	0	1.00	.00
MONTANA	0	0	1.00	.00	0	0	1.00	.00
NEBRASKA	.	.			.	.		
NEVADA	0	0	1.00	.00	0	0	1.00	.00
NEW HAMP.	0	0			0	0		
NEW JERSEY	60	0	.98	.02	40	0	.99	.01
NEW MEXICO	2	0	.99	.01	2	0	.99	.01
NEW YORK	65	1	.99	.01	47	1	.99	.01
N. CAROLINA	5	10	.98	.02	8	12	.97	.03
N. DAKOTA	0	0	1.00	.00	0	0	1.00	.00
OHIO	26	0	.99	.01	33	0	.99	.01
OKLAHOMA	0	0	1.00	.00	0	0	1.00	.00
OREGON	0	0	1.00	.00	0	0	1.00	.00
PENN.	30	0	.99	.01	20	0	.99	.01
PUERTO RICO	76	0	.89	.11	76	0	.88	.12
RHODE ISL.	.	.			.	.		
S. DAKOTA	.	.			.	.		
TENNESSEE	52	1	.90	.10	57	1	.89	.11
TEXAS	14	1	.99	.01	27	1	.99	.01
UTAH	12	0	.97	.03	10	0	.98	.02
VERMONT	0	0	1.00	.00	0	0	1.00	.00
VIRGINIA	132	0	.88	.12	184	0	.85	.15
WASHINGTON	.	.			.	.		
WYOMING	.	.			.	.		
Totals	995	13			638	15		
Mean	.	.	.978	.02	.	.	.978	.02
Minimum	.	.	.880	.00	.	.	.850	.00
Maximum	.	.	1.000	.12	.	.	1.000	.15
Valid cases	37	35	32	32	36	35	31	31
Missing cases	10	12	15	15	11	12	16	16

TABLE 12

Changes in the Use of Less Than Fully Certified Teachers

State	Less Than Fully Certified				Increase/Decrease	
	Male Tchr in 7677 Eu1m	Female Tchr in 7677 Eu1f	Male Tchr in 7778 Eu2m	Female Tchr in 7778 Eu2f	Number	Percent
ALABAMA	23	0	23	0	0	0
ALASKA	40	.	40	.	.	.
ARIZONA	.	.	.	.	.	.
ARKANSAS	0	0	0	0	0	0
CALIFORNIA	0	0	0	0	0	0
COLORADO	0	0	0	0	0	0
CONNECTICUT	.	.	.	.	.	.
DELAWARE	0	0	0	0	0	0
WASH. D.C.	0	0	0	0	0	0
FLORIDA	70	0	35	0	-35	-50%
GEORGIA	6	0	7	0	1	17%
HAWAII	2	0	4	0	2	100%
IDAHO	.	.	.	.	.	.
INDIANA	0	0	0	0	0	0
IOWA	12	.	15	.	.	.
KENTUCKY	0	0	0	0	0	0
LOUISIANA	.	.	.	.	.	.
MAINE	12	0	10	0	-2	-17%
MARYLAND	.	.	.	.	.	.
MASS.	350	0	.	0	.	.
MICHIGAN	0	0	0	0	0	0
MINNESOTA	0	0	0	0	0	0
MISSISSIPPI	6	0	0	0	-6	-100%
MISSOURI	0	0	0	0	0	0
MONTANA	0	0	0	0	0	0
NEBRASKA	.	.	.	.	.	.
NEVADA	0	0	0	0	0	0
NEW HAMP.	0	0	0	0	0	0
NEW JERSEY	60	0	40	0	-20	-33%
NEW MEXICO	2	0	2	0	0	0
NEW YORK	65	1	47	1	-18	-28%
N. CAROLINA	5	10	8	12	5	33%
N. DAKOTA	0	0	0	0	0	0
OHIO	26	0	33	0	7	27%
OKLAHOMA	0	0	0	0	0	0
OREGON	0	0	0	0	0	0
PENN.	30	0	20	0	-10	-33%
PUERTO RICO	76	0	76	0	0	0
RHODE ISL.	.	.	.	.	.	.
S. DAKOTA	.	.	.	.	.	.
TENNESSEE	52	1	57	1	5	9%
TEXAS	14	1	27	1	13	87%
UTAH	12	0	10	0	-2	-17%
VERMONT	0	0	0	0	0	0
VIRGINIA	132	0	184	0	52	39%
WASHINGTON	.	.	.	.	.	.
WYOMING	.	.	.	.	.	.
Totals	995	13	638	15	(-93) / (+85)	-
Valid cases	37	35	36	36	34	-
Missing cases	10	12	11	12	13	-

teachers can be identified.

Proportion of Potential Teachers Accepting Positions

Bachelor's Degree Awardees

In the 1976-77 school year 4,408 bachelor's degrees were awarded in industrial arts education by 174 industrial arts teacher education institutions. Of these, 154 institutions reported that 2,288 graduates accepted industrial arts teaching positions in 1977-78 in the state where they graduated and another 477 (141 institutions reporting) accepted positions in another state. Using data reported by 136 institutions, a determination was made that 75.7 percent of the 1976-77 graduates accepted industrial arts teaching positions in 1977-78. Appendix H (Part 2) contains a summary of these and other data collected on the survey of teacher education institutions.

Master's Degree Awardees

In 1976-77 there were between 384 and 389 master's degrees awarded (149 institutions responding) to persons who had never taught industrial arts. Of these graduates, 214 to 216 (sixty-six institutions responding) accepted industrial arts teaching positions in 1977-78 in the state where they graduated and sixty-three to sixty-six (fifty-five institutions responding) accepted positions in another state. The overall acceptance rate for graduates was found to be 84.7 percent for the fifty-one institutions which responded to these particular survey items.

Other Teachers Who Gained Certification in Industrial Arts Education

In the 1976-77 school year 202 to 204 teachers from other fields

gained certification in industrial arts education without obtaining a bachelor's or master's degree in the process (166 institutions responding). Of these, 128 to 130 teachers accepted industrial arts teaching positions in the state where they gained certification and fourteen to fifteen others accepted positions in other states during 1977-78 (sixty-nine and sixty-five institutions responding respectively). The overall proportion of these teachers who accepted industrial arts positions was 77.2 to 77.5 percent (data from sixty-four institutions).

Overall

The overall proportion of graduates and other teachers who accepted industrial arts positions could not be established with much certainty because missing data on any single variable caused all data for the case to be ignored. Only twenty-six institutions had all the data needed and the acceptance rate for those was 74.8 percent, lower than the rate for any single group.

Mobility of Industrial Arts Graduates

Data from the teacher education institution survey and state supervisors' survey provided a determination of the mobility of industrial arts teachers from two sources. The teacher education institution survey data was processed using the formula below for the proportion of potential teachers who accepted positions in the state where they received their training:

$$\text{INSTATE1} = (Q_{2a1} + Q_{2a2} + Q_{7a})/(Q_{2a1} + Q_{2a2} + Q_{2b1} + Q_{2b2} + Q_{7a} + Q_{7b}).$$

Complete data were available for only twenty-six institutions, therefore proportions were calculated individually for graduates with bachelor's

degrees (INSTATEB), graduates with master's degrees (INSTATEM), and other teachers who gained certification in industrial arts (INSTATEO). Out of the 1976-77 graduates with bachelor's degrees who accepted teaching positions (75.7 percent) in 1977-78, 80.8 percent accepted positions in the state where they graduates (data from 135 institutions). Out of the 1976-77 graduates with master's degrees who accepted teaching positions (84.7 percent) in 1977-78, 76.8 to 77.0 percent accepted positions in the state where they graduated (data from forty-seven institutions). Out of the number of other teachers who gained certification in industrial arts education in 1976-77 and accepted teaching positions (77.5 percent) in 1977-78, 87.7 percent accepted positions in the state where they became certified (data from fifty-one institutions). The proportions which accepted positions in other states for the three groups were, respectively: 19.2 percent, 23.0 to 23.2 percent, and 12.3 percent.

Utilization of Undergraduate Capacity

With their present facilities, 167 institutions reported they could enroll between 32,407 and 32,827 undergraduate industrial arts education students. At the time of the survey (summer, 1979), undergraduate enrollments in industrial arts education totalled 18,001 students in 171 institutions. The percent of utilization for 165 institutions was between 51.5 and 52 percent.

Summary

The national supply of and demand for industrial arts teachers was not fully ascertained during the study because the data were not forthcoming from the state industrial arts supervisors. Sufficient data were

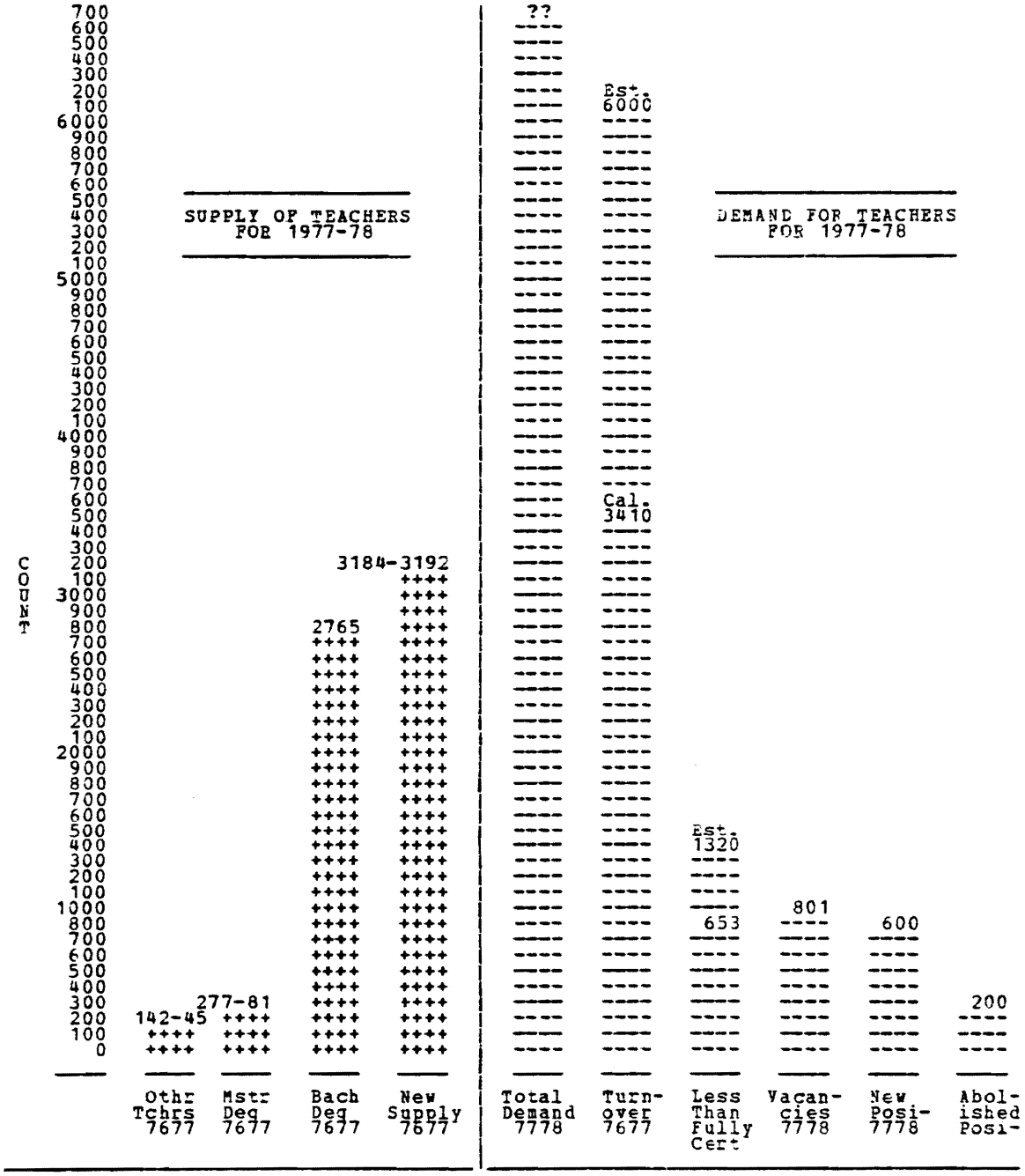
obtained, however, to allow for all but the most global research questions to be partially answered.

A central issue of the study was the U.S.O.E. determination that there were 439 vacant industrial arts positions in 1977-78. Data collected during this study show there were at least 786 vacancies in 1976-77 and at least 801 vacancies in 1977-78. In addition, there were at least 1,008 persons employed to teach industrial arts in 1976-77 who were not fully certified to teach industrial arts; in 1977-78 at least 753 less than fully certified people were employed to teach. These figures represent 2.2 percent of the teachers in thirty-two and thirty-one states respectively. Using this percentage for the 50,112 teachers identified in forty-three states and the 60,000 estimated teaching force, it may be estimated there were between 1,102 to 1,320 persons employed to teach without full certification in industrial arts education in 1977-78. Lastly, a component of the shortage problem which had never been investigated was the problem of positions being abolished because of the lack of teachers. In 1977-78, 200 positions were abolished because qualified teachers could not be obtained. Using the three categories of shortages (vacancies, less than fully certified teachers, and abolished positions) the study identified a minimum shortage of 1,754 qualified teachers, with an estimated shortage of between 2,103 and 2,321 teachers. Even with sparce data on key variables the shortage problem was shown to be four to five times greater than indicated by the U.S. Office of Education.

Although the study failed to establish a complete data base from which to make projections, statistics vital to the projection process were identified for the teacher turnover rate. The 10.7 percent turnover

rate which was determined from data from thirty states, when applied nationally, produces an estimate that over 6,000 teachers annually leave the profession. Another statistic which is critical is the proportion of new potential teachers who go into teaching. Only 75.7 percent of the 4,408 bachelor's degree recipients from 1976-77 went into teaching in 1977-78, along with 84.7 percent of the 384 to 389 master's degree recipients and 77.2 to 77.5 percent of the 202 to 204 teachers from other fields who obtained industrial arts certification in 1976-77.

In conclusion, the data for 1977-78 paint a rather dismal picture for that year. Data from the Standards Project survey identified 1,077 vacant positions in 1978-79 which was an increase of 276 positions in just one year. The survey of teacher education institutions revealed there was a capacity for 32,407 to 32,827 undergraduate industrial arts education students in 1978-79 but only 18,001, or 51.5 to 52.0 percent of capacity, were enrolled. Industrial arts teacher education programs in 1977-78 were able to produce only enough teachers to meet approximately half the demand if the broad estimates shown in Graph 1 are reasonable. The total demand for new teachers, as shown in Graph 1, remains unknown but could quite easily have exceeded 7,000 teachers in 1977-78 if factors such as turnover positions, newly created positions, abolished positions, vacant positions, and positions held by persons not fully qualified were added together. It appears that the practice of placing less than fully qualified teachers in industrial arts positions is declining. This in itself will put more pressure on teacher education to produce more qualified teachers. Assuming enrollments in industrial arts education followed the decline experienced in other fields over the last two years, or



GRAPH 1

Summary of Major Supply and Demand Factors

possibly remained constant, it is possible that a massive influx of 15,000 undergraduate students tomorrow, which would bring programs to capacity, would not, in and of itself, solve the problem. A doubling of the enrollments would, presumably, double the output --four years from now. If the number of graduates were twice what they were in 1976-77 it does not appear likely there would have been enough teachers to meet demand.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The industrial arts profession is in a period of turbulence that is unlike any before in the history of the profession. Three separate factors are likely to have major impacts on the profession in the coming decade. The focus of this study was on one of these factors, the national supply of and demand for qualified industrial arts teachers. Teacher supply and demand is linked to the other two: funding of industrial arts programs with federal monies and the development of exemplary standards for the profession.

Fundamental to any program, albeit a program supported with federal funds, a program operating without federal funds, a program that meets exemplary standards, or a program that fails to meet exemplary standards, is the need for fully qualified teachers. Although the exemplary standards being developed by the Standards Project had not been written as of this writing, it is reasonable to assume that some consideration will be given to the qualifications of industrial arts teachers. The profession finds itself in the awkward position of attempting to develop exemplary programs and make these programs available to a wider segment of the student population, driven by either federal pressures, philosophical views, or both, while being faced with a teacher shortage problem that is apparently far worse than had been suspected. The damage which can be done to the field of industrial arts education at this juncture cannot be estimated, but shortages of the magnitude identified

during this study will most certainly retard the development and evolution of industrial arts to some degree.

Summary

The ten research questions addressed in this study are listed in Chapter One and Chapter Four. Chapter Four contains the detailed findings of this study which are briefly summarized in the following narrative. A full determination of the supply of and demand for industrial arts teachers was not made because many state supervisors were unable to supply complete data. Although this lack of data was a serious limitation, it did not prevent important findings from being made from the data which were collected.

Total teacher demand could be determined for only twenty-nine states, but partial data show that at least 45,518 teachers in 1976-77 in forty states and 50,112 teachers in 1977-78 in forty-three states were employed to teach industrial arts. From data reported by thirty-two states, it was found that 2.2 percent of the persons who were employed to teach industrial arts in 1976-77 and 1977-78 were not fully qualified to teach industrial arts. Using the estimated figure of 60,000 for the total number of teachers in the United States, it can be estimated that over 1,300 persons who were not fully qualified could have been employed in 1977-78. This study identified at least 1,008 such teachers in thirty-seven states in 1976-77 and 653 in thirty-six states in 1977-78. (Missing data accounts for almost all of the difference in these two years.) In thirty-four states the number of less than fully qualified persons who were employed to teach decreased very little.

In 1977-78 there were at least 600 new positions that were created and filled by qualified teachers, but 200 existing positions were abolished and 801 positions remained vacant because qualified teachers could not be found. These figures may have been higher if the other one-third of the states had the data to report on their situation. Three states that had no vacancies in 1976-77 had vacancies in 1977-78. In addition, eighteen states had increases in the number of vacancies while only nine states had decreases in the number of vacancies. Only eight of the 36 states reporting did not have vacancies in either year.

The shortfall of teachers, shown to be at least 1,754 teachers in 1977-78, can be easily explained. There were not enough new teachers to replace the 10.7 percent who left the profession (estimated to be over 3,400 and possibly as high as 6,000 teachers in 1977-78) or fill newly created positions. Teacher education programs in 1978-79 were at only half capacity. About three-fourths of the graduates from 1976-77 went into teaching the following year.

The recruitment techniques used in the past succeeded in bringing the percentage of females in the teaching force only up to 1.1 percent in 1977-78. A few states had, at the most, about four percent females. As the teacher shortages spread from state to state, and it appears eminent that they will in the future, those states which have been able to recruit teachers from other states will have fewer teachers from which to select. The options appear to be either expand teacher education enrollments by seeking females and other groups not traditionally enrolled, employ teachers who are not fully qualified to teach, or close programs.

General Conclusions

1. In 1977-78, the shortage of qualified industrial arts teachers was at least four times worse than was reported by the U.S. Office of Education. In this study, demand exceeded supply by at least 1,754 teachers, compared to 439 vacancies reported by U.S.O.E.

2. At the end of 1976-77, an average of 10.7 percent of the teaching force left the profession in thirty states.

3. One-fourth of the industrial arts education graduates who earned bachelor's degrees in 1976-77 did not go into teaching in 1977-78.

4. During the two-year period from 1976-77 to 1977-78, the number of vacant industrial arts teaching positions increased in twenty-one states and declined in only nine, with eight states reporting no shortages. Three states that had no shortages in 1976-77 had shortages in 1977-78.

5. The number of persons who were hired to teach industrial arts without being fully qualified did not diminish significantly from 1976-77 to 1977-78. In 1976-77 and 1977-78, 2.2 percent of the teachers in thirty-two states were not fully qualified to teach industrial arts.

6. The industrial arts teaching profession was overwhelmingly male in 1976-77 and 1977-78, with females constituting only one percent.

7. Undergraduate industrial arts teacher education programs were only at half capacity (51.5 to 52.0%) in 1978-79. National trends suggest that enrollments in all fields of education will continue to fall.

Teacher Education Conclusions

The survey of teacher education programs revealed that undergraduate

programs are at about half capacity at the present time. Some of this can be explained by the general reductions in the numbers of undergraduate students across the nation. Part of it may be explained by the publicity of teacher oversupplies in other teaching fields. Perhaps a large part of this problem may be explained by the growth of non-teaching industrial arts options (technology) in programs which were formerly predominantly teacher education. Regardless of the reasons for the declining enrollments, it is obvious that something more must be done if programs are brought to capacity.

Recruitment

It goes without saying that industrial arts is a predominantly male profession, but data from the Standards Project show that some progress is being made in recruiting women into the teaching ranks. Women now constitute about one percent of the teaching force and about three percent of the bachelor's degree graduates. Data from this study show that one-fourth of the graduates never go into teaching and 10.7 percent of those who are teachers leave the classroom annually. The number of women in the profession has now reached a point where it might be possible to determine if women graduates and teachers tend to be more mobile or less mobile than their male counterparts. To make an accurate determination of the mobility of men or women, it will be necessary for teacher education programs to accept responsibility for conducting follow-up studies which many have not done in the past. Respondents to the teacher education survey used in this study indicated they had some difficulty in determining what happened to their graduates once they were given their

diplomas. Follow-up studies and accurate data collection and reporting procedures are absolutely necessary if the profession is ever to measure the supply of teachers.

The data show that one potential group of future industrial arts teachers which has barely been tapped is teachers and qualified potential teachers from other teaching fields. Only 202 teachers from other fields gained certification, license, or endorsement in industrial arts education in 1976-77. Some of the 384 to 389 persons who were awarded master's degrees in 1976-77 could have been persons who were qualified to teach in other areas and earned a master's degree while acquiring endorsement to teach industrial arts education.

Terms

During the development of the list of institutions to be included in the survey one fact became very clear, that it is difficult to determine which institutions had teacher education programs from the Industrial Teacher Education Directory listings. The descriptive terms that were used to identify potential teacher education programs included: industrial arts, industrial arts education, industrial education, and technical education. Out of the 182 institutions that responded to the survey, only four did not have an industrial arts teacher education program. It should be noted that the use of the various descriptors to describe graduates is the option of the responding institutions, and that the directory is provided as a service of the American Council on Industrial Arts Teacher Education and the National Association of Industrial and Technical Teacher Educators. The directory serves as an extremely

important aid to the profession and, through modifications to the information collecting efforts, could serve as a national vehicle through which to collect more accurate data on the supply of teachers. The use of standard terminology is one tactic which could be employed. More data, such as those sought in this study could be included on the annual questionnaire which must be sent anyway. In this way a reliable data base could be built and maintained.

Recommendations for Teacher Education

1. The first recommendation is that research be conducted on successful recruitment methods that have been used by industrial arts teacher education programs which are at or near capacity in an attempt to identify strategies which work best with various target groups that were included in the recruitment efforts.

2. It is recommended that teacher educators look toward non-traditional sources for undergraduates such as women and teachers from other fields that have surpluses. This latter group is projected to dwindle away in the coming decade but it may offer a more immediate source of teachers than others because of the shorter training period that would be needed.

3. It is recommended that teacher education programs conduct periodic follow-up studies on their graduates.

4. It is recommended that teacher education programs be given greater emphasis at institutions that offer both non-teaching and teaching options. This task might be more easily accomplished if the institutions would emphasize teaching with as much enthusiasm as is given to developing tool skills, for example.

5. It is recommended that teacher certification be addressed during the development of standards, and that any criteria which are developed should be based on empirical evidence. For example, many institutions only provide a teaching option for programs that include both a major and minor in industrial arts while others consider a major as adequate. Some states welcome teachers with a minor in industrial arts and a few states allow anyone to teach if they taught at least one year in their area of preparation.

6. It is recommended that the publishers of the Industrial Teacher Education Directory adopt a policy of using standardized terms to describe graduates who are qualified to teach industrial arts, as well as other teaching disciplines in the broad category of industrial education. These terms should be defined in the introduction of the Directory.

7. It is recommended that the Industrial Teacher Education Directory expand its contents to include more data relevant to the supply of teachers and that these data be used to establish part of a national data base on industrial arts education.

State Supervision Conclusions

The state supervisor of industrial arts education is potentially the key leader in industrial arts education in any given state. It is most unfortunate that a large number of states do not have anyone designated to oversee industrial arts programs. Some of those states which have a designated person to supervise industrial arts have employed people who do not have industrial arts backgrounds. Other supervisors split positions in trade and industrial education or other

teaching disciplines. There has been no reference or guide in the past as to what a state-level supervisor of industrial arts should be or what he or she should do or be responsible for. This study, the Standards Project study, and perhaps others have been based on the assumption that someone in each state must ultimately be responsible for industrial arts. The difficulty experienced in obtaining contact persons for many states suggests this assumption is not true.

The Role of the State-Level Supervisors

The roles of the state supervisor of industrial arts differ widely because of the organization of state departments of education. While some supervisors have a great deal of discretionary power over instructional programs, budget, personnel, and other matters, other supervisors have little or no authority and serve in consulting capacities only. Many states have neither a supervisor nor a consultant for industrial arts, but place the responsibility for industrial arts with the trade and industrial education supervisor or the director of vocational-technical education in some instances. In the states which have no bona fide industrial arts consultant or supervisor, industrial arts may be cast adrift.

Data Collection. Regardless of who has the ultimate responsibility for industrial arts, it is reasonable to assume that basic information on the number of teachers who were employed and other pertinent information would be readily available for that person through some state data collection system. Although states that receive federal funds are required to collect and report massive amounts of data much of these data are

practically useless to the industrial arts supervisor. The single, almost unanimous comment from state supervisors on questions that were left blank was that the data were not available. Some commented that it would take hours to find the information sought, and when found would more than likely not be in the form requested. The Standards Project surveys, which were subjected to a stringent review process by the U.S. Office of Education, included the basic questions of how many male and female students are in the state at each grade level from six to twelve in industrial arts. These questions were included because the data did not exist anywhere in the entire federal data collection system. The responses from the state supervisors ranged from actual data by sex and by grade to reports on total enrollments only with no breakdowns.

One conclusion which may be drawn from the previous discussion is that state supervisors do not appear to agree on the notion that collection and dissemination of information on industrial arts in their state is one of their roles. Many supervisors were able to produce all the information requested and others were unable to supply any information.

Personnel. Another conclusion which can be drawn from the process of data collection and the data itself is that state supervisors have very different relationships with their state teacher certification agencies and local school divisions in the area of teacher certification and recruitment. In some states the number of teachers appears to be unknown; in states where the number is known certification levels are unknown. Teacher certification may not have been an important issue until now but this study has shown the use of less than fully qualified

teachers to be a major part of the teacher shortage problem. With states having more than ten percent of their teachers underqualified, the quality of the instructional program must be brought into question. The other alternative which schools are faced with is closing down programs.

Recommendations for State Supervision

1. It is recommended that industrial arts educators in states which do not have bona fide state industrial arts supervisors establish and carry out a plan of action to establish a supervisor's position at the state level and hire qualified industrial arts persons for this position.
2. It is recommended that the American Industrial Arts Association identify states where there are no bona fide state industrial arts supervisors and assist leaders of industrial arts in those states to develop and carry out plans of action to establish state-level supervisor's positions.
3. It is recommended that the role of the state supervisor be expanded in some instances, and strengthened in others, to include data collection activities. Specifically, each supervisor should be familiar with data collection procedures and instruments used in the state and be able to extract data when needed. Data collection procedures and instruments should be modified wherever necessary to insure that the state supervisor has basic information on industrial arts students, programs, and teachers.
4. It is recommended that data be collected on industrial arts from the state supervisors on an annual basis by some organization or foundation until such time as the American Industrial Arts Association can assume the responsibility.

5. It is recommended that state supervisors, the American Industrial Arts Association, and the Standards for Industrial Arts Education Project develop a survey which can be used at the state and national levels to collect data on industrial arts. This document should include standardized terminology which matches terminology used in the standards presently being developed through the Standards Project.

6. It is recommended that each state conduct teacher supply and demand studies on a regular basis and that the findings of these studies be furnished to the American Industrial Arts Association. The findings of these studies should be directly transferrable to the survey instrument referenced in the previous recommendation.

7. It is recommended that each state establish a plan for alleviating the shortage of teachers, or preventing a shortage where there are no shortages at the present time. This plan should include articulation with teacher education institutions as a primary element. It is further recommended that these plans be shared with other states, either directly or through the American Industrial Arts Association. It is further recommended that successful strategies and activities be given the widest dissemination possible.

Summary

State supervisors and teacher educators jointly share the critical task of overcoming the teacher shortage problem. The shortages are becoming more widespread each year and are increasing in severity. The industrial arts profession finds itself in a period of positive growth and change through the development of standards which should result in

improvements in industrial arts programs. Before quality of programs for children can be greatly improved the teacher shortage problem must be solved. All data indicate the problem will not improve but worsen for the next three years because of the low numbers in undergraduate teacher education programs. Fourteen specific recommendations are made which would enable the profession to monitor the teacher shortage problem and initiate means for combating the problem. These recommendations call for an assessment of the roles of state supervision and teacher education in reference to data collection and dissemination and call for the American Industrial Arts Association to renew efforts to assist the profession in solving the teacher shortage problem.

REFERENCES

1. Books

Brandon, George L., ed.
1970 Research Visibility: Development of Professional Personnel for Vocational-Technical Education (May). U.S., Education Resources Information Center, ERIC Document ED039358.

Dennis, Ervin A., comp.
1977 Industrial Teacher Education Directory (November). Washington, D.C.: National Association of Industrial and Technical Teacher Education.

———
1978 Industrial Teacher Education Directory (November). Washington, D.C.: National Association of Industrial and Technical Teacher Educators.

Evans, Rupert N.
1971 Foundations of Vocational Education. Columbus, Ohio: Charles E. Merrill Publishing Co.

Gerwin, Donald, ed.
1974 The Employment of Teachers. Berkeley, Calfornia: McCutchan Publishing Corp.

Hughes, Thomas A., John Frank, Jr., and Chester Lane, comps.
1978 The Virginia Industrial Arts Association, 1958-78 (August).

Kershaw, Joseph A. and Roland N. McKean.
1962 Teacher Shortages and Salary Schedules. New York: McGraw-Hill. (rpt. in Donald Gerwin, ed. 1974. The Employment of Teachers. Berkeley, California: McCutchan Publishing Corp.)

Regier, Herold G.
1972 Too Many Teachers: Fact or Fiction? Bloomington, Indiana: Phi Delta Kappa Education Foundation. PDK Fastbacks No. 5.

Strong, Merle E. and Carl J. Schaefer.
1975 Introduction to Trade, Industrial, and Technical Education. Columbus, Ohio: Charles E. Merrill Publishing Co.

2. Dissertations

Bailey, Francis L.
1939 A Planned Supply of Teachers for Vermont. Contributions to Education, No. 771. New York: Bureau of Publications, Teachers College, Columbia University (rpt. New York: ASM Press Inc. 1972).

Elliff, Mary.
1935 Some Relationships Between Supply and Demand for Newly Trained Teachers. Contributions to Education, No. 654. New York: Bureau of Publications, Teachers College, Columbia University (rpt. New York: ASM Press Inc., 1972).

Elsbree, Willard S.
1928 Teacher Turnover in Cities and Villages of New York State. Contributions to Education, No. 300. New York: Bureau of Publications, Teachers College, Columbia University.

Gerbracht, Carlton J.
1950 "Industrial Arts Teacher Supply and Demand in the United States: A Survey to Assist in Teacher Education Planning and to Indicate Professional Trends." The Ohio State University, unpublished Ph.D. dissertation.

Van Houten, Lyman H.
1932 Length of Service of Pennsylvania High School Teachers. Contributions to Education, No. 522. New York: Bureau of Publications, Teachers College, Columbia University (rpt. New York: AMS Press, Inc. 1972).

Washburn, John S.
1977 The Effects of Declining School Enrollment on Vocational Education Programs and Practices at the Secondary School Level in Illinois. University of Illinois at Urbana - Champaign, unpublished Ed.D. dissertation.

Weir, E. Lee.
1970 "An Experimental Evaluation of Selected Printed Graphic Communication Media for Recruiting Industrial Arts and Technology Students." Arizona State University, unpublished Ed.D. thesis. ERIC Document ED044492.

Wommack, Charles H.
1967 "A Study of the Industrial Arts Teacher Shortage in the State of Louisiana." Texas Tech University, unpublished Ph.D. dissertation.

3. Government Publications

Appalachian Regional Commission.
1968 The Status of Vocational Education at the Secondary Level in Appalachia, Second Draft (May). Washington, D.C.: Appalachian Regional Commission. ERIC Document ED022571.

Baker, Curtis O.
1977 Students Enrolled for Advanced Degrees, Fall 1975: Summary Data. National Center for Education Statistics, NCES 77-332. Washington, D.C.: U.S. Government Printing Office.

Comptroller General of the United States.
1974 Supply and Demand Conditions for Teachers and Implications for Federal Programs. Report to Congress. Washington, D.C.: General Accounting Office.

Frankel, Martin M., ed.
1978 Projections of Education Statistics to 1986-87. National Center for Education Statistics. Washington, D.C.: U.S. Government Printing Office.

_____ and Debra Gerald.
1978 "Instructional Staff." Projections of Education Statistics to 1986-87. National Center for Education Statistics. Washington, D.C.: U.S. Government Printing Office.

_____ and William C. Sonnenberg.
1978 "Enrollment." Projections of Education Statistics to 1986-87. National Center for Education Statistics. Washington, D.C.: U.S. Government Printing Office.

Grant, W. Vance and C. George Lind.
1974 Digest of Education Statistics, 1973 Edition. National Center for Education Statistics. Washington, D.C.: U.S. Government Printing Office.

_____ and C. George Lind.
1977 Digest of Education Statistics, 1976 Edition. National Center for Education Statistics. Washington, D.C.: U.S. Government Printing Office.

Lewin and Associates, Inc.
1977 The State of Teacher Education, 1977. National Center for Education Statistics, NCES 78-409. Washington, D.C.: U.S. Government Printing Office.

Schmitt, Marshall L. and Albert L. Pelley.
1966 Industrial Arts Education: A Survey of Programs, Teachers, Students and Curriculum. Washington, D.C.: U.S. Government Printing Office. ERIC Document ED017667.

Simon, Kenneth A. and W. Vance Grant.
1969 Digest of Education Statistics, 1969 Edition. Washington, D.C.: U.S. Government Printing Office.

_____ and W. Vance Grant.
1970 Digest of Education Statistics, 1970 Edition. Washington, D.C.: U.S. Government Printing Office.

_____ and W. Vance Grant.
1972 Digest of Education Statistics, 1971 Edition. Washington, D.C.: U.S. Government Printing Office.

U.S. Department of Health, Education, and Welfare.
1974a Summary of Offerings and Enrollments in Public Schools, 1972-73. National Center for Education Statistics. Washington, D.C.: U.S. Government Printing Office.

1974b Trends in Vocational Education, FY 1973. Bureau of Occupational and Adult Education. Washington, D.C.: Div. of Vocational and Technical Education (June). ERIC Document ED103647.

1978a Summary Data: Vocational Education, Fiscal Year 1976. Vocational Education Information, No. 1. Bureau of Occupational and Adult Education. Washington, D.C.: Office of Education (January).

1978b Vocational and Technical Educational: Selected Statistical Tables, Fiscal Year 1976. Vocational Education Information, No. 2. Bureau of Occupational and Adult Education. Washington, D.C.: Office of Education (March).

1978c "Vocational Education Teacher Certification Fellowship Program: Teacher Shortages." Federal Register 43:82 (April 27):18117-18127.

4. Papers

Boyett, Ray H. and Hollie B. Thomas.
1977 "Baseline Data for Teacher Education." Paper presented at the Annual Meeting of the American Educational Research Association, April 4-8, 1977. ERIC Document ED138562.

Macdonnell, Elisabeth and Floy Strosnider, eds.
1966 Frontiers in Industrial Arts Education. Addresses and proceedings of the 28th Annual Convention of the American Industrial Arts Association, San Francisco, 1966. ERIC Document ED057238.

MacManus, Susan A. and Nikki R. Van Hightower.
1977 "The Impact of Federally-Funded Vocational Education Programs on Women: Present Patterns and Future Implications." Paper presented at the annual meeting of the American Political Science Association, Washington, D.C., Sept. 1-4, 1977. ERIC Document ED149027.

Vivian, Neal E. and Kenneth E. Hoffman.
1967 Vocational-Technical Teacher Education National Seminar Proceedings. ERIC Document ED020431.

5. Periodicals

Becker, Howard S.
1966 "Notes on the Concepts of Commitment." American Journal of Sociology 66 (July):32-40.

Unsigned.
1966 "Bigger Teacher Shortage." Time Magazine 88:13 (September 23):43.

Boyd, Gardner.
1966 "Recruit We Must." The Journal of Industrial Arts Education 25 (May-June):12-13.

Geer, Blanche.
1966 "Occupational Commitment and the Teaching Profession." The School Review 74 (Spring):31-47.

Johannsen, L. Kenneth.
1969 "Salary Incentives for Industrial Arts Teachers." Industrial Arts Vocational Education 38:6 (June):12-13.

London, H. H.
1967 "Forward from 50 Years of Experience in Industrial Arts." American Vocational Journal 42 (March):40-42.

Mannion, Edmund J. and Alvin W. Spencer.
1971 "1980 Projections." Man/Society/Technology 31:1 (September-October):22-27.

Miller, Rex.
1978 "Industrial Arts Teacher Supply and Demand." Industrial Education 67:6 (September):23-25.

Morrison, R. E., Jr.
1975 "Building Industrial Arts to Suit." School Shop 34:5 (January): 23-24.

Pavalko, Ronald M.
1970 "Recruitment to Teaching: Patterns of Selection and Retention." Sociology of Education 43:3 (Summer):340-353.

Ressler, Ralph.
1966 "Recruitment of Students for Industrial Arts Teacher Preparation." Journal of Industrial Teacher Education 4 (December):21-23.

Schmitt, Marshall L.
1976 "Trends in Industrial Arts." School Shop 36:1 (September):37-38.

Smith, Donald F.
1979 "Serious Teacher Shortage Exists in Industrial Arts." Man/Society/Technology 38:6:12-15.

Storm, George.
1970 "Differentiated Staffing --A New Approach to Classification and Assignment." Technical Education 59:1 (January):TE6, TE10.

6. Reports

Boyer, Elisabeth.
1973 "Women --Are the Technical-Occupational Programs Attracting Them?" ERIC Document ED085065.

Copa, George and Robert W. Korpi.
1974 "The Need for and Sources of Teachers in Vocationally Reimbursed Positions in Minnesota." Minneapolis: Minnesota Research Coordinating Unit for Vocational Education. ERIC Document ED112175.

Graybeal, William S.
1972a "Teacher Supply and Demand in Public Schools, 1971." Report No. RR-1972-R4. Washington, D.C.: National Education Association. ERIC Document ED066801.

1972b "Teacher Supply and Demand in Public Schools, 1972." Report No. NEA-RR-1972-R8. Washington, D.C.: National Education Association. ERIC Document ED070165.

1975 "Teacher Supply and Demand in Public Schools, 1974." Washington, D.C.: National Education Association. ERIC Document ED107670.

Indiana State Commission for Higher Education.
1976 "Employability of Elementary and Secondary School Teachers in Indiana." Indiana College-Level Manpower Study, Report No. 7. Indianapolis: Indiana State Commission for Higher Education. ERIC Document ED127315.

National Education Association.
1967 The American Public-School Teacher, 1965-66. Research Report of 1967-R4. Washington, D.C.: National Education Association.

1969a Teacher Supply and Demand in Public Schools, 1968. Research Report 1969-R4. Washington, D.C.: National Education Association. ERIC Document ED033450.

1969b Economic Status of the Teaching Profession, 1968-69. Research Report 1969-R5. Washington, D.C.: National Education Association.

1970 Teacher Supply and Demand in Public Schools, 1970. Research Report 1970-R14. Washington, D.C.: National Education Association. ERIC Document ED048653.

National Education Association.
1972 Status of the American Public School Teacher, 1970-71. Research Report 1972-R3. Washington, D.C.: National Education Association.

1977 Teacher Supply and Demand in Public Schools: 1974, 1975, 1976, with Population Trends and Their Implications for Schools, 1976-77. Washington, D.C.: National Education Association.

State Board of Education.
1968 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1967-68. Richmond, Va.: State Board of Education.

1969 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1968-69. Richmond, Va.: State Board of Education.

1970 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1969-70. Richmond, Va.: State Board of Education.

1971 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1970-71. Richmond, Va.: State Board of Education.

1972 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1971-72. Richmond, Va.: State Board of Education.

1973 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1972-73. Richmond, Va.: State Board of Education.

1974 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1973-74. Richmond, Va.: State Board of Education.

1975 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1974-75. Richmond, Va.: State Board of Education.

State Board of Education.
1976 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1975-76. Richmond, Va.: State Board of Education.

1977 Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia: School Year 1976-77. Richmond, Va.: State Board of Education.

Swanson, Gordon I.
1974 The Preparation of Teachers fof Vocational Education. Project Baseline Supplemental Report. Flagstaff, Az.: Northern Arizona University. ERIC Document ED099690.

Wiens, A. Emerson.
1973 The Characteristics of "Mobile" and "Stable" Occupational Educators by Specialty and by Type of School. Urbana, Ill.: Illinois University. ERIC Document ED085605.

7. Secondary Sources

American Vocational Association.
1971 Vocational-Technical Terminology. Washington, D.C.: American Vocational Association (cited by Strong and Schaefer, 1975).

Astin, Alexander W., et al.
1976 The American Freshman: National Norms. Reports for Fall 1970 through 1975. Los Angeles: American Council on Education and the University of Los Angeles (cited by Indiana State Commission for Higher Education, 1976).

Evans, Rupert N.
1974 Vocational Education: Staff Development for the 1970's. Washington: D.C.: Technical Education Research Centers, Inc. ERIC Document ED099690 (cited by Boyett and Thomas, 1977).

Ferns, George W.
1971 Michigan's Vocational-Technical Education Personnel Development Needs, 1971-1975. ERIC Document ED060192 (cited by Boyett and Thomas, 1977).

Goldstein, H. and S. Swerdloff.
1967 Methods of Long-Term Projection of Requirements for Supply of Qualified Manpower. Paris: U.N.E.S.C.O. (cited by Boyett and Thomas, 1977).

Jarhman, Quain K.
1964 "Recruiting Prospective Teachers of Industrial Education." University of Arkansas, unpublished doctoral dissertation (cited by Wommack, 1967).

Kentucky Department of Education.
1966 Teacher Turnover Study, 1966. Frankfort, Ky.: Division of Statistical Services, Kentucky Department of Education (cited by Regier, 1972).

Maul, Ray C.
1965 Teacher Supply and Demand in Public Schools, 1965. Washington, D.C.: National Education Association (cited by Wommack, 1967).

Mason, Ward.
1966 The Beginning Teacher: Status and Career Orientations. Washington, D.C.: U.S. Office of Education (cited by Pavalko, 1970).

National Education Association.
1956. Salary Scheduling. Discussion Pamphlet No. 8, 4th Edition. Washington, D.C.: National Education Association (cited by Kershaw and McKean, 1962).

_____
1964 Teacher Supply and Demand in Public Schools, 1964. Research Report 1964-R9. Washington, D.C.: National Education Association (cited by Geer, 1966).

Ostendorf, Logan.
1976 Summary of Offerings and Enrollments in Public Secondary Schools, 1972-73. Washington, D.C.: National Center for Education Statistics, U.S. Office of Education (cited by Schmitt, 1976).

Senteney, George W.
1955 "Factors Related to the Choice of Industrial Education Teaching As a Career and the Retention of These Teachers in the Profession." University of Missouri, unpublished doctoral dissertation (cited by Wommack, 1967).

U.S. Department of Health, Education, and Welfare.
1967 "Actual and Projected State and Local Administrative and Other Ancillary Personnel in Vocational Education." Unpublished planning document (March 15). Division of Vocational and Technical Education, U.S. Office of Education (cited by Wiens, 1973).

8. Unpublished Sources

Clendenning, Lee R.
1978 Presentation at Southeastern Industrial Arts Conference (October 6). Atlanta, Ga. (by permission).

Dugger, William E., Jr.
1978 "Admissions and Student Supply Problems in Industrial Arts Education at Virginia Polytechnic Institute and State University." Unpublished report (Oct. 11).

Heggen, James.
1978 Presentation at Southeastern Industrial Arts Conference (October 6). Atlanta, Ga.

Rathbun, Donald L.
1979 Conversations at various meetings.

Appendices

Appendix A.

Literature Search Strategy

1. Strategy for Comprehensive Dissertation Abstract Computer Search

Set	Items	Description
1	0	Dan Miller
2	634	Industrial(W)Arts
3	409	Instructor? ?
4	821	Educator? ?
5	1338	Faculty
6	19493	Teacher? ?
7	52	Teaching(W)Profession
8	22139	2-7/OR
9	33	Shortage? ?
10	273	Turnover
11	4456	Transfer
12	205	Promotion
13	532	Deficiency??? ?
14	5495	9-13/OR
15	5	2 * 8 * 14
16	634	2 * 8

2. Strategy for Computer Search of E.R.I.C., A.I.M., and A.R.M.

Set	Items	Description
1	1468	Industrial Arts/DE
2	1546	Industrial(W)Arts/DE
3	419	Teacher Supply and Demand
4	162	Teacher Shortage
5	7	2 * (3+4)
6	393	Beginning Teachers
7	117	Faculty Mobility
8	399	Teacher Recruitment
9	81	Teacher Promotion
10	67	Teacher Alienation
11	913	Teacher Salaries
12	78	Teacher Persistence
13	226	Teacher Morale
14	2110	6-13/OR
15	11	2 * 14

3. Strategy for Comprehensive Dissertation Abstract Computer Search

Set	Items	Description
1	464	Vocational(W)Education
2	634	Industrial(W)Arts
3	21	Teacher(1W)Supply
4	0	Teachers(1W)Supply
5	3	Teacher(W)Shortage
6	0	Shortage(1W)Teachers
7	3	(1+2) * (3+5)
8	291	Enrollment? ?
9	3	8 * (1+2)
10	291	Enrollment?

4. Strategy for Computer Search of E.R.I.C., A.I.M., and A.R.M.

Set	Items	Description
1	0	Dan Miller (DB)
2	9324	Vocational Education/DF
3	1838	Industrial(W)Arts
4	424	Teacher Supply and Demand
5	202	Teacher(1W)Shortage
6	4	Teachers(1W)Shortage
7	37	Average Daily Enrollment
8	172	Declining Enrollment
9	1396	Enrollment Trends
10	391	Enrollment Rate
11	683	Enrollment Projections
12	443	Enrollment Influences
13	47	(2+3) * (4+5+6)
14	181	(2+3) * (7+8+9+10+11+12)
15	157	14/ED
16	24	14/EJ
17	30	15/MAJ
18	127	15-17

Appendix B.

List of State Supervisors

Alabama:

Charles F. Tate, Supervisor
Industrial Arts

Alaska:

Ray Ming, Supervisor
Department of Education

Arizona:

Hoyt Kenmore, Supervisor
Industrial Arts

Arkansas:

Charles W. Easley, Supervisor
Trade and Industrial Education

California:

Chris Almeida
Industrial Arts Consultant

Colorado:

Dr. Rodney Anderson
Industrial Arts Education
Colorado State University

Connecticut:

David M. Mordavsky
Industrial Arts Consultant

Delaware:

Franklin D. Arbaugh, Supervisor
Industrial Arts and Occupational
Programs

Washington, D.C.:

Sol M. Goldstein, Director
Industrial Arts Program

Florida:

*Dr. Ralph V. Steeb, Consultant
for Industrial Arts

Georgia:

*Raymond S. Ginn, Jr.
State Coordinator of IA

Hawaii:

Mr. Eric Chang, Supervisor
Industrial Arts Education

Idaho:

*Lee Carter, State Supervisor
Industrial Arts

Illinois:

Fred Kagy
Department of Industrial Tech.
Illinois State University

Indiana:

Monte Janik, Chief Supervisor
Industrial Education

Iowa:

Harold Berryhill, Consultant

Kansas:

Edwin Henry
Industrial Arts Specialist

Kentucky:

James H. Disney, Supervisor
Industrial Arts

Louisiana:

Ed Storey
Industrial Arts Supervisor

Maine:

Thomas J. Wheeler, Consultant
Industrial Arts Education

Maryland:

Allan B. Myers, Specialist
Industrial Arts

Massachusetts:

Gerald Antonellis, Senior
Supervisor of Industrial Arts

Michigan:

William Weisgerber, Supervisor
Career Development

Minnesota:

Tom Ryerson, State Supervisor
Industrial Arts

Mississippi:

Larry Godfrey, State Supervisor
Industrial Arts

Missouri:

B. Eugene Brightwell, Supervisor
Industrial Arts

Montana:

Jeff Wulf, Supervisor
Trade and Industrial Education

Nebraska:

Mr. Delmar Johnson
Supervisor, Industrial Arts Ed.

Nevada:

R. Courtney Riley, Director
Vocational and Adult Education

New Hampshire:

Mr. Robert Holt
Industrial Arts Consultant

New Jersey:

Richard P. Callan, Director
Industrial Arts Education

New Mexico:

Raymond Smith, Supervisor

New York:

*Arthur J. Dudley, Chief
Bureau of Industrial Arts Education

North Carolina:

*Ralph Johnston, Consultant
Industrial Arts

North Dakota:

Robert Gates, Supervisor
Industrial Arts

Oklahoma:

Harold Winburn, State Supervisor
Industrial Arts

Oregon:

John Fessant
Industrial Arts Specialist

Pennsylvania:

Earl R. Zimmerman, Coordinator
Division of Industrial Arts

Puerto Rico:

Mr. Angel Ramipet
Industrial Arts Programs

Rhode Island:

John S. Wilkinson
Consultant Industrial Arts

South Carolina:

William J. Singletary
Supervisor of Industrial Arts

South Dakota:

Wyland Borth
Industrial Arts Supervisor

Tennessee:

*Dennis Hirsch
Industrial Arts Specialist

Texas:

*Neil E. Ballard, Consultant
Industrial Arts Education

Utah:

Joe O. Luke, Specialist
Industrial Arts Education

Vermont:

Joseph P. Kisko
Industrial Arts Consultant

Virginia:

*Mr. Tom Hughes
State Supervisor of Industrial Arts

Washington:

*Herbert Y. Bell, Supervisor
Industrial Arts Program

West Virginia:

James F. Snyder
Program Specialist

Wisconsin:

Dr. Leonard F. Sterry
Supervisor of Industrial Arts

Wyoming:

Harley Strayer, Director
Industrial Arts Education

Appendix C.

State Supervisors' Survey

July 12, 1979

Dear State Industrial Arts Supervisor:

Your assistance is urgently needed in determining the magnitude of the shortages of industrial arts teachers in the United States. Recent studies that were conducted by Dr. Rex Miller and Dr. Donald Smith indicated that the number of states which were unable to obtain sufficient numbers of qualified teachers has almost doubled in only three years. These studies, however, did not collect accurate data to indicate how many teachers were needed to fill the vacancies that actually existed in the states reporting shortages.

At the present time the U.S. Office of Education is using data which placed the number of vacancies in 1977-78 at 439 teachers. Since the study which collected these data was concerned only with vocational education it is very unlikely that this figure represents the actual extent of the shortages. Unfortunately, this figure is the only one available to be used to determine policies and priorities but it probably grossly underestimates the seriousness of the problem. It is imperative that solutions to the teacher shortage problem in industrial arts be found soon because it appears likely that teacher shortages will occur in most teaching fields by the mid-1980's. If we have a shortage when other fields are having large surpluses what will we have when most teaching fields also are having shortages?

This study will supply data that will be a direct comparison with the U.S.O.E. data, and will determine statistics which will allow projections to be made regarding future shortages. The Standards for Industrial Arts Education Programs Project at V.P.I. & S.U. is collecting data which, when coupled with data from this study will present a much more accurate picture of how large the shortages are currently and what they are likely to be in the next few years.

Every state supervisor of industrial arts and every industrial arts teacher training institution in the United States has been contacted to supply data and most will willingly complete the survey because of the obvious need to the profession. The response from the profession, historically, has been less than total in the past, but 100 percent response is needed in this study. This means that <u>your</u> response is critical, so, please complete and return the survey. Thank you for your help in this most important study.

Sincerely,

C Daniel Miller

C. Daniel Miller

SURVEY OF STATE INDUSTRIAL ARTS SUPERVISORS

The following questions are designed to collect data on the supply of and demand for industrial arts teachers in the United States. Data collected in a survey recently conducted by the Standards for Industrial Arts Education Programs Project will be used, with permission, along with these data and data collected in a survey of teacher education institutions to determine supply and demand. Using the data below, from the Standards Project Survey, please answer the following questions.

NORMAL OR FULLY CERTIFIED I.A. TEACHERS	male	female
1976-77	_____	_____
1977-78	_____	_____

LESS THAN FULLY CERTIFIED TEACHERS	male	female
1976-77	_____	_____
1977-78	_____	_____

1. How many of the industrial arts teachers who were employed in your state during the 1976-77 school year (figures given above) left their positions and had to be replaced for the 1977-78 school year (turnover rate)?

   TEACHER TURNOVER RATE: _____ number or _____ % percent

2. How many NEW industrial arts teaching positions were open for the first time during the 1977-78 school year?

   NEW TEACHING POSITIONS: _____

3. How many of the vacated positions in 1976-77 (#1) and the new positions in 1977-78 (#2) were filled by QUALIFIED industrial arts teachers during the 1977-78 school year?

   FILLED POSITIONS: _____

4. How many of the teachers who were hired initially in the 1977-78 school year (#3) were obtained from the following sources:

   *NOTE: THE TOTAL FOR 4a, 4b, and 4c SHOULD = #3

   a. 1976-77 industrial arts graduates from teacher education programs within your state?

      IN-STATE IA GRADUATES: _____

   b. 1976-77 industrial arts graduates from teacher education programs outside your state?

      OUT OF STATE IA GRADS: _____

   c. other sources?

      OTHER SOURCES: _____

5. How many industrial arts positions were ABOLISHED in your state in the 1977-78 school year (no longer open in that year) because schools were unable to obtain qualified industrial arts teachers?

   ABOLISHED IA POSITION: _____

SURVEY OF STATE INDUSTRIAL ARTS SUPERVISORS

TO DETERMINE

THE NATIONAL SUPPLY OF AND DEMAND FOR INDUSTRIAL ARTS TEACHERS

This survey is one of three surveys that are being or have been recently conducted to collect data on several aspects of industrial arts, specifically related to industrial arts teachers and supply and demand. This survey is designed to collect data on factors such as teacher turnover, teacher retention, sources of teachers, and abolished positions. Once all the data have been collected and analyzed, educational planners such as yourself will be able to make more accurate projections of future supply of and demand for industrial arts teachers.

DEFINITIONS OF TERMS USED IN THE SURVEY:

1. Less than fully certified - refers to two categories of data collected in a survey of state industrial arts supervisors by the Standards for Industrial Arts Education Programs Project; a combination of teachers who are temporarily certified, non-certified, or emergency certified in industrial arts education who taught in 1976-77 and 1977-78.

2. Industrial arts education - refers to that segment of industrial education which is either general education, pre-technical, exploratory, pre-vocational in nature; does not include vocational or occupational education, trade and industrial education, industrial cooperative training, or technical education as related to specific job entry preparation.

3. Normal or fully certified I.A. teacher - refers to a category of data collected in a survey of state industrial arts supervisors by the Standards for Industrial Arts Education Programs Project; the recognition, usually by a state department of education, that a person meets all of the qualifications established by the governing agency for a person to teach a specific subject at a specific grade level; a special certificate, license, or endorsement in industrial arts education.

4. Qualified industrial arts teacher - refers to a teacher who holds a special certificate, license, or endorsement in industrial arts education, usually as the result of graduating from an accredited teacher education institution with a major in industrial arts education.

5. Teacher turnover rate - the number of persons hired between the 1976-77 and 1977-78 school years to replace those teachers who left their teaching positions for whatever reason. Can be expressed as a raw number or as a percentage of the total teaching force who left their teaching positions during or at the end of the 1976-77 school year.

6. Teaching position - any teaching position which specifies that a person hold a certificate, license, or endorsement in industrial arts education in addition to the general teaching certificate that is required of all public school teachers in that state.

7. Vacated position - a position in which the existing teacher left for whatever reason, thus creating a vacancy which was available to be occupied by someone else; see teacher turnover rate.

DIRECTIONS FOR COMPLETING THE SURVEY:

Please answer the questions as accurately as possible. If it should be necessary to estimate some of the responses please make them as close to the actual as possible. Do not give ranges. All the questions are related to the supply of and demand for industrial arts teachers for the 1977-78 school instead of the recently past school year because this is year that federal agencies are using to describe the teacher shortages in industrial arts education.

When you have completed the survey, please return it in the pre-addressed envelope which was enclosed with the survey, or, mail it to:

C. Daniel Miller
224 Lane Hall
V.P.I. & S.U.
Blacksburg, VA 24061

Thank you for your assistance.

224 Lane Hall
Virginia Polytechnic Institute and
State University
Blacksburg, VA 24061
August 8, 1979

About three weeks ago I sent you a short survey designed to collect some data which is needed to determine the national supply of and demand for industrial arts teachers. Although these data certainly do not describe supply and demand by themselves, they are absolutely essential in the process. A national assessment is incomplete without data from your state.

I am certain that you are entering a very busy period of the new year, but won't you take a few minutes to complete the survey? Thirty-three states have already responded and I would very much like to report the supply and demand status in your state along with their's. If you are experiencing teacher shortages, this study may be useful to you now. If you do not have shortages at this time, the study will show what you may be facing in the next few years. Some researchers are predicting teacher shortages in most areas of education in the 1980's, partially because of the reduction in college undergraduates in education. Data from a national survey of industrial arts teacher education institutions just completed in this study revealed that industrial arts enrollments are down to a fraction of the capacity at many institutions. In some states, such as Virginia, enrollments are near capacity but demand outstrips supply. The supply and demand situation is complex but it is a total mystery without data.

Thank you for your indulgence in allowing me to make a second appeal.

Sincerely,

C. Daniel Miller

Appendix D.

Standards Project Survey of State and

Territorial Industrial Arts Supervisors

FEDAC No. S4
Approval Expires 4-80

STANDARDS FOR INDUSTRIAL ARTS EDUCATION PROJECT

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

STATE AND TERRITORIAL SUPERVISOR'S SURVEY

GENERAL INFORMATION

PURPOSE: The purpose of this survey is to obtain a data base for the development of qualitative standards for improving industrial arts education programs that support vocational education as legislated under Public Law 94-482 and to establish industrial arts student organization activities as an effective and integral part of the instructional program.

DIRECTIONS

The state or territorial supervisor for industrial arts is asked to complete the attached form and return it within five (5) days in the self-addressed stamped envelope. Please provide actual data if available. If this is not possible, supply us with your BEST ESTIMATE based on the latest information accessible to you. Print all comments. Right justify the answers in the response box. Example: 352 Female Industrial Arts teachers in the state.

0	3	5	2

DEFINITIONS

STANDARDS FOR INDUSTRIAL ARTS: Measures of quality against which all existing industrial arts programs and activities can be evaluated and which serve as a guide for new or expanding programs. Example: Standards consist of those qualitative elements which affect the total program, such as facilities, content, methodologies, staffing, enrollment and resources.

INDUSTRIAL ARTS EDUCATION PROGRAMS: Those education programs (A) which pertain to the body of related subject matter, or related courses, organized for the development of understanding about all aspects of industry and technology, including learning experiences involving activities such as experimenting, designing, constructing, evaluating, and using tools, machines, materials, and processes and (B) which assist individuals in the making of informed and meaningful occupational choices or which prepare them for entry into advanced trade and industrial or technical education programs. (Public Law 94-482).

GRADES COVERED: Report data for grades 6-12 in Middle Schools and Secondary Schools.

AIASA: American Industrial Arts Student Association, the industrial arts student organization for secondary school students. AIASA helps assure the quality and relevance of instruction, develop student leadership, enhance citizenship responsibilities, overcome sex and race discrimination and sex stereotyping, and serve students with special needs.

DISADVANTAGED PERSONS (VOCATIONAL EDUCATION): Persons (other than handicapped persons) who have academic or economic handicaps and who require special services and assistance in order to enable them to succeed in vocational education programs under criteria developed by the Commissioner based on objective standards and the most recent available data. (Vocational Education Act of 1963).

FULL-TIME EQUIVALENCY (F.T.E.): The amount of time spent or required in a less than full-time activity divided by the amount of time normally spent or required in a corresponding full-time activity during the regular school term. Full-time equivalency usually is expressed as a decimal fraction to the nearest tenth. (National Center for Education Statistics)

GIFTED AND TALENTED: The mentally gifted include individuals whose level of mental development is so far advanced that they have been identified by professionally qualified personnel as needing additional educational opportunities beyond what is provided by the usual school program if they are to be educated to the level of their ability. The "talented" include individuals identified by professionally qualified personnel as being capable of high performance in one or more areas of special competency. Among these areas of special competence are intellectual ability, creativity, leadership ability and social adeptness, and facility in the productive and performing arts. (National Center for Education Statistics)

HANDICAPPED PERSONS: Persons who are mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, orthopedically impaired or other health impaired person or persons with specific learning disabilities who by reasons thereof require special education and related services, and who, because of their handicapping condition, cannot succeed in the regular vocational education program without special education assistance or who require a modified vocational education program. (Vocational Education Act of 1963).

SECONDARY SCHOOL: A school comprising any span of grades beginning with the next grade following an elementary or middle school and ending with or below grade 12. (National Center for Education Statistics)

1. How many industrial arts positions were vacant (not filled by anyone) in your state or territory (at the beginning of each school year) for the past three years?

Year	Vacant I.A. Positions
1976-77	
1977-78	
1978-79	

2. Please indicate the actual number of fully certified, emergency or temporary certified, and non-certified male and female industrial arts teachers employed in your state or territory for the past three years.

Certified

Year	Male	Female
1975-76		
1976-77		
1977-78		

Emergency or Temporary

Year	Male	Female
1975-76		
1976-77		
1977-78		

Non-Certified

Year	Male	Female
1975-76		
1976-77		
1977-78		

3. Indicate by sex how many persons earned bachelor degrees with teaching certification in industrial arts in your state or territory during the past three years.

Year	Male	Female
1975-76		
1976-77		
1977-78		

4. In your opinion, should in-service industrial arts training be required of all: (Please respond to each item)

	YES	NO
First year industrial arts teachers?	○	○
Teachers with provisional certification in industrial arts?	○	○
Teachers with other certification?	○	○
Teachers without certification?	○	○

5.a. Please indicate the total number of male and female students enrolled in each of the grade levels in your state or territory for the past three years.

	1977-78	
Grade	Male	Female
K-5		
6		
7		
8		
9		
10		
11		
12		

(5.a. continued on next page)

5.a. (Contd.)

1976-77

Grade	Male	Female
K-5		
6		
7		
8		
9		
10		
11		
12		

1975-76

Grade	Male	Female
K-5		
6		
7		
8		
9		
10		
11		
12		

5.b. Are these figures estimate or actual? - - - Estimated ○ Actual ○

6. Please indicate the 1977-78 total enrollments in federally funded (either full or partially) and non-federally supported industrial arts courses for each of the following grade levels in your state or territory.

Grades	Enrollments in Federally Funded Industrial Arts Courses	Enrollments In Non-Federally Funded Industrial Arts Courses
6		
7		
8		
9		
10		
11		
12		

7. Please list below the course titles and grade levels of federally funded industrial arts courses in your state or territory.

Course Titles	Grade Levels

8. Please list (by title) all industrial arts courses that are planned to be deleted in your state or territory within the next three years. (1979-81)

9. List (by title) all new industrial arts courses that are planned for implementation by your state or territorial agency within the next three years. (1979-81)

10.a. How many secondary schools are there in your state or territory? ☐☐☐☐☐

10.b. How many secondary schools offer industrial arts courses in your state or territory? ☐☐☐☐☐

10.c. How many schools in your state or territory are receiving federal funds for industrial arts? ☐☐☐☐☐

11.a. How many elementary and middle schools are there in your state or territory?
Elementary ☐☐☐☐☐
Middle ☐☐☐☐☐

11.b. How many elementary and middle schools offer industrial arts courses in your state or territory?
Elementary ☐☐☐☐☐
Middle ☐☐☐☐☐

12. Are all courses in industrial arts, which meet the criteria for federal funding, receiving funds? - - - - - - - YES ○ NO ○

COMMENTS:

13. Should all industrial arts courses in public schools, regardless of philosophical orientation, be federally funded? - - - - - - - - YES ○ NO ○

COMMENTS:

14. Please estimate the number of students with the following handicapping conditions served by industrial arts courses approved for federal funding. (Each student should be reported only once.) - - -

☐☐☐☐	Hard of hearing
☐☐☐☐	Deaf
☐☐☐☐	Visually handicapped
☐☐☐☐	Deaf - Blind
☐☐☐☐	Speech impaired
☐☐☐☐	Orthopedically impaired
☐☐☐☐	Specific learning disability
☐☐☐☐	Other health impaired
☐☐☐☐	Mentally gifted and talented
☐☐☐☐	Mentally retarded
☐☐☐☐	Seriously emotionally disturbed
☐☐☐☐	Disadvantaged
8 ○	Information not available

15. Has your state or territory developed a master plan for the scope and sequence of industrial arts courses? - - - YES ◯ NO ◯

If yes, does this plan or any other existing plan identify and/or include student club activities?

YES ◯ NO ◯

If no, are there plans to develop one in the next three years? (1979-81)

YES ◯ NO ◯

16. List the state or territory curriculum guides in industrial arts planned for development within the next three years. (1979-81) - - - - - -

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

17. Do provisions in the state or territory plan for vocational education cover industrial arts courses? - - - - - - - - - - - - YES ◯ NO ◯

If no, are there plans for inclusion of industrial arts in the state or territory plan for vocational education within the next three years? (1979-81) - - - - - - - YES ◯ NO ◯

18. Please indicate the type and number of industrial arts laboratories planned for construction during the next five years in your state or territory. (1979-84)

Type	Number Planned
_____	☐☐☐
_____	☐☐☐
_____	☐☐☐
_____	☐☐☐
_____	☐☐☐
_____	☐☐☐

COMMENTS:

_____

_____

_____

_____

19. Does the state or territorial industrial arts supervisory staff approve new industrial arts facility plans and major renovations? YES ○ NO ○

COMMENTS:

_____

_____

_____

_____

20. How many Full Time Equivalent (F.T.E.) supervisory personnel for industrial arts programs are employed at the state or territory level?
(use decimal equivalent for fraction) ☐☐ • ☐

21. How many Full Time Equivalent (F.T.E) supervisory personnel for industrial arts programs should be employed in your state or territory level? ☐☐

22. Is there a state or territorial staff member assigned to supervise industrial arts student organizations? - - - - - YES ◯ NO ◯

If yes, what percentage of time? ☐☐☐ %

If no, are there plans to make such an assignment within the next two years? (1979-81) YES ◯ NO ◯

23. How does the state or territory provide funding for student clubs? (Mark as many as apply) - - - -

◯ Supplement to teacher salary
◯ Extended employment for teachers
◯ Travel
◯ Others
◯ None is provided

COMMENTS:

_____

_____

_____

24. Please indicate the number of industrial arts clubs in your state or territory. - - - - - - - - - - ☐☐☐☐

NOTE: If the actual numbers are not known, please estimate.

25. Have any AIASA in-service work shops been conducted in your state or territory for teachers during the past three years? (1977-79) - - - - - - YES ◯ NO ◯

If YES, what is the total number of teachers who participated? ☐☐☐☐

If NO, are there any plans within the next three years? (1979-81) YES ◯ NO ◯

25. Do you have an Advisory Committee to assist in the promotion and establishment of industrial arts student clubs in your state or territory? - - - - - - - - - YES ◯ NO ◯

27. In your opinion, what are the major incentives for the promotion and establishment of industrial arts student clubs in your state or territory? - - - -

_____

_____

_____

_____

28. In your opinion, what are the constraints or "roadblocks" to promoting the establishment of industrial arts clubs in your state or territory? - - - - -

29. What do you think should be the maximum student/teacher ratio for industrial arts laboratory courses? - - - - - - - - - - [ ][ ] students to [1] teacher

30. Are industrial arts items included on minimum competency tests used in your state or territory? - YES ○ NO ○ MINIMUM COMPETENCY TESTING IS NOT USED ○

31. In your opinion, should industrial arts items be included on minimum competency tests? - - - - - - - - - YES ○ NO ○

32. Does the state or territory have regular and systematic evaluations of industrial arts programs? - - - - - - - - - - YES ○ NO ○

COMMENTS:

33. In your opinion, what are the major characteristics of an exemplary program in industrial arts? - - - - -

34. In your opinion, what should be the basic elements of standards for industrial arts in secondary schools in the United States. - - - -

Thank you for your valuable input into this research. NOTE: PLEASE MAIL THIS FORM BACK WITHIN FIVE (5) DAYS USING THE SELF-ADDRESSED ENVELOPE.

Appendix E.

List of Teacher Training Institutions Reporting

Industrial Arts and Industrial Arts Education Graduates

X - Responded, no industrial arts teacher education programs in existence

* - Responded, had an industrial arts teacher education program, reported data

0 - Responded, had an industrial arts teacher education program, but no data

XX - Responded, program closed

Institutions by State

Alabama
- Alabama A. & M. University
- * Tuskegee Institute
- * University of Alabama, University
- * University of Alabama, Birmingham

Arizona
- * Arizona State University
- * Northern Arizona University

Arkansas
- * University of Arkansas at Pine Bluff

California
- * California Polytechnic State University
- * California State University, Chico
- * California State University, Fresno
- * California State University, Long Beach
- X California State University, San Francisco
- * Humboldt State University
- * Pacific Union College
- * San Diego State University
- * San Jose State University

Colorado
- * Adams State College
- * Colorado State University
- * University of Northern Colorado
- * University of Southern Colorado
- * Western State College

Connecticut
- * Central Connecticut State College

Delaware
- * University of Delaware

Florida
- * Florida A. & M. University
- * Florida International University
- XX Florida State University
- * The University of West Florida

Georgia
* Berry College
* Georgia Southern College
* Savannah State College
* University of Georgia

Hawaii
* Brigham Young University, Hawaii Campus
* University of Hawaii

Idaho
University of Idaho

Illinois
* Eastern Illinois University
* Illinois State University
University of Illinois

Indiana
* Indiana State University

Iowa
* University of Northern Iowa
* Westmar College
William Penn College

Kansas
* Bethel College
* Emporia Kansas State College
* Fort Hays Kansas State College
* Pittsburg State University

Kentucky
Berea College
* Eastern Kentucky University
* Kentucky State University
0 Morehead State University
* Murray State University

Louisiana
* Grambling State University
* Louisiana State University
* Northwestern State University
* Southeastern Louisiana University
* University of Southwestern Louisiana

Maine
* University of Maine at Portland-Gorham

Maryland
* University of Maryland, College Park

Massachusetts
* Fitchburg State College

Michigan
* Lake Superior State College
* Michigan State University
* Western Michigan University

Minnesota
* Bemidji State University
* St. Cloud State University

Mississippi
* Alcorn State University
* Jackson State University
* Mississippi State University
* Mississippi Valley State University
* University of Southern Mississippi

Missouri
* Central Missouri State University
* Missouri Southern State College
* Northwest Missouri State University
* Southeast Missouri State University
* The School of the Ozarks
* University of Missouri

Montana
* Northern Montana College
* Western Montana College

Nebraska
* Chadron State College
* Kearney State College
* Peru State College
* Wayne State College

New Hampshire
Keene State College

New Jersey
* Glassboro State College
* Kean College of New Jersey

New Mexico
* New Mexico Highlands University

New York
* New York University - Washington Square
* State University College at Buffalo
* State University College at Oswego
* The City University of New York

North Carolina
  Appalachian State University
* Elizabeth City State University
* North Carolina Agricultural and Technical State University
* North Carolina State University
* Western Carolina University

Ohio
  Central State University
* Kent State University
* Ohio Northern University
* Ohio University

Oklahoma
* Central State University
* East Central Oklahoma State University
* Langston University
* Northeastern Oklahoma University
* Northwestern Oklahoma State University
* Oklahoma State University
* Panhandle State University
* Southwestern Oklahoma State University

Oregon
* Oregon State University

Pennsylvania
* California State College
  Cheyney State College
* Millersville State College
* The Pennsylvania State University
* Temple University

South Carolina
* Black Hills State College
* Dakota State College
* Northern State College

Tennessee
  Austin Peay State University
* East Tennessee State University
* Memphis State University
* Middle Tennessee State University
  Southern Missionary College
* Tennessee Technological University

Texas
* Abilene Christian University
* East Texas State University
* North Texas State University
* Southwest Texas State University

Texas, continued
* Southwest Adventist College
* Sul Ross State University
Tarleton State University
West Texas State University

Utah
* Brigham Young University
* Southern Utah State College
* Utah State University

Virginia
Norfolk State College
* Old Dominion University
* Virginia Polytechnic Institute and State University
* Virginia State College

Washington
* Walla Walla Washington
* Western Washington State College

West Virginia
* Fairmont State College
* West Virginia Institute of Technology

Wisconsin
* University of Wisconsin - Stout

Wyoming
* University of Wyoming

Appendix F.

List of Teacher Training Institutions Reporting Industrial Education, Industrial Technology (Teaching Option), and Technical Education (Occupational Education)

X - Responded, no industrial arts teacher education programs in existence

* - Responded, had an industrial arts teacher education program, reported data

0 - Responded, had an industrial arts teacher education program, but no data

XX - Responded, program closed

Institutions by State

Alabama
- X Athens State College

Arkansas
- * University of Arkansas
- * University of Central Arkansas

California
- X California State University, Los Angeles

Colorado
- * Metropolitan State College

Illinois
- X Bradley University
- * Chicago State University
- * Northern Illinois University
- * Southern Illinois University
- * Western Illinois University

Indiana
- * Ball State University
- * Purdue University

Iowa
- * Iowa State University

Kansas
- * McPherson College
- Wichita State University

Kentucky
- * Western Kentucky University

Maryland
- * University of Maryland - Eastern Shore

Michigan
- * Andrews University
- * Central Michigan University

Michigan, continued
* Eastern Michigan University
0 Northern Michigan University
Wayne State University

Minnesota
* Mankato State University
* Moorhead State University
* University of Minnesota, Duluth
* Winona State University

Missouri
* Lincoln University
* Northeast Missouri State University
* Southwest Missouri State University

Montana
* Montana State University

Nebraska
* University of Nebraska
X University of Nebraska at Omaha

New Jersey
Montclair State College
* Trenton State College

New Mexico
Eastern New Mexico University
* University of New Mexico

North Carolina
* East Carolina University

North Dakota
* University of North Dakota
* Valley City State College

Ohio
Bowling Green State University
* Miami University
* The Ohio State University

Oklahoma
* Southeastern Oklahoma State University

Puerto Rico
* University of Puerto Rico

Rhode Island
Rhode Island College

South Carolina
* South Carolina State College

Tennessee
* The University of Tennessee

Texas
* Prairie View A & M University
* Sam Houston State University
* Texas A & M University
* Texas A & I University
* Texas Eastern University
* Texas Southern University
* University of Houston

Vermont
* University of Vermont

Washington
* Central Washington State College
* Eastern Washington University
* University of Washington
* Washington State University

West Virginia
West Virginia University (no Bachelor's)

Wisconsin
* University of Wisconsin - Platteville
* University of Wisconsin - River Falls

Appendix G.

Teacher Training Institution Survey

Dear Industrial Arts/Education Department Head:

Your assistance is urgently needed in determining the magnitute of the shortages of industrial arts teachers in the United States. Recent studies that were conducted by Dr. Rex Miller and Dr. Donald Smith indicated that the number of states which were unable to obtain sufficient numbers of qualified teachers has almost doubled in only three years. These studies, however, did not collect accurate data to indicate how many teachers were needed to fill the vacancies that actually existed in the states reporting shortages.

At the present time the U.S. Office of Education is using data which placed the number of vacancies in 1977-78 at 439 teachers. Since the study which collected these data was concerned only with vocational education it is very unlikely that this figure represents the actual extent of the shortages. Unfortunately, this figure is the only one available to be used to determine policies and priorities but it probably grossly underestimates the seriousness of the problem. It is imperative that solutions to the teacher shortage problem in industrial arts be found soon because it appears likely that teacher shortages will occur in most teaching fields by the mid-1980's. If we have a shortage when other fields are having large surpluses what will we have when most teaching fields also are having shortages?

This study will supply data that will be a direct comparison with the U.S.O.E. data, and will determine statistics which will allow projections to be made regarding future shortages. The Standards for Industrial Arts Education Programs Project at V.P.I. & S.U. is collecting data which, when coupled with data from this study will present a much more accurate picture of how large the shortages are currently and what they are likely to be in the next few years.

Every state supervisor of industrial arts and every industrial arts teacher training institution in the United States has been contacted to supply data and most will willingly complete the survey because of the obvious need to the profession. The response from the profession, historically, has been less than total in the past, but 100 percent response is needed in this study. This means that <u>your</u> response is critical, so, please complete the survey and return it within 48 hours.

Thank you for your help in this most important study.

Sincerely,

C Daniel Miller

C. Daniel Miller

SURVEY OF INDUSTRIAL ARTS TEACHER TRAINING INSTITUTIONS
to determine
THE NATIONAL SUPPLY OF INDUSTRIAL ARTS TEACHERS

This survey is designed to collect data on several aspects of the employment of public school industrial arts education teachers in the United States. The questions being asked are related to supply and demand factors such as sources of public school teachers. This survey and a survey of state industrial arts supervisors are being used to collect data on twenty-one separate variables that are used to determine the balance between supply and demand. Once these variables have been quantified educational planners will be able to make more accurate supply and demand projections and plan accordingly. At the present time we only know that we need more teachers than we have, but we need to know much more about the situation.

DEFINITIONS OF TERMS USED IN THE SURVEY:

1. Former industrial arts teacher - a person who had formerly held a teaching position in industrial arts but left the profession. Does NOT include those persons who left to further their education on sabatical or leave of absence.

2. Industrial arts education - refers to that segment of industrial education which is either general education, pre-technical, exploratory, or pre-vocational in nature. Does NOT include vocational education, trade and industrial education, or technical education as related to specific job entry preparation.

3. Industrial arts graduate - includes anyone who graduates from an accredited teacher training institution and meets that state's training requirements for beginning teachers of industrial arts education. For this survey this may include BOTH bachelor's and master's degree awardees IF the graduate obtained initial qualifications to teach industrial arts at the advanced level OR completed both degrees before accepting an initial teaching position. This includes teachers from other fields or others who are re-trained to be industrial arts teachers IF a degree and certification are obtained in industrial arts education.

4. Teaching position - any teaching position which specifies that a teacher hold a license, endorsement, or certification in industrial arts education in addition to the general teaching certificate that is required of all public school teachers in that state.

DIRECTIONS FOR COMPLETING THE SURVEY:

Please answer each of the following questions as accurately as possible. If it should be necessary to estimate some of the responses, please make the estimates as close to the actual as possible and indicate that the response was an estimate beside the response.

1.a. Does your department or program graduate potential industrial arts education teachers who meet your state's certification, license, or endorsement requirements in industrial arts education? YES ☐ NO ☐

If NO, stop here. Return survey in pre-addressed envelope.

b. If YES, what was the number who graduated between December 1976 and August 1977 with a bachelor's degree? ☐

c. If YES, what was the number who graduated between December 1976 and August 1977 with a master's degree who had never taught industrial arts other than student teaching? (see the definition of Industrial arts graduate) ☐

2. Of the numbers given in questions 1b and 1c, how many of the graduates accepted industrial arts teaching positions in public schools in the 1977-78 school year:

a. in your state? . . . . . bachelor's ☐ master's ☐

b. in another state? . . . . . bachelor's ☐ master's ☐

3. Of the numbers given in questions 1b and 1c, how many of the graduates were unable to obtain an industrial arts teaching position in the 1977-78 school year? (see #4) ☐

4. Of the numbers given in questions 1b and 1c, how many of the graduates were unwilling to relocate to obtain an industrial arts teaching position in the 1977-78 school year and subsequently did not obtain one? (see #3) ☐

5. How many of the full-time industrial arts graduate students who were enrolled in your program during the 1977-78 school year (NOT the same year as question 1c) were industrial arts teachers who were on sabatical or leave of absence from their school? ☐

6. How many teachers from other teaching fields gained certification, license, or endorsement to teach industrial arts education at your institution without obtaining a degree during the 1976-77 school year? ☐

7. Of the number given in question 6, how many of them held an industrial arts teaching position during the 1977-78 school year:

a. in your state? . . . . . ☐

b. in another state? . . . . . ☐

8. With your present facilities, how many undergraduate students -

a. can you have enrolled in industrial arts education? . . . ☐

b. do you presently have enrolled in industrial arts education? ☐

224 Lane Hall
V.P.I. & S.U.
Blacksburg, VA 24061

Dear Industrial Arts Department Head:

About a month ago, I sent you a short survey to collect data on your industrial arts education program. As of June 1, I have not received the survey back, probably because you have been experiencing the rush we all have at the end of the school year. Now that things have settled, for the time being, I would greatly appreciate it if you would take a few minutes to complete the survey. An additional copy of the survey is enclosed so that you will not have to search for it.

Since this is part of a national supply and demand study which has been designed to determine the total ability of teacher education programs to produce industrial arts education teachers, it is important that your survey be included. Once it has been completed please return it to the following address:

C. Daniel Miller
224 Lane Hall
V.P.I. & S.U.
Blacksburg, VA 24061

Thank you for your assistance.

Sincerely,

C Daniel Miller

C. Daniel Miller

224 Lane Hall
V.P.I & S.U.
Blacksburg, Va. 24061

Dear Teacher Educator:

Summer is a most inconvenient time to be conducting a survey of teacher educators, but I have been fortunate to obtain responses from 160 institutions so far. Unfortunately, yours was not one of them, no doubt for one or more of several good reasons. Please indulge me just once more in my request for data on your industrial arts students. The survey should take very little of your time and the data you provide on your students is sorely needed. The data that have been returned indicate a great deal but they cannot replace the data on your students.

Thank you for permitting me the opportunity to make one more appeal. Hopefully, I will have been able to succeed in finding you not on travel, vacation, or summer conferences. I eagerly await your completed survey.

Sincerely

C. Daniel Miller

Appendix H.

Computer Printouts

Part 1.

State Supervisors' Survey SPSS Program

```
//B1185DUG JOB 400C8,MILLER,VM=DIRTY
/*LONGKEY XXXXX
/*JOBPARM LINES=10
/*PRIORITY IDLE
//STEP EXEC SPSS
//FT09F001 DD SYSOUT=A,DCB=BLKSIZE=80
//SYSIN DD *
COMMENT          THE FILE USED TO GENERATE THIS OUTPUT WAS SUPV SPSS.
VARIABLE LIST    SID,EC1M, EC1F,EU1M,EU1F,EC2M,EC2F,
                 EU2M,EU2F,TOUTFLO,TURNOVER,NEWJOBS,INFLO,
                 TGINSTA,TGOUTSTA,TGOTHER,ABOLISH1,ABOLISH2,
                 ESTIMATE,V1,V2A
INPUT MEDIUM     CARD
INPUT FORMAT     FIXED(F2.0,F4.0,F3.0,F3.0,F2.0,F4.0,F3.0,
                 F3.0,F2.0,F4.0,1X,F3.3,F3.0,F3.0,
                 F3.0,F3.0,F3.0,F3.0,F2.0,5X,
                 F1.0,2X,F3.0,1X,F3.0)
N OF CASES       47
COMMENT            THESE COMPUTATIONS ARE TO DETERMINE SUPPLY AND DEMAND FOR 77-78
COMPUTE          OUTFLO=(EC1M + EC1F) * TURNOVER
IF               (SID EQ 26) OUTFLO=20
IF               (SID EQ 31) OUTFLO=32
COMPUTE          SX1= EC1M+EC1F+TGINSTA+TGOUTSTA+TGOTHER-((EC1M+EC1F) * TURNOVER)
COMMENT            THESE COMPUTATIONS ARE TO DETERMINE THE PROPORTION OF MALE AND
                   FEMALE INDUSTRIAL ARTS TEACHERS IN THE UNITED STATES
COMPUTE          TOT7677=EC1M + EC1F + EU1M + EU1F
IF               (SID EQ 26) TOT7677=274
IF               (SID EQ 14) TOT7677=260
IF               (SID EQ 53) TOT7677=232
IF               (SID EQ 20) TOT7677=567
IF               (SID EQ 2) TOT7677=258
IF               (SID EQ 3) TOT7677=816
IF               (SID EQ 17) TOT7677=1065
IF               (SID EQ 31) TOT7677=326
IF               (SID EQ 23) TOT7677=353
COMPUTE          TOT7778= EC2M + EC2F + EU2M + EU2F
IF               (SID EQ 26) TOT7778=274
IF               (SID EQ 14) TOT7778=249
IF               (SID EQ 53) TOT7778=243
IF               (SID EQ 20) TOT7778=540
IF               (SID EQ 2) TOT7778=268
IF               (SID EQ 50) TOT7778=1476
IF               (SID EQ 7) TOT7778=1221
IF               (SID EQ 3) TOT7778=824
IF               (SID EQ 17) TOT7778=1071
IF               (SID EQ 31) TOT7778=326
IF               (SID EQ 16) TOT7778=2240
IF               (SID EQ 23) TOT7778=2005
COMPUTE          DEM7677 = EC1M + EC1F + EU1M + EU1F + V1
COMPUTE          DEM7778A= EC2M + EC2F + EU2M + EU2F + V2A
COMPUTE          V2B= TOUTFLO - INFLO + NEWJOBS + ABOLISH1
COMPUTE          DEM7778B= EC2M + EC2F + EU2M + EU2F + V2B
COMPUTE          GRODECA= DEM7778A - DEM7677
COMPUTE          GRODECB= DEM7778B - DEM7677
COMPUTE          SHORTA= DEM7778A - SX1
```

```
COMPUTE         SHORTB= DEM7778B - SX1
COMPUTE         MALE7677= EC1M + EU1M
IF              (SID EQ 14) MALE7677=260
IF              (SID EQ 53) MALE7677=230
IF              (SID EQ 20) MALE7677=560
IF              (SID EQ 3) MALE7677=814
IF              (SID EQ 23) MALE7677=350
COMPUTE         MALE7778= EC2M + EU2M
IF              (SID EQ 14) MALE7778=249
IF              (SID EQ 53) MALE7778=241
IF              (SID EQ 20) MALE7778=530
IF              (SID EQ 50) MALE7778=1472
IF              (SID EQ 7) MALE7778=1215
IF              (SID EQ 3) MALE7778=823
IF              (SID EQ 23) MALE7778=2000
COMPUTE         MALEPRO1= (EC1M + EU1M) / (EC1M + EC1F + EU1M + EU1F)
COMPUTE         MALEPRO2= (EC2M + EU2M) / (EC2M + EC2F + EU2M + EU2F)
COMPUTE         FEMA7677= EC1F + EU1F
COMPUTE         FEMA7778= EC2F + EU2F
COMPUTE         FEMAPRO1= (EC1F +EU1F) / (EC1M + EC1F +EU1M + EU1F)
COMPUTE         FEMAPRO2= (EC2F +EU2F) / (EC2M + EC2F +EU2M + EU2F)
COMMENT           THESE COMPUTATIONS ARE TO DETERMINE THE PROPORTION OF CERTIFIED
                  AND UNCERTIFIED TEACHERS
COMPUTE         CERTPRO1= (EC1M + EC1F) / (EC1M + EC1F + EU1M + EU1F)
COMPUTE         CERTPRO2= (EC2M + EC2F) / (EC2M + EC2F + EU2M + EU2F)
COMPUTE         UNDCERT1= 1 - CERTPRO1
COMPUTE         UNDCERT2= 1 - CERTPRO2
COMMENT           THESE COMPUTATIONS ARE TO DETERMINE THE PROPORTIONS OF IND.
                  ARTS GRADUATES WHO ACCEPTED IA TEACHING JOBS IN THE STATE WHERE
                  THEY GRADUATED AND THOSE WHO ACCEPTED IA TEACHING JOBS OUTSIDE
                  THE STATE WHERE THEY GRADUATED.
COMPUTE         INSTATE2= TGINSTA / ( TGINSTA + TGOUTSTA )
COMPUTE         OUTSTA2= 1 - INSTATE2
VAR LABELS      SID IDENTIFICATION OF STATE/
                SX1 SUPPLY OF IA TEACHERS FOR 1977-78/
                EC1M CERTIFIED MALE IA TEACHERS IN 1976-77/
                EC1F CERTIFIED FEMALE IA TEACHER IN 1976-77/
                TGINSTA 76-77 IN-STATE GRADS HIRED IN 77-78/
                TGOUTSTA 76-77 OUT-STATE GRADS HIRED IN 77-78/
                TGOTHER OTHER IA TEACHERS HIRED IN 1977-78/
                OUTFLO TURNOVER OF QUALIFIED TEACHERS, 76-77/
                DEM7677 IA TEACHER DEMAND IN 76-77, STANPROJ DATA/
                DEM7778A IA TEACHER DEMAND IN 77-78, STANPROJ DATA/
                EC2M CERTIFIED MALE IA TEACHERS IN 1977-78/
                EC2F CERTIFIED FEMALE IA TEACHERS IN 1977-78/
                EU1M UNDERCERTIFIED MALE IA TEACHERS IN 76-77/
                EU1F UNDERCERTIFIED FEMALE IA TCHRS IN 76-77/
                EU2M UNDERCERTIFIED MALE IA TEACHERS IN 77-78/
                EU2F UNDERCERTIFIED FEMALE IA TCHRS IN 77-78/
                V1 VACANT IA POSITIONS IN 1976-77/
                V2A VACANT IA POSITIONS IN 1977-78, SUPV DATA/
                V2B CALCULATED VACANT POSITIONS IN 1977-78/
                NEWJOBS NEW POSITIONS INITIALLY OPEN IN 1977-78/
                INFLO NEW AND TURNOVER POSITIONS FILLED, 77-78/
                ABOLISH1 IA POSITIONS ABOLISHED IN 1977-78/
```

```
                TURNOVER IA TEACHER TURNOVER PERCENT RATE, 76-77/
                IOUTFLO POSITIONS VACATED BY ICHR TURNOVER,76-77/
                GRODECA ICHR DEMAND GROWTH - 76-78, STANPROJ DATA/
                GRODECB TCHR DEMAND GROWTH - 76-78, SUPV DATA/
                DEM7778B IA TEACHER DEMAND IN 77-78, SUPV DATA/
                SHORTA IA TEACHER SHORTAGE IN 1977-78, STANPROJ/
                SHORTB IA TEACHER SHORTAGE IN 1977-78, SUPV DATA/
MISSING VALUES  EC1F,EU1M,EC2F,EU2M,NEWJOBS,TO ABOLISH1,V1,V2A(997,998,999)/
                EC1M,EC2M(9997,9998,9999)/EU1F,EU2F,ABOLISH2(97,98,99)/
                TOUTFLO(9999)/TURNOVER(.999)/ESTIMATE(9)
ASSIGN MISSING  OUTFLO,SX1,DEM7677,DEM7778A,DEM7778B,GRODECA,GRODECB,SHORTA,
                SHORTB,TOT7677,TOT7778,MALE7677,MALE7778,MALEPRO1,MALEPRO2,
                FEMA7677,FEMA7778,FEMAPRO1,FEMAPRO2,CERTPRO1,CERTPRO2,UNDCERT1,
                UNDCERT2,INSTATE2,OUTSTA2,V2B(9999)
WRITE CASES     (2(F7.0,2X),F5.0,2X,F5.0,2X,F7.0,2X,F8.0,2X,F7.0,2X,F6.0,2X,F5.0)
                SID, SID, EC1M,EC1F,TGINSTA,TGOUTSTA,TGOTHER,OUTFLO,SX1
READ INPUT DATA
WRITE CASES     (F7.0,2X,F7.0,6(2X,F5.0))
                SID,SID,EC1M,EC1F,EU1M,EU1F,V1,DEM7677
WRITE CASES     (F7.0,2X,F7.0,2X,F5.0,2X,F5.0,2X,F5.0,2X,F5.0,2X,F5.0,3X,F5.0,
                2X,F5.0,3X,F5.0)
                SID,SID,EC2M,EC2F,EU2M,EU2F,V2A,DEM7778A,V2B,DEM7778B
WRITE CASES     (F7.0,2X,F7.0,2X,F5.0,3X,F5.0,3X,F5.0,3X,F5.0,3X,F5.0,3X,F5.0)
                SID,SID,TOUTFLO,ESTIMATE1,NEWJOBS,INFLO,ABOLISH1,V2B
WRITE CASES     (F7.0,2X,F7.0,2X,F5.0,4X,F5.0,4X,F5.0,4X,F5.0,4X,F5.0)
                SID,SID,DEM7677,DEM7778A,DEM7778B,GRODECA,GRODECB
WRITE CASES     (F7.0,2X,F7.0,2X,F5.0,2X,F5.0,5X,F5.0,4X,F5.0,3X,F5.0)
                SID,SID,SX1,DEM7778A,DEM7778B,SHORTA,SHORTB
WRITE CASES     (F7.0,2X,F7.0,2X,F4.0,2X,F4.0,1X,F6.2,F6.2,4X,
                2X,F4.0,3X,F4.0,1X,F6.2,1X,F6.2)
                SID,SID,MALE7677,FEMA7677,MALEPRO1,FEMAPRO1,MALE7778,FEMA7778,
                MALEPRO2,FEMAPRO2
WRITE CASES     (F7.0,2X,F7.0,2X,F4.0,2X,F4.0,1X,F6.2,F6.2,3X,
                2X,F4.0,3X,F4.0,1X,F6.2,1X,F6.2)
                SID,SID,EU1M,EU1F,CERTPRO1,UNDCERT1,EU2M,EU2F,CERTPRO2,UNDCERT2
WRITE CASES     (F7.0,2X,F7.0,4(3X,F4.0))
                SID,SID,EU1M,EU1F,EU2M,EU2F
FINISH
/*
//
```

Part 2.

Teacher Education Institution Survey SPSS Program

SPSS BATCH SYSTEM 09/29/79 PAGE 1

SPSS FOR OS/360, VERSION M, RELEASE 8.0, MAY 15, 1979
DEFAULT SPACE ALLOCATION.. ALLOWS FOR.. 102 TRANSFORMATIONS
WORKSPACE 71680 BYTES 409 RECODE VALUES + LAG VARIABLES
TRANSPACE 10240 BYTES 1641 IF/COMPUTE OPERATIONS

```
 1 RUN NAME       THIRD ANALYSIS USING HIGH VALUES FOR SCHOOL SURVEY
 2 VARIABLE LIST  ID Q1A Q1B Q1C Q2A1 Q2A2 Q2B1 Q2B2 Q3 Q4 Q5 Q6 Q7A Q7B Q8A Q8B
 3                SUM2 SUM7
 4 INPUT MEDIUM   CARD
 5 INPUT FORMAT   FIXED(F3.0,F1.0,F3.0,F2.0,2(F3.0,F2.0),6(F2.0),3(F3.0),F2.0)
```

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
ID	F 3. 0	1	1- 3
Q1A	F 1. 0	1	4- 4
Q1B	F 3. 0	1	5- 7
Q1C	F 2. 0	1	8- 9
Q2A1	F 3. 0	1	10- 12
Q2A2	F 2. 0	1	13- 14
Q2B1	F 3. 0	1	15- 17
Q2B2	F 2. 0	1	18- 19
Q3	F 2. 0	1	20- 21
Q4	F 2. 0	1	22- 23
Q5	F 2. 0	1	24- 25
Q6	F 2. 0	1	26- 27
Q7A	F 2. 0	1	28- 29
Q7B	F 2. 0	1	30- 31
Q8A	F 3. 0	1	32- 34
Q8B	F 3. 0	1	35- 37
SUM2	F 3. 0	1	38- 40
SUM7	F 2. 0	1	41- 42

THE INPUT FORMAT PROVIDES FOR 18 VARIABLES. 18 WILL BE READ
IT PROVIDES FOR 1 RECORDS ('CARDS') PER CASE. A MAXIMUM OF 42 'COLUMNS' ARE USED ON A RECORD.

```
 6 N OF CASES     175
 7 COMPUTE        ACC7677B=(Q2A1+Q2B1)/Q1B
 8 COMPUTE        ACC7677M=(Q2A2+Q2B2)/Q1C
 9 COMPUTE        ACC7677=(Q2A1+Q2A2+Q2B1+Q2B2)/(Q1B+Q1C)
10 COMPUTE        MOBILITY=(Q7A+Q7B)/Q6
11 COMPUTE        TOTALACC=(Q2A1+Q2A2+Q2B1+Q2B2+Q7A+Q7B)/(Q1B+Q1C+Q6)
12 COMPUTE        INSTATEB=Q2A1/(Q2A1+Q2B1)
13 COMPUTE        INSTATEM=Q2A2/(Q2A2+Q2B2)
14 COMPUTE        INSTATEO=Q7A/(Q7A+Q7B)
15 COMPUTE        INSTATE1=(Q2A1+Q2A2+Q7A)/(Q2A1+Q2A2+Q2B1+Q2B2+Q7A+Q7B)
16 COMPUTE        OUTSTAB=1-INSTATEB
17 COMPUTE        OUTSTAM=1-INSTATEM
18 COMPUTE        OUTSTAO=1-INSTATEO
```



```
19 COMPUTE        OUTSTA1=1-INSTATE1
```

```
                20 COMPUTE         UTILIZED=Q8B/Q8A
                21 ASSIGN MISSING ACC7677B,ACC7677M,ACC7677,MOBILITY,TOTALACC,INSTATE1,OUTSTA1,
                22                UTILIZED,INSTATEB,INSTATEM,INSTATEO,OUTSTAB,OUTSTAM,OUTSTAO(9999)
                23 VAR LABELS     ID IDENTIFICATION OF INSTITUTION/
                24                Q1A DOES YOUR DEPARTMENT PREPARE IA TEACHERS?/
                25                Q1B BACHELOR'S DEGREE GRADUATES IN 1976-77/
                26                Q1C MASTER'S DEGREE GRADUATES IN 1976-77/
                27                Q2A1 BACH DEGREE GRADS ACCPTNG JOB IN STATE/
                28                Q2B1 BACH DEGREE GRADS ACPTNG JOB OUT-STATE/
                29                Q2A2 MASTER DEGREE GRADS ACPTNG JOB IN STATE/
                30                Q2B2 MASTER DEGREE GRADS ACPTNG JOB OUT-STATE/
                31                Q3 1976-77 GRADS UNABLE TO GET IA POSITION/
                32                Q4 1976-77 GRADS WOULD NOT MOVE FOR IA JOB/
                33                Q5 IA TEACHERS ON SABBATICAL LEAVE IN 77-78/
                34                Q6 OTHER TEACHERS GAINING CERT IN IA, 76-77/
                35                Q7A OTHER CERT TEACHERS WHO HELD JOB IN STATE/
                36                Q7B OTHER CERT TEACHER WHO HELD JOB OUT-STATE/
                37                Q8A MAXIMUM UNDERGRAD IA ENROLLMENT/
                38                Q8B NO. UNDERGRAD IA STUDENTS ENROLLED NOW/
                39                ACC7677B PROP 76-77 BACH GRADS ACCPTNG IA JOB/
                40                ACC7677M PROP 76-77 MASTERS GRADS ACCPTNG IA JOB/
                41                ACC7677 PROP ALL 76-77 IA GRADS ACCPTNG IA JOBS/
                42                MOBILITY PROP OTHER CERT TEACHERS ACCPTNG IA JOBS/
                43                TOTALACC PROP ALL POTENTIAL TEACHERS ACCPTNG JOBS/
                44                INSTATEB PROP BACH GRADS ACCPTNG IA JOBS IN-STATE/
                45                INSTATEM PROP MASTERS GRADS ACCPTNG JOBS IN-STATE/
                46                INSTATEO PROP OTHER TCHR ACCPTNG IA JOB IN-STATE/
                47                INSTATE1 PROP GRADS, OTHERS ACCPTNG JOBS IN-STATE/
                48                OUTSTAB PROP BACH GRADS ACCPTNG IA JOB OUT-STATE/
                49                OUTSTAM PROP MASTERS GRADS ACCPTNG JOB OUT-STATE/
                50                OUTSTAO PROP OTHER TCHR ACCPTNG IA JOB OUT-STATE/
                51                OUTSTA1 PROP GRADS, OTHERS ACCPTNG JOB OUT-STATE/
                52                UTILIZED PROP OF UNDERGRAD IA CAPACITY UTILIZED
                53 MISSING VALUES Q1B(998,999)/Q1C,Q2A2,Q2B2,Q3 TO Q7B,SUM7(97,98,99)/
                54                Q2A1,Q2B1,Q8A,Q8B,SUM2(997,998,999)
                55 IF              (Q1C EQ 97) Q1C=0
                56 IF              (Q2A2 EQ 97) Q2A2=0
                57 IF              (Q2B2 EQ 97) Q2B2=0
                58 IF              (Q7A EQ 97) Q7A=0
                59 IF              (Q7B EQ 97) Q7B=0
                60 IF              (Q5 EQ 97) Q5=0
                61 CONDESCRIPTIVE Q1B TO Q8B, ACC7677B, ACC7677M, ACC7677, MOBILITY,TOTALACC,

 ***** GIVEN WORKSPACE ALLOWS FOR 1433 VARIABLES FOR CONDESCRIPTIVE PROBLEM *****

                62                INSTATEB,INSTATEM,INSTATEO,INSTATE1,OUTSTAB,OUTSTAM,OUTSTAO,
                63                OUTSTA1,UTILIZED
                64 STATISTICS     ALL
                65 READ INPUT DATA
```


FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE Q1B BACHELOR'S DEGREE GRADUATES IN 1976-77

MEAN	25.333	STD ERROR	2.071	STD DEV	27.322
VARIANCE	746.513	KURTOSIS	16.812	SKEWNESS	3.481
RANGE	215.000	MINIMUM	0.0	MAXIMUM	215.000
SUM	4408.000				
VALID OBSERVATIONS -	174	MISSING OBSERVATIONS -	1		

VARIABLE Q1C MASTER'S DEGREE GRADUATES IN 1976-77

MEAN	2.447	STD ERROR	0.359	STD DEV	4.528
VARIANCE	20.502	KURTOSIS	36.793	SKEWNESS	4.877
RANGE	42.000	MINIMUM	0.0	MAXIMUM	42.000
SUM	389.000				
VALID OBSERVATIONS -	159	MISSING OBSERVATIONS -	16		

VARIABLE Q2A1 BACH DEGREE GRADS ACCPTNG JOB IN STATE

MEAN	14.857	STD ERROR	1.250	STD DEV	15.517
VARIANCE	240.790	KURTOSIS	7.653	SKEWNESS	2.503
RANGE	95.000	MINIMUM	0.0	MAXIMUM	95.000
SUM	2288.000				
VALID OBSERVATIONS -	154	MISSING OBSERVATIONS -	21		

VARIABLE Q2A2 MASTER DEGREE GRADS ACPTNG JOB IN STATE

MEAN	1.469	STD ERROR	0.277	STD DEV	3.358
VARIANCE	11.278	KURTOSIS	53.579	SKEWNESS	6.217
RANGE	33.000	MINIMUM	0.0	MAXIMUM	33.000
SUM	216.000				
VALID OBSERVATIONS -	147	MISSING OBSERVATIONS -	28		

THIRD ANALYSIS USING HIGH VALUES FOR SCHOOL SURVEY 09/29/79 PAGE 4

FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE Q2B1 BACH DEGREE GRADS ACPTNG JOB OUT-STATE

MEAN	3.383	STD ERROR	0.459	STD DEV	5.455
VARIANCE	29.752	KURTOSIS	19.730	SKEWNESS	3.965
RANGE	40.000	MINIMUM	0.0	MAXIMUM	40.000
SUM	477.000				
VALID OBSERVATIONS -	141	MISSING OBSERVATIONS -	34		

VARIABLE Q2B2 MASTER DEGREE GRADS ACPTNG JOB OUT-STATE

MEAN	0.485	STD ERROR	0.123	STD DEV	1.435
VARIANCE	2.059	KURTOSIS	21.482	SKEWNESS	4.427
RANGE	9.000	MINIMUM	0.0	MAXIMUM	9.000

SUM 66.000
VALID OBSERVATIONS - 136 MISSING OBSERVATIONS - 39

VARIABLE Q3 1976-77 GRADS UNABLE TO GET IA POSITION

MEAN	0.463	STD ERROR	0.177	STD DEV	2.257
VARIANCE	5.095	KURTOSIS	46.812	SKEWNESS	6.628
RANGE	18.000	MINIMUM	0.0	MAXIMUM	18.000
SUM	75.000				

VALID OBSERVATIONS - 162 MISSING OBSERVATIONS - 13

VARIABLE Q4 1976-77 GRADS WOULD NOT MOVE FOR IA JOB

MEAN	1.331	STD ERROR	0.334	STD DEV	4.182
VARIANCE	17.492	KURTOSIS	70.747	SKEWNESS	7.480
RANGE	44.000	MINIMUM	0.0	MAXIMUM	44.000
SUM	209.000				

VALID OBSERVATIONS - 157 MISSING OBSERVATIONS - 18

FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE Q5 IA TEACHERS ON SABBATICAL LEAVE IN 77-78

MEAN	0.633	STD ERROR	0.177	STD DEV	2.306
VARIANCE	5.317	KURTOSIS	76.452	SKEWNESS	7.853
RANGE	25.000	MINIMUM	0.0	MAXIMUM	25.000
SUM	107.000				

VALID OBSERVATIONS - 169 MISSING OBSERVATIONS - 6

VARIABLE Q6 OTHER TEACHERS GAINING CERT IN IA, 76-77

MEAN	1.229	STD ERROR	0.151	STD DEV	1.940
VARIANCE	3.765	KURTOSIS	15.479	SKEWNESS	3.057
RANGE	15.000	MINIMUM	0.0	MAXIMUM	15.000
SUM	204.000				

VALID OBSERVATIONS - 166 MISSING OBSERVATIONS - 9

VARIABLE Q7A OTHER CERT TEACHERS WHO HELD JOB IN STAT

MEAN	0.833	STD ERROR	0.139	STD DEV	1.737
VARIANCE	3.017	KURTOSIS	28.621	SKEWNESS	4.308
RANGE	15.000	MINIMUM	0.0	MAXIMUM	15.000
SUM	130.000				

VALID OBSERVATIONS - 156 MISSING OBSERVATIONS - 19

VARIABLE Q7B OTHER CERT TEACHER WHO HELD JOB OUT-STAT.

MEAN	0.099	STD ERROR	0.028	STD DEV	0.341
VARIANCE	0.116	KURTOSIS	14.041	SKEWNESS	3.679
RANGE	2.000	MINIMUM	0.0	MAXIMUM	2.000
SUM	15.000				
VALID OBSERVATIONS -	152	MISSING OBSERVATIONS -	23		

FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE Q8A MAXIMUM UNDERGRAD IA ENROLLMENT

MEAN	196.569	STD ERROR	12.030	STD DEV	155.461
VARIANCE	24168.114	KURTOSIS	6.926	SKEWNESS	2.241
RANGE	920.000	MINIMUM	0.0	MAXIMUM	920.000
SUM	32827.000				
VALID OBSERVATIONS -	167	MISSING OBSERVATIONS -	8		

VARIABLE Q8B NO. UNDERGRAD IA STUDENTS ENROLLED NOW

MEAN	105.269	STD ERROR	9.337	STD DEV	122.100
VARIANCE	14908.515	KURTOSIS	17.841	SKEWNESS	3.695
RANGE	916.000	MINIMUM	4.000	MAXIMUM	920.000
SUM	18001.000				
VALID OBSERVATIONS -	171	MISSING OBSERVATIONS -	4		

VARIABLE ACC7677B PROP 76-77 BACH GRADS ACCPTNG IA JOB

MEAN	0.757	STD ERROR	0.019	STD DEV	0.220
VARIANCE	0.048	KURTOSIS	0.310	SKEWNESS	-0.826
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	102.906				
VALID OBSERVATIONS -	136	MISSING OBSERVATIONS -	39		

VARIABLE ACC7677M PROP 76-77 MASTERS GRADS ACCPTNG IA JOB

MEAN	0.847	STD ERROR	0.044	STD DEV	0.318
VARIANCE	0.101	KURTOSIS	2.774	SKEWNESS	-2.030
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	43.173				
VALID OBSERVATIONS -	51	MISSING OBSERVATIONS -	124		

FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE ACC7677 PROP ALL 76-77 IA GRADS ACCPTNG IA JOBS

MEAN	0.771	STD ERROR	0.025	STD DEV	0.174
VARIANCE	0.030	KURTOSIS	3.709	SKEWNESS	-1.302

RANGE	0.909	MINIMUM	0.091	MAXIMUM	1.000
SUM	36.217				
VALID OBSERVATIONS -	47	MISSING OBSERVATIONS -	128		

VARIABLE MOBILITY PROP OTHER CERT TEACHERS ACCPTNG IA JOBS

MEAN	0.775	STD ERROR	0.052	STD DEV	0.417
VARIANCE	0.174	KURTOSIS	-0.152	SKEWNESS	-1.337
RANGE	1.167	MINIMUM	0.0	MAXIMUM	1.167
SUM	49.583				
VALID OBSERVATIONS -	64	MISSING OBSERVATIONS -	111		

VARIABLE TOTALACC PROP ALL POTENTIAL TEACHERS ACCPTNG JOBS

MEAN	0.748	STD ERROR	0.038	STD DEV	0.192
VARIANCE	0.037	KURTOSIS	2.924	SKEWNESS	-1.246
RANGE	0.870	MINIMUM	0.130	MAXIMUM	1.000
SUM	19.444				
VALID OBSERVATIONS -	26	MISSING OBSERVATIONS -	149		

VARIABLE INSTATEB PROP BACH GRADS ACCPTNG IA JOBS IN-STATE

MEAN	0.808	STD ERROR	0.017	STD DEV	0.192
VARIANCE	0.037	KURTOSIS	2.314	SKEWNESS	-1.391
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	109.088				
VALID OBSERVATIONS -	135	MISSING OBSERVATIONS -	40		

FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE INSTATEM PROP MASTERS GRADS ACCPTNG JOBS IN-STATE

MEAN	0.768	STD ERROR	0.037	STD DEV	0.252
VARIANCE	0.064	KURTOSIS	-0.599	SKEWNESS	-0.692
RANGE	0.900	MINIMUM	0.100	MAXIMUM	1.000
SUM	36.105				
VALID OBSERVATIONS -	47	MISSING OBSERVATIONS -	128		

VARIABLE INSTATEO PROP OTHER TCHR ACCPTNG IA JOB IN-STATE

MEAN	0.877	STD ERROR	0.034	STD DEV	0.246
VARIANCE	0.060	KURTOSIS	4.862	SKEWNESS	-2.221
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	44.714				
VALID OBSERVATIONS -	51	MISSING OBSERVATIONS -	124		

VARIABLE INSTATE1 PROP GRADS, OTHERS ACCPTNG JOBS IN-STATE

MEAN	0.801	STD ERROR	0.034	STD DEV	0.171
VARIANCE	0.029	KURTOSIS	-0.868	SKEWNESS	-0.432
RANGE	0.522	MINIMUM	0.478	MAXIMUM	1.000
SUM	20.818				
VALID OBSERVATIONS -	26	MISSING OBSERVATIONS -	149		

VARIABLE OUTSTAB PROP BACH GRADS ACCPTNG IA JOB OUT-STATE

MEAN	0.192	STD ERROR	0.017	STD DEV	0.192
VARIANCE	0.037	KURTOSIS	2.314	SKEWNESS	1.391
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	25.912				
VALID OBSERVATIONS -	135	MISSING OBSERVATIONS -	40		

THIRD ANALYSIS USING HIGH VALUES FOR SCHOOL SURVEY 09/29/79 PAGE 9

FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE OUTSTAM PROP MASTERS GRADS ACCPTNG JOB OUT-STATE

MEAN	0.232	STD ERROR	0.037	STD DEV	0.252
VARIANCE	0.064	KURTOSIS	-0.599	SKEWNESS	0.692
RANGE	0.900	MINIMUM	0.0	MAXIMUM	0.900
SUM	10.895				
VALID OBSERVATIONS -	47	MISSING OBSERVATIONS -	128		

VARIABLE OUTSTAO PROP OTHER TCHR ACCPTNG IA JOB OUT-STATE

MEAN	0.123	STD ERROR	0.034	STD DEV	0.246
VARIANCE	0.060	KURTOSIS	4.862	SKEWNESS	2.221
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	6.286				
VALID OBSERVATIONS -	51	MISSING OBSERVATIONS -	124		

VARIABLE OUTSTA1 PROP GRADS, OTHERS ACCPTNG JOB OUT-STATE

MEAN	0.199	STD ERROR	0.034	STD DEV	0.171
VARIANCE	0.029	KURTOSIS	-0.868	SKEWNESS	0.432
RANGE	0.522	MINIMUM	0.0	MAXIMUM	0.522
SUM	5.182				
VALID OBSERVATIONS -	26	MISSING OBSERVATIONS -	149		

VARIABLE UTILIZED PROP OF UNDERGRAD IA CAPACITY UTILIZED

MEAN	0.515	STD ERROR	0.018	STD DEV	0.231
VARIANCE	0.054	KURTOSIS	-0.600	SKEWNESS	0.360
RANGE	1.000	MINIMUM	0.120	MAXIMUM	1.120
SUM	84.920				
VALID OBSERVATIONS -	165	MISSING OBSERVATIONS -	10		

SPSS BATCH SYSTEM 09/29/79 PAGE 1

SPSS FOR OS/360, VERSION M, RELEASE 8.0, MAY 15, 1979

THIS RUN WAS MADE ON SEPT 29,1979 AT 2:45.

THIRD ANALYSIS OF SCHOOL DATA USING LOW VALUES. THIS RUN IS DIFFERENT FROM THE SCHOOL2 OUTPUTLO IN THAT THE VALUES FOLLOWING VARIABLES WERE CHANGED TO 0 IN ORDER TO SHOW THE CORRECT NUMBER OF OBSERVATIONS IN THE CALCULATIONS.

```
55 IF (Q1C EQ 97) Q1C=0
56 IF (Q2A2 EQ 97) Q2A2=0
57 IF (Q2B2 EQ 97) Q2B2=0
58 IF (Q7A EQ 97) Q7A=0
59 IF (Q7B EQ 97) Q7B=0
60 IF (Q5 EQ 97) Q5=0
```

******CONDESCRIPTIVE Q1B TO Q8B, ACC76778, ACC7677M, ACC7677, MOBILITY,TOTALACC INSTATEB,INSTATEM,INSTATED,INSTATE1,OUTSTAB,OUTSTAM,OUTSTAD,OUTSTA1, UTILIZED

VARIABLE Q1B BACHELOR'S DEGREE GRADUATES IN 1976-77

MEAN	25.333	STD ERROR	2.071	STD DEV	27.322
VARIANCE	746.513	KURTOSIS	16.812	SKEWNESS	3.481
RANGE	215.000	MINIMUM	0.0	MAXIMUM	215.000
SUM	4408.000				
VALID OBSERVATIONS -	174	MISSING OBSERVATIONS -	1		

VARIABLE Q1C MASTER'S DEGREE GRADUATES IN 1976-77

MEAN	2.415	STD ERROR	0.353	STD DEV	4.457
VARIANCE	19.865	KURTOSIS	39.176	SKEWNESS	5.023
RANGE	42.000	MINIMUM	0.0	MAXIMUM	42.000
SUM	384.000				
VALID OBSERVATIONS -	159	MISSING OBSERVATIONS -	16		

VARIABLE Q2A1 BACH DEGREE GRADS ACCPTNG JOB IN STATE

MEAN	14.857	STD ERROR	1.250	STD DEV	15.517
VARIANCE	240.790	KURTOSIS	7.653	SKEWNESS	2.503
RANGE	95.000	MINIMUM	0.0	MAXIMUM	95.000
SUM	2288.000				
VALID OBSERVATIONS -	154	MISSING OBSERVATIONS -	21		

VARIABLE Q2A2 MASTER DEGREE GRADS ACPTNG JOB IN STATE

MEAN	1.456	STD ERROR	0.275	STD DEV	3.336
VARIANCE	11.126	KURTOSIS	55.160	SKEWNESS	6.322
RANGE	33.000	MINIMUM	0.0	MAXIMUM	33.000
SUM	214.000				
VALID OBSERVATIONS -	147	MISSING OBSERVATIONS -	28		

VARIABLE Q2B1 BACH DEGREE GRADS ACPING JOB OUT-STATE

MEAN	3.383	STD ERROR	0.459	STD DEV	5.455
VARIANCE	29.752	KURTOSIS	19.730	SKEWNESS	3.965
RANGE	40.000	MINIMUM	0.0	MAXIMUM	40.000
SUM	477.000				
VALID OBSERVATIONS -	141	MISSING OBSERVATIONS -	34		

VARIABLE Q2B2 MASTER DEGREE GRADS ACPTNG JOB OUT-STATE

MEAN	0.463	STD ERROR	0.116	STD DEV	1.355
VARIANCE	1.836	KURTOSIS	24.339	SKEWNESS	4.604
RANGE	9.000	MINIMUM	0.0	MAXIMUM	9.000
SUM	63.000				
VALID OBSERVATIONS -	136	MISSING OBSERVATIONS -	39		

VARIABLE Q3 1976-77 GRADS UNABLE TO GET IA POSITION

MEAN	0.463	STD ERROR	0.177	STD DEV	2.257
VARIANCE	5.095	KURTOSIS	46.812	SKEWNESS	6.628
RANGE	18.000	MINIMUM	0.0	MAXIMUM	18.000
SUM	75.000				
VALID OBSERVATIONS -	162	MISSING OBSERVATIONS -	13		

VARIABLE Q4 1976-77 GRADS WOULD NOT MOVE FOR IA JOB

MEAN	1.331	STD ERROR	0.334	STD DEV	4.182
VARIANCE	17.492	KURTOSIS	70.747	SKEWNESS	7.480
RANGE	44.000	MINIMUM	0.0	MAXIMUM	44.000
SUM	209.000				
VALID OBSERVATIONS -	157	MISSING OBSERVATIONS -	18		

VARIABLE Q5 IA TEACHERS ON SABBATICAL LEAVE IN 77-78

MEAN	0.615	STD ERROR	0.174	STD DEV	2.260
VARIANCE	5.107	KURTOSIS	82.773	SKEWNESS	8.201
RANGE	25.000	MINIMUM	0.0	MAXIMUM	25.000

SUM	104.000				
VALID OBSERVATIONS -	169	MISSING OBSERVATIONS -	6		

VARIABLE Q6 OTHER TEACHERS GAINING CERT IN IA, 76-77

MEAN	1.217	STD ERROR	0.149	STD DEV	1.917
VARIANCE	3.674	KURTOSIS	16.280	SKEWNESS	3.115
RANGE	15.000	MINIMUM	0.0	MAXIMUM	15.000
SUM	202.000				
VALID OBSERVATIONS -	166	MISSING OBSERVATIONS -	9		

VARIABLE Q7A OTHER CERT TEACHERS WHO HELD JOB IN STAT

MEAN	0.821	STD ERROR	0.137	STD DEV	1.713
VARIANCE	2.935	KURTOSIS	30.332	SKEWNESS	4.431
RANGE	15.000	MINIMUM	0.0	MAXIMUM	15.000
SUM	128.000				
VALID OBSERVATIONS -	156	MISSING OBSERVATIONS -	19		

VARIABLE Q7B OTHER CERT TEACHER WHO HELD JOB OUT-STAT

MEAN	0.092	STD ERROR	0.025	STD DEV	0.312
VARIANCE	0.097	KURTOSIS	12.487	SKEWNESS	3.491
RANGE	2.000	MINIMUM	0.0	MAXIMUM	2.000
SUM	14.000				
VALID OBSERVATIONS -	152	MISSING OBSERVATIONS -	23		

FILE NONAME (CREATION DATE = 09/29/79)

VARIABLE Q8A MAXIMUM UNDERGRAD IA ENROLLMENT

MEAN	194.054	STD ERROR	12.010	STD DEV	155.198
VARIANCE	24086.557	KURTOSIS	7.145	SKEWNESS	2.294
RANGE	920.000	MINIMUM	0.0	MAXIMUM	920.000
SUM	32407.000				
VALID OBSERVATIONS -	167	MISSING OBSERVATIONS -	8		

VARIABLE Q8B NO. UNDERGRAD IA STUDENTS ENROLLED NOW

MEAN	105.269	STD ERROR	9.337	STD DEV	122.100
VARIANCE	14908.515	KURTOSIS	17.841	SKEWNESS	3.695
RANGE	916.000	MINIMUM	4.000	MAXIMUM	920.000
SUM	18001.000				
VALID OBSERVATIONS -	171	MISSING OBSERVATIONS -	4		

VARIABLE ACC7677B PROP 76-77 BACH GRADS ACCPING IA JOB

MEAN	0.757	STD ERROR	0.019	STD DEV	0.220
VARIANCE	0.048	KURTOSIS	0.310	SKEWNESS	-0.826
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	102.906				
VALID OBSERVATIONS -	136	MISSING OBSERVATIONS -	39		

VARIABLE ACC7677M PROP 76-77 MASTERS GRADS ACCPTNG IA JOB

MEAN	0.847	STD ERROR	0.044	STD DEV	0.318
VARIANCE	0.101	KURTOSIS	2.774	SKEWNESS	-2.030
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	43.173				
VALID OBSERVATIONS -	51	MISSING OBSERVATIONS -	124		

VARIABLE ACC7677 PROP ALL 76-77 IA GRADS ACCPTNG IA JOBS

MEAN	0.771	STD ERROR	0.025	STD DEV	0.174
VARIANCE	0.030	KURTOSIS	3.714	SKEWNESS	-1.303
RANGE	0.909	MINIMUM	0.091	MAXIMUM	1.000
SUM	36.215				
VALID OBSERVATIONS -	47	MISSING OBSERVATIONS -	128		

VARIABLE MOBILITY PROP OTHER CERT TEACHERS ACCPTNG IA JOBS

MEAN	0.772	STD ERROR	0.052	STD DEV	0.415
VARIANCE	0.172	KURTOSIS	-0.143	SKEWNESS	-1.347
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	49.417				
VALID OBSERVATIONS -	64	MISSING OBSERVATIONS -	111		

VARIABLE TOTALACC PROP ALL POTENTIAL TEACHERS ACCPTNG JOBS

MEAN	0.748	STD ERROR	0.038	STD DEV	0.192
VARIANCE	0.037	KURTOSIS	2.951	SKEWNESS	-1.253
RANGE	0.870	MINIMUM	0.130	MAXIMUM	1.000
SUM	19.435				
VALID OBSERVATIONS -	26	MISSING OBSERVATIONS -	149		

VARIABLE INSTATEB PROP BACH GRADS ACCPTNG IA JOBS IN-STATE

MEAN	0.808	STD ERROR	0.017	STD DEV	0.192
VARIANCE	0.037	KURTOSIS	2.314	SKEWNESS	-1.391
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	109.088				
VALID OBSERVATIONS -	135	MISSING OBSERVATIONS -	40		

VARIABLE INSTATEM PROP MASTERS GRADS ACCPTNG JOBS IN-STATE

MEAN	0.770	STD ERROR	0.037	STD DEV	0.251

VARIANCE	0.063	KURTOSIS	-0.547	SKEWNESS	-0.708
RANGE	0.900	MINIMUM	0.100	MAXIMUM	1.000
SUM	36.171				
VALID OBSERVATIONS -	47	MISSING OBSERVATIONS -	128		

VARIABLE INSTATEO PROP OTHER TCHR ACCPTNG IA JOB IN-STATE

MEAN	0.877	STD ERROR	0.034	STD DEV	0.245
VARIANCE	0.060	KURTOSIS	4.943	SKEWNESS	-2.239
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	44.750				
VALID OBSERVATIONS -	51	MISSING OBSERVATIONS -	124		

VARIABLE INSTATE1 PROP GRADS, OTHERS ACCPTNG JOBS IN-STATE

MEAN	0.801	STD ERROR	0.034	STD DEV	0.171
VARIANCE	0.029	KURTOSIS	-0.851	SKEWNESS	-0.438
RANGE	0.522	MINIMUM	0.478	MAXIMUM	1.000
SUM	20.828				
VALID OBSERVATIONS -	26	MISSING OBSERVATIONS -	149		

VARIABLE OUTSTAB PROP BACH GRADS ACCPTNG IA JOB OUT-STATE

MEAN	0.192	STD ERROR	0.017	STD DEV	0.192
VARIANCE	0.037	KURTOSIS	2.314	SKEWNESS	1.391
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	25.912				
VALID OBSERVATIONS -	135	MISSING OBSERVATIONS -	40		

VARIABLE OUTSTAM PROP MASTERS GRADS ACCPTNG JOB OUT-STATE

MEAN	0.230	STD ERROR	0.037	STD DEV	0.251
VARIANCE	0.063	KURTOSIS	-0.547	SKEWNESS	0.708
RANGE	0.900	MINIMUM	0.0	MAXIMUM	0.900
SUM	10.829				
VALID OBSERVATIONS -	47	MISSING OBSERVATIONS -	128		

VARIABLE OUTSTAO PROP OTHER TCHR ACCPTNG IA JOB OUT-STATE

MEAN	0.123	STD ERROR	0.034	STD DEV	0.245
VARIANCE	0.060	KURTOSIS	4.943	SKEWNESS	2.239
RANGE	1.000	MINIMUM	0.0	MAXIMUM	1.000
SUM	6.250				
VALID OBSERVATIONS -	51	MISSING OBSERVATIONS -	124		

VARIABLE OUTSTA1 PROP GRADS, OTHERS ACCPTNG JOB OUT-STATE

MEAN	0.199	STD ERROR	0.034	STD DEV	0.171
VARIANCE	0.029	KURTOSIS	-0.851	SKEWNESS	0.438

RANGE	0.522	MINIMUM	0.0	MAXIMUM	0.522
SUM	5.172				
VALID OBSERVATIONS -	26	MISSING OBSERVATIONS -	149		

VARIABLE UTILIZED PROP OF UNDERGRAD IA CAPACITY UTILIZED

MEAN	0.520	STD ERROR	0.018	STD DEV	0.230
VARIANCE	0.053	KURTOSIS	-0.629	SKEWNESS	0.327
RANGE	1.000	MINIMUM	0.120	MAXIMUM	1.120
SUM	85.846				
VALID OBSERVATIONS -	165	MISSING OBSERVATIONS -	10		

The vita has been removed from the scanned document

THE NATIONAL SUPPLY OF AND DEMAND FOR INDUSTRIAL ARTS TEACHERS

by

Charles Daniel Miller

(ABSTRACT)

The industrial arts profession has long been aware of the imbalance between the demand for industrial arts teachers and the supply of qualified teachers, but the size of the shortfall has not been known. This study identified a need for at least 1,754 additional qualified teachers in 1977-78, a figure that is four times the number of vacant positions (439) identified by the U.S. Office of Education for that year. Data collected from state industrial arts supervisors and heads of industrial arts teacher education programs nationwide reveal new insights into the state of teacher supply and demand. In thirty states, an average of 10.7 percent of the teachers left the profession. Only 75.7 percent of the 1976-77 bachelor's degree recipients with certification in industrial arts education accepted teaching positions in 1977-78. During the two-year period from 1976-77 to 1977-78 the number of vacant teaching positions increased in twenty-one states. Three states that did not have vacancies in 1976-77 had vacancies in 1977-78. The number of persons who were employed to teach industrial arts , not being fully qualified to teach , decreased only slightly from 1976-77 to 1977-78. During 1977-78, 600 new teaching positions were created and filled with qualified teachers. Unfortunately, 200 positions were abolished in that year because qualified teachers could not be obtained. It does not appear likely that the

supply of qualified teachers coming from teacher education programs will increase anytime soon. The supply may actually decrease during the next five years or more because undergraduate enrollments were at only half the capacity in 1978-79.