1984

Effects of program quality and evaluator's professional role on program ratings derived with the use of Industrial Arts Standards

Anthony Francis McEvoy Jr.

Iowa State University

Follow this and additional works at: https://lib.dr.iastate.edu/rtd

Part of the Engineering Education Commons

Recommended Citation

McEvoy, Anthony Francis Jr., "Effects of program quality and evaluator's professional role on program ratings derived with the use of Industrial Arts Standards" (1984). Retrospective Theses and Dissertations. 8192.

https://lib.dr.iastate.edu/rtd/8192

This Dissertation is brought to you for free and open access by the Iowa State University Capstones, Theses and Dissertations at Iowa State University Digital Repository. It has been accepted for inclusion in Retrospective Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
INFORMATION TO USERS

This reproduction was made from a copy of a document sent to us for microfilming. While the most advanced technology has been used to photograph and reproduce this document, the quality of the reproduction is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help clarify markings or notations which may appear on this reproduction.

1. The sign or “target” for pages apparently lacking from the document photographed is “Missing Page(s)”. If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure complete continuity.

2. When an image on the film is obliterated with a round black mark, it is an indication of either blurred copy because of movement during exposure, duplicate copy, or copyrighted materials that should not have been filmed. For blurred pages, a good image of the page can be found in the adjacent frame. If copyrighted materials were deleted, a target note will appear listing the pages in the adjacent frame.

3. When a map, drawing or chart, etc., is part of the material being photographed, a definite method of “sectioning” the material has been followed. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.

4. For illustrations that cannot be satisfactorily reproduced by xerographic means, photographic prints can be purchased at additional cost and inserted into your xerographic copy. These prints are available upon request from the Dissertations Customer Services Department.

5. Some pages in any document may have indistinct print. In all cases the best available copy has been filmed.
McEvoy, Anthony Francis, Jr.

EFFECTS OF PROGRAM QUALITY AND EVALUATOR'S PROFESSIONAL ROLE ON PROGRAM RATINGS DERIVED WITH THE USE OF INDUSTRIAL ARTS STANDARDS

Iowa State University

Ph.D. 1984

University Microfilms International 300 N. Zeib Road, Ann Arbor, MI 48106
PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark _____.

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages _____
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) __________ lacking when material received, and not available from school or author.
12. Page(s) __________ seem to be missing in numbering only as text follows.
13. Two pages numbered __________. Text follows.
14. Curling and wrinkled pages _____
15. Other ____________________________________________________________
Effects of program quality and evaluator's professional role on program ratings derived with the use of Industrial Arts Standards

by

Anthony Francis McEvoy, Jr.

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of DOCTOR OF PHILOSOPHY

Major: Industrial Education and Technology

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa
1984
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER I. INTRODUCTION</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem</td>
<td>8</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>8</td>
</tr>
<tr>
<td>Need for the Study</td>
<td>9</td>
</tr>
<tr>
<td>Hypothesis of the Study</td>
<td>10</td>
</tr>
<tr>
<td>Assumptions of the Study</td>
<td>13</td>
</tr>
<tr>
<td>Limitations</td>
<td>13</td>
</tr>
<tr>
<td>Procedure of the Study</td>
<td>14</td>
</tr>
<tr>
<td>Definitions</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHAPTER II. REVIEW OF LITERATURE</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>22</td>
</tr>
<tr>
<td>Public Interest in Education</td>
<td>22</td>
</tr>
<tr>
<td>Evaluation Activities of the 1960s and 1970s</td>
<td>24</td>
</tr>
<tr>
<td>Professional judgment in evaluation</td>
<td>25</td>
</tr>
<tr>
<td>Federal mandate for evaluation</td>
<td>28</td>
</tr>
<tr>
<td>Standards</td>
<td>31</td>
</tr>
<tr>
<td>NCATE standards</td>
<td>35</td>
</tr>
<tr>
<td>Applied science standards</td>
<td>40</td>
</tr>
<tr>
<td>Standards for Industrial Arts Programs</td>
<td>42</td>
</tr>
<tr>
<td>Development and validation of the Industrial Arts Standards</td>
<td>44</td>
</tr>
<tr>
<td>Previous Research in Industrial Arts Evaluation</td>
<td>50</td>
</tr>
<tr>
<td>Summary</td>
<td>53</td>
</tr>
</tbody>
</table>
CHAPTER III. METHODOLOGY

Population 56
Selection of Sample 57
Development of the Instruments 58
  Written program descriptions 59
  Selection of standards for study 62
  Questionnaire 63
  Human Subjects Committee 63
  Pilot testing 64
Data Collection 64
  Data tabulation 67
Research Design 69
  Variables included in this study 69
  Data analysis 71
  Analysis of the significant covariables 76
  Data analysis 77

CHAPTER IV. FINDINGS 78

Description of the Sample 78
Research Hypothesis I 82
Research Hypothesis II 85
Research Hypothesis III 89
Research Hypotheses IV and V 89
Analysis of Significant Covariables 92
  Degree status variable 93
  Years of experience in present position 97

CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 102

Summary 102
  Restatement of the problem 103
Conclusions 103
LIST OF TABLES

Table 1. Number of respondents that agreed to participate in the study 66
Table 2. Number of returns from evaluator groups 67
Table 3. Role of respondents who evaluated Programs I, II, and III 68
Table 4. Degree status of respondents 79
Table 5. Total years of professional experience of respondents 79
Table 6. Respondents' length of employment at their present positions 80
Table 7. Industrial experience of respondents 80
Table 8. Enrollment of school(s) where respondent was teaching and/or supervising 81
Table 9. Respondent's area of teaching or administrative emphasis 81
Table 10. Professional role of respondents 82
Table 11. Comparison of mean ratings, standard deviations, and ranges of ratings for Programs I, II, and III by high school teachers, supervisory personnel, and teacher educators for all participants 84
Table 12. Comparison of mean ratings, standard deviations, and range of ratings for Programs I, II, and III by high school teachers, supervisory personnel, and teacher educators 87
Table 13. ANOVA ratings of program quality for Programs I, II, and III and evaluators classified by role 88
Table 14. R² values for each predictor and F test for change in R² value
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Comparison of means, standard deviations, and ranges of ratings for Programs I, II, and III by evaluators with bachelor's, master's and doctoral degree status</td>
<td>94</td>
</tr>
<tr>
<td>16.</td>
<td>GLM analysis for ratings of program quality for Programs I, II, and III by evaluators with bachelor's, master's, and doctoral degree status</td>
<td>96</td>
</tr>
<tr>
<td>17.</td>
<td>Comparison of means, standard deviations, and ranges of ratings of Programs I, II, and III by evaluators classified according to years of experience in present position</td>
<td>99</td>
</tr>
<tr>
<td>18.</td>
<td>GLM analysis of ratings of program quality for Programs I, II, and III by evaluators classified according to years of experience in their present positions</td>
<td>101</td>
</tr>
</tbody>
</table>
CHAPTER I. INTRODUCTION

All industrial arts practitioners must make decisions which affect the quality of industrial arts education. Many of these decisions are made on a day-to-day basis and have a limited impact on a course or program. Decisions of this nature can usually be altered easily if the outcomes do not meet expectations. Other decisions, however, may require a large commitment of a school district's resources and result in profound and lasting effects on the program. The magnitude of the pending decisions may dictate the use of outside consultants to evaluate present conditions or make recommendations for change.

All decisions should be predicated on an accurate assessment of current conditions. Until recently, the industrial arts evaluator did not have an up-dated, universally accepted set of criteria for the assessment of existing programs. Many programs were judged against out-dated standards or "in house" criteria which may or may not have been valid for evaluation purposes.

The development of the Industrial Arts Standards has been hailed as the means for improving the quality of industrial arts education at the high school level. Dugger defined the 235 Standards as "descriptive statements established by key professionals and used as a model to evaluate the degree to which a program meets qualitative and quantitative characteristics of excellence" (1981, p. 2).

More than 400 industrial arts practitioners from all levels of professional activity and representing all fifty states and three
territories participated in developing the Standards (Dugger, Bame, and Pinder, 1982, p. 8). Since a large cross section of industrial arts professionals participated in developing the Standards, it was assumed that the criteria could be used to assure an accurate assessment of strengths and weaknesses of any industrial arts course or program in the country. It also seemed reasonable to assume that program evaluators would reach similar conclusions regardless of their perceptions about the role of industrial arts in American education.

A divergence of opinion about the role of industrial arts in the American educational system has existed since the discipline was introduced into the curriculum at the turn of the century. Cochran (1970), Lemons (1981), and Luethmeyer (1983) have all documented the diversity but offered varying explanations about its origins. They seemed to be in accord on one point; there is not a consensus about the role of industrial arts in the American high school curriculum among professionals within the discipline. Israel (1981) used a hypothetical spectrum to describe the divergence of professional opinion. At one end of his continuum, Israel placed those practitioners who maintain the view that industrial arts is quasi-vocational in nature. Others, who insist that industrial arts should be the study of technology and its applications to the solution of social problems, were placed at the other extremity.

Feirer appears to be one of the most articulate advocates of the quasi-vocational point of view. He suggested that the primary purpose of industrial arts education should be directed toward teaching the
basics: metal working, woodworking, and drafting (Feirer, 1979). Feirer offered two major arguments to support his philosophy. Although he recognized that over two-thirds of the work force will be employed in information intensive occupations by the turn of the century, he argued that the craftsmanship values of industrial arts will become increasingly important to society as more leisure time becomes available for avocational pursuits. Feirer's second argument was predicated on the assumption that increasingly large numbers of the work force will be employed in service occupations. He foresees an even larger demand for people skilled in the repair of power and electronic equipment, automobiles, and other consumer items (Feirer, 1981a). The results of a study conducted by Bame (1980) seem to support Feirer's argument. Bame surveyed secondary principals, guidance coordinators, and industrial arts chairpersons representing 2,235 schools. He found that the majority of the respondents rated skill development in the use of common tools and machines as the first priority of industrial arts. Shedd (1983) also felt that, "More and more pressure is being put on our schools to produce students with skills that are adequate for entry-level jobs" (p. 3).

According to other members of the profession, skill development represents a very narrow segment of working life in a nation which is undergoing accelerated technological and social change. Maley (1970) stated that, "As a nation we are no longer in the industrial period. We are now in a post-industrial period--with a smaller percentage of our people engaged in manufacturing and production" (p. 41). If the
industrial arts profession clings to the limited objective of developing skills, it may become obsolete in the modern school curriculum. Unless the curriculum is altered to reflect changes in technology and society, Maley envisioned a future in which industrial arts "will be hard pressed for its share of the school day, the budget, and a secure place in the curriculum" (Starkweather, 1980, p. 11). Lux also viewed the back-to-basics movement as a threat to the continuance of industrial arts in the high school curriculum. He concluded that students will not accept 19th century methods as adequate preparation for life in the 20th century: "Only those programs which realistically can claim to contribute substantially to producing technical literacy for the 1980s and beyond are, in fact, basics. Others can expect to be, and ought to be, terminated" (Lux, 1979, p. 26). Maley advocated "a form of industrial arts which explores an application of technology to solution of major social, environmental, and operational problems that face mankind" (Maley, 1970, p. 42). DeVore and Lauda have also proposed that technology should serve as the content base for industrial arts programs (Streichler, 1980).

American industry is a changing, complex, multifaceted phenomenon open to numerous interpretations and definitions. Industrial arts curriculum designers have used several definitions of industry to identify and structure content for industrial arts programs. The literature indicates that most curriculum designers consider their definitions to be discrete and mutually exclusive.

Swanson (1983) conducted an analysis of the industrial, business,
and economic literature to ascertain how experts from these fields define and classify their own activities. According to Swanson, the views of industry, business, and economic leaders have three major implications for industrial arts. These are:

1. ... a reaffirmation of industry as a robust and vital concept of the American economic structure. The hailing of the arrival of the post-industrial era apparently does not eliminate the importance and vitality of industry.

2. ... the need for clearer definition of the portion of industry which industrial education can reasonably attempt to deal with. While industry is concerned with goods production, industrial education has traditionally focused on the segment concerned with the production of durable goods. Additionally, given a common knowledge base for goods production and goods servicing, the inclusion of servicing durable goods is also appropriate. ... the extractive elements—agriculture, mining, forestry, and energy along with transportation, distribution, and finance are not industry.

3. The literature clearly suggests that existing schemes for classifying industry are inadequate (p. 11-12).

Swanson proposed an industrial model "for the purpose of producing definitive boundaries for the component of industry that the field of industrial education can reasonably handle" (p. 14).

Several innovative curricular projects were introduced in the 1960s and early 1970s as the result of attempts to replace skill development with a broader technological, social, and environmental content base. According to Streichler (1980), "It is difficult to assess the true impact of these curriculum projects. However, the Industrial Arts Curriculum Project (I.A.C.P.) is generally accepted as the single most important program to come out of the period. Between 2,700 and 3,000
junior high schools were at one time or another using the I.A.C.P. materials. Individual teachers have been adopting parts of the I.A.C.P. program and incorporating them into existing courses . . ." (p. 83). This program had considerable success only during the 1970s. According to Feirer, the innovative programs of the 1960s were not widely accepted by the profession and the success they did enjoy was largely the result of the promotional efforts of their advocates. He believes that these programs did not receive wide acceptance because they went beyond the curricular responsibilities of industrial arts and intruded into areas of education more properly reserved to business, economics, and distributive education (Feirer, 1979).

Bonfadini (1982) reported a study in which he found that students, their parents, and high school industrial arts teachers seem to agree with Feirer's point of view. These groups identified occupational information and the use of tools as important priorities for industrial arts programs. Bonfadini also found that teacher educators put a high degree of emphasis on technical literacy at the expense of occupational information and practical use of tools.

Micheels (1978) defined industrial arts as an eclectic discipline which must incorporate changes brought by advancing technology while preserving the traditional benefits that it has brought to American education. Micheels explained that several rationales have been built around the tools, materials, and ideas indigenous to industrial arts.

Even evaluators who share a common philosophy may not produce similar results when they apply the Standards to an industrial arts
course or program. Franklin (1976) asserted that most of the recommendations derived through the evaluation process do not result in meaningful program changes. He reasoned that some evaluators do not understand how their recommendations will impact on budgets, total school programs, communities, or other areas of consideration outside of those in which they have an immediate interest. According to Franklin, evaluation recommendations are only one of many sources of input used in program decision making. Programs must be managed in the real world of negotiation and political compromise. A high school teacher may evaluate his or her program from a perspective which is entirely different from that of his/her supervisor or principal even though they have similar views about the role of industrial arts. Consultants from outside the school district may view the program from yet another perspective.

High school industrial arts teachers, local school administrators, local and state industrial arts supervisors, and industrial arts teacher educators will use the data gathered with the Standards to identify areas where program changes are needed. These practitioners will either collect and act on the information themselves or they will pass the data along with their recommendations to higher decision-making authorities. The literature suggested that the evaluators who use the Standards represent a wide philosophical spectrum about what industrial arts programs should be trying to accomplish within the high school curriculum. Even people with similar philosophies may evaluate the same program and produce different results.
Problem
The problem of this study was to investigate and to:

1. determine if industrial arts program evaluators make similar judgments about the worth of industrial arts programs when the Industrial Arts Standards are used as the criteria for evaluation.

2. determine if industrial arts teacher educators, high school teachers, and high school supervisory personnel reach the same conclusions about the worth of industrial arts programs when the Industrial Arts Standards are used as the evaluation criteria.

3. determine if the ratings assigned to an industrial arts program were affected by the evaluator's degree status, length of service in the industrial arts profession, industrial experience, teaching area, length of tenure in his/her present position, or the population of the school in which he or she is employed.

Purpose of the Study
The purpose of this study was to:

1. provide industrial arts professionals with additional information about program evaluation.

2. determine whether industrial arts curriculum planners will be able to rely on program assessments made with the Industrial Arts Standards.

3. discover whether or not the criteria set forth in selected Industrial Arts Standards are of value for judging the worth of programs.
4. discover if evaluators give industrial arts programs similar ratings when the Standards are used as the evaluation criteria.

5. provide industrial arts professionals with additional information about the application and limitations of the Industrial Arts Standards.

Need for the Study

Educational evaluation is conducted to provide decision makers with information about the worth and value of programs and services. Decision makers decide to terminate, improve, or continue programs on the strength of the judgments made during the evaluation. A multitude of evaluation models have been put forward during the past twenty years to aid in the judgment process. Steele (1973) identified and classified more than fifty evaluation models. Many of the models rely on subjective decisions made by the evaluator for program assessment.

Scriven (1976) stated that all evaluators are biased to some degree and suggested that evaluator biases can be balanced by using a group of judges, some of whom are not directly connected with the program being evaluated. However, a group of independent evaluators may not possess the background or expertise necessary to recognize a program's strengths and weaknesses or may use the perceived values of the program for forming judgments (Innes, 1982; Kean, 1983; Lincoln and Gulia, 1981).

Decisions that carry far reaching implications for the industrial arts curriculum need to be made by high school industrial arts teachers, industrial arts supervisors, and school administrators during the next
few years. At present, there is a diversity of opinion about what industrial arts should be striving to accomplish in the education of American youth. Investigations are needed to determine if the diversity of opinion will have a significant effect on evaluator opinion when judging the quality and worth of industrial arts programs. If evaluators make inaccurate decisions, damage may result which is subtle, widespread, and long-lasting to the program, students, and society (House, 1980).

The Industrial Arts Standards "contain the best thinking of the profession on what industrial arts courses should be and how they can be improved" (Dugger, 1982b, p. 36). For the Standards to be of use in evaluating industrial arts programs, the profession needs to know if knowledgeable people can apply them to industrial arts programs and arrive at similar conclusions about the programs' worth and value. This research provided information about the evaluation process which can be used to improve decision making. This research also provided insight into understanding the strengths and limitations of the evaluation process and the standards used to build future industrial arts programs.

**Hypotheses of the Study**

The purpose of this study was to determine whether the Industrial Arts Standards are able to detect differences in the quality of industrial arts programs. Two independent variables, program quality and the evaluator's role in industrial arts, were investigated to determine their effects on the dependent variable, program rating. The
researcher considered the evaluator's industrial experience, area of
teaching expertise, years of tenure in the profession, years of tenure
in present position, and the population of the school where he/she is
presently employed to determine if these factors had an effect on the
ratings obtained with the Standards.

Research hypothesis I:

It was hypothesized that the mean value of ratings obtained from
the evaluation of three different industrial arts programs would not
differ significantly, at the 95 percent level of confidence, when the
Industrial Arts Standards were used as the evaluation criteria.

\[ H_0: u_1 = u_2 = u_3, \text{ or all group affects } A_i = 0 \text{ for } i = 1 \text{ to } 3 \]
\[ H_A: u_1 \neq u_2 \neq u_3, \text{ or all group affects } A_i \neq 0 \text{ for } i \neq 1 \text{ to } 3 \]

Research hypothesis II:

It was hypothesized that there would be no significant difference,
at the 95 percent level of confidence, between the mean value of program
ratings obtained from high school teachers, high school supervisory
personnel, and industrial arts teacher educators when the Industrial
Arts Standards were used to evaluate industrial arts programs.

\[ H_0: u_1 = u_2 = u_3, \text{ or all group affects } B_j = 0 \text{ for } i = 1 \text{ to } 3 \]
\[ H_A: u_1 \neq u_2 \neq u_3, \text{ or all group affects } B_j \neq 0 \text{ for } i = 1 \text{ to } 3 \]

Research hypothesis III:

It was hypothesized that there would be no significant interaction,
at the 95 percent level of confidence, between the evaluator's role
and their evaluation of the program quality level.

\[ H_03: u_{ij} = u_{..} + a_i + B_j \text{ for all } ij, \text{ or all } (A \times B)_{ij} = 0 \]

\[ H_{A3}: u_{ij} \neq u_{..} + a_i + B_j \text{ for some } ij, \text{ or all } (A \times B)_{ij} \neq 0 \]

Research hypothesis IV:

It was hypothesized that the standardized regression coefficient \((\beta)\) for evaluator's role would not differ significantly from zero, at the 95 percent level of confidence, after the effects of degree status, years of professional experience, years of tenure in present position, area of professional expertise, school population and industrial experience had been taken into account.

\[ H_04: \beta = 0 \text{ (j = 1 to 7)} \]

\[ H_{A4}: \beta \neq 0 \text{ (j = 1 to 7)} \]

\((j = j^{\text{th}} \text{ standardized regression coefficient})\)

Research hypothesis V:

It was hypothesized that the standardized regression coefficient \((\beta)\) for program level would not differ significantly from zero, at the 95 percent level of confidence, after the effects of degree status, years of professional experience, years of tenure in present position, area of professional expertise, school population, industrial experience, and professional role had been taken into account.

\[ H_05: \beta = 0 \text{ (j = 1 to 7)} \]

\[ H_{A5}: \beta \neq 0 \text{ (j = 1 to 7)} \]

\((j = j^{\text{th}} \text{ standardized regression coefficient})\)
Assumptions of the Study

The following assumptions were made for the purpose of this study:

1. The subjects who were selected as participants in this study represented the same diversity of opinion that exists within the industrial arts profession.

2. Adequate sampling was available.

3. The subjects selected to participate in this study made a conscientious effort to complete the evaluation instrument in an accurate manner.

4. The written description of programs provided the subjects with enough information upon which to make reliable evaluations.

5. Evaluation results obtained from written program descriptions had high correlation with the results obtained through other methods such as visitation and observation.

6. Subjects judged criteria as "not meeting the Standard" if they needed more information than the written program provided for making a decision.

Limitations

This study was limited to:

1. The study of evaluations made by
   a) high school industrial arts classroom teachers.
   b) high school administrators.
   c) industrial arts teacher educators.
   d) industrial arts supervisors at the state or school district level.
2. Written information provided for forming evaluation judgments.
3. The use of a sample of thirty Standards from five topic areas.
4. Three different programs considered to be traditional.

Procedure of the Study

I. Review of literature was conducted to:
   A. Identify how standards affect the accuracy of evaluation.
   B. Identify the procedures used to develop and validate the Industrial Arts Standards.

II. Test of hypotheses

   The hypotheses of this study were tested by having groups of industrial arts practitioners and secondary school administrators evaluate one of three industrial arts written program description using a set of selected Standards as the criteria for evaluation.

   Each of the written programs described a different level of program quality.

   A. Selection of the Standards

      1. All of the Standards in Topic Area I through V were divided into two categories by the researcher.
         a. Subjective category: those Standards which might elicit different response from the evaluators depending on their perspective on industrial arts, area of expertise, and professional background.
         b. Objective category: those Standards which should elicit the same response from all evaluators
regardless of their perspective on industrial arts, area of expertise, and professional background.

2. Ten subjective Standards from each of the Topic Areas I through V were submitted to eight graduate students at Iowa State University.
   a. Each of the graduate student judges rated each of the fifty Standards on a 1 to 5 subjective scale.

3. The thirty Standards that received the highest subjective rating were used by the subjects within this study as the criteria for judging the program's quality.

B. Development of the written program descriptions

1. Information included in program description:
   a. Description of community
   b. Occupational and educational profile of community
   c. Educational philosophy of the school
   d. Objectives of school
   e. Organizational chart for school district
   f. General description of high school curriculum
   g. Budget report for instructional areas
   h. Description of industrial arts curriculum
   i. Industrial arts philosophy
   j. Industrial arts objectives
   k. Course summary (enrollment, time schedules, etc.)
   l. Course descriptions
m. Department activities
   1) Department meetings
   2) Awards programs
n. School and department policies affecting industrial arts
o. Staff qualifications and memberships
p. Courses of study

C. Test for differences between program descriptions
   1. Ten upper division college students majoring in industrial arts compared and ranked the program descriptions.
   2. Although ninety percent agreement among the upper division students was considered adequate assurance that differences did exist between the program descriptions, in practice actually one-hundred percent of the students ranked the program in proper order of quality.

D. Pilot study
   1. Ten upper division industrial arts students served as subjects and evaluated one of the three program descriptions using the thirty Standards as the evaluation criteria.

E. Approval was secured from the Human Subjects Committee to conduct the study.

F. Selection of subjects
   1. The subjects who served as program evaluators were randomly selected from national populations of educators
who would usually be expected to conduct evaluations of industrial arts programs.

G. Sample size

1. A total of one hundred seventy-seven subjects participated in this study as program evaluators.
   a. High school industrial arts teachers were divided into three equal groups. Each group evaluated a low, average, or high quality level program description.
   b. High school administrators were divided into three equal groups. Each group evaluated a low, average, or high quality level program description.
   c. Industrial arts teacher educators were divided into three equal groups. Each group evaluated a low, average, or high quality level program description.
   d. Industrial arts supervisors were divided into three equal groups. Each group evaluated a low, average, or high quality level program description.

I. Data collection

1. Potential subjects received written communication that included:
   a. Purpose of study
   b. Time requirements
   c. Outline of data collection procedures
   d. Importance of study and need for cooperation
18

e. A short form to be returned to the researcher indicating acceptance or rejection of participation in the study.

2. Each subject who agreed to participate in the study evaluated one of the program descriptions using thirty of the Standards as the criteria for making the evaluation.

3. Data on each evaluator's length of tenure, industrial experience, teaching area, years of professional experience, years employed in present position, and population of school where he/she is presently employed were obtained through the use of a questionnaire.

J. Analysis of data

1. Variable-

   a. Dependent variable

      1) Rating the subject has assigned to the program descriptions using thirty selected Standards as the evaluation criteria

   b. Independent variables

      1) Program quality
      2) Evaluator's role in industrial arts

   c. Covariates

      1) Industrial experience
      2) Area of expertise
      3) Years of professional experience
      4) Years employed in present position
5) Enrollment of school in which subject is currently employed

6) Area of teaching expertise

2. The data were analyzed using means, stepwise regression, correlation, and two-way analysis of variance procedures. Statistical Analysis Systems (SAS) and Statistical Package for the Social Science (SPSS) computer programs were used to process the data.

3. A statistical level of significance of $\alpha = .05$ was used to test each of the null hypotheses.

III. The findings were reported.

IV. Conclusions and recommendations were made based upon the findings.

Definitions

Evaluation - "... the determinant of the worth of a thing. It includes obtaining information for use in judging the worth of a program, product, procedure, or objective or the potential utility or alternative approaches designed to obtain specific objectives" (Worthen and Sanders, 1973, p. 19).

Evaluation instrument - Standards topics taken verbatim from "Standards for Industrial Arts Programs."

Evaluation ratings - Scores obtained from the Standards selected for study from Topic areas I through V. A total evaluation score was obtained by summing those Standards which meet or exceed the criteria set by the Standards.
Industrial arts - "Those phases of general education that deal with industry - its organization, materials, occupations, processes, and products - and with the problems resulting from the industrial and technological nature of society" (Wilber and Pendered, 1967, p. 2).

Industrial Arts Standards - 235 criteria for the assessment of industrial arts programs. They were produced by the Standards for Industrial Arts Programs at Virginia Polytechnic Institute and State University Industrial Arts Programs and were developed and disseminated pursuant to Project No. 4981+80061 (REP. 78-129) contract No. 300-78-1565 with the United States Department of Education.

Industrial arts teacher educator - Individual employed at the college or university level who is responsible for teaching required or elective industrial arts courses.

Industrial experience - Full time employment in business or industry for a period of 1 year or more.

High school industrial arts teacher - An individual who holds, at least, a Bachelor's Degree with a major in industrial arts from an accredited college or university and whose work load includes teaching industrial arts courses a minimum of sixty percent of the time.

Program quality - Activities, conditions, or situations in an industrial arts program which do not meet, meet, or exceed the criteria described by the Industrial Arts Standards.
Program description - Written description of an industrial arts program including information about school, community, students, industrial arts program of studies, course outlines, objectives, facilities, resources, teaching methods, teacher qualifications, activities, and outcomes.

Supervisory personnel - School district or state level administrators who monitor the activities and quality of industrial arts programs as part of their professional responsibilities.

Teaching area - One of the three cluster groupings of industrial arts courses: manufacturing, communications, or power and energy.

Upper division college student - Student majoring in industrial arts who has completed a minimum of ninety college hours of credit.

Years in present position - Total number of years that an individual has been employed in his/her present job description.

Years of professional experience - Total number of years that an individual has been professionally involved on a full time basis in teaching or in education administrative activities since receiving his/her B.S. degree.
CHAPTER II. REVIEW OF LITERATURE

Introduction

The purpose of this study was to discover whether the Industrial Arts Standards could be used to obtain precise assessments of program quality. The review of literature is divided into three sections. The first section identifies efforts made to improve the accuracy of program evaluation during the last twenty-five years and how standards emerged as part of that effort. Section two traces the development of the Industrial Arts Standards, and the third section reports the results of related research in the area of industrial arts evaluation.

Public Interest in Education

National attention was quickly focused on public education after the Soviet Union successfully launched the first satellite in the Fall of 1957. At that time, the launching of a space satellite required the most advanced technology and scientific knowledge that a society could produce. It was generally concluded that since the Soviet Union had been the first to develop and successfully use such advanced technology, their society must be producing scientists and engineers superior to those being produced in the United States. Critics reasoned that the educational system of the United States must be inferior to that of the Soviet Union.

Commissions (Conant, 1959), committees, and concerned citizens (Rickover, 1959) began a thorough evaluation of the existing educational system and made recommendations for its improvement. Federal, state,
and local financial support for education was increased. New courses in science, mathematics, and foreign languages were introduced. Teaching methods and equipment were improved. New social programs were developed to help students who were considered to be academic underachievers.

Despite the millions of tax dollars that local, state and federal governments were spending, the educational system appeared to be in a state of decline. College board scores were showing a steady decline. Grade inflation was apparent at all levels of education. High school graduates did not have the basic language or math skills necessary for entry level jobs. Both the public and the legislators were beginning to ask if the money was being well spent (Baron and Baron, 1980). Gephart (1972) stated, "As American society grew more and more concerned about the value of the educational programs it was purchasing, greater and greater emphasis was gained for engaging in evaluation." (p. 20)

The public wanted to know if new programs and processes were:

1. focusing compensatory education on those students who had previously been neglected;
2. bringing about achievement gains in students being served;
3. responding to valid needs of students in both achievement and nonachievement areas;
4. being designed with consideration of sound theoretical and practical principles;
5. being operated competently and efficiently;
6. producing new and better ways of educating students. 
   (Joint Committee on Standards for Educational Evaluation, 1981, p. 3)

Formal evaluation of educational programs and processes were initiated to help answer the questions raised by those interested in the quality of education.

More precise evaluation methods were needed to accurately answer these and other questions being raised about the quality of American education.

Evaluation Activities of the 1960s and 1970s

Prior to 1960, evaluation activities had been restricted mainly to gathering and assessing data on student performance. This view of evaluation was considered to be too narrow to adequately judge the new programs. As a result, evaluation activities began to focus on the total program and its relationship to the school and community. Evaluation practices were altered to meet the needs of the time. Newer theories and models stressed that evaluation should have a holistic focus and a broad data base. Evaluators were encouraged to examine the complex interactions that occur between all of the components of the program. Instructional goals and objectives, teaching methods, program activities, staff relationships, the community, and the environment in which the program operated were all considered as potential sources of data for a complete evaluation review. Evaluation activity was broadened to include all information that affected the program (Wentling and Lawson, 1975).
The data collected for a holistic evaluation often represented complex relationships among the various elements of the program. For the first time, the evaluator faced choices about what information to collect and how it was to be collected. The outcome of an evaluation can be seriously affected if one set of data is collected and equally relevant data is excluded. When the evaluator holds certain values, predispositions, or preferences he/she is likely to examine that data which support his/her point of view. "Different ideologies, therefore, lead to different evidence" (Anderson and Ball, 1978, p. 114). Most people hold common values regarding the need for quality, universal education, but they may have widely differing viewpoints on which educational programs will best gain the desired end. Professional judgment began to play an increasingly important role in the evaluation effort.

Professional judgment in evaluation

In addition to decisions needed concerning the nature and amount of data to collect, judgments were also needed to interpret the data and to make decisions on whether to maintain, modify, or delete the program being evaluated (Worthen and Sanders, 1973).

Expert judgment began to play a much more important role in the evaluation process. There is not, however, universal agreement regarding the role of expert opinion in evaluation practice. Anderson and Ball (1978) stated:
Expert judgment is avoided by some evaluators simply because they are aware that with lay groups it can be highly persuasive and that it can be badly misused. The problem of using expert opinion arises chiefly in viewing expert judgment as a substitute for actual program performance data. (p. 88)

They go on to explain that even with the possibility of their judgments being misused, experts do need to be involved for the greatest benefit from an evaluation. Their judgments concerning the program need to be considered along with other program performance data. At this point, some differences in opinion arise over the place where the judgments made by the evaluator and where the decision making responsibilities of the client meet, overlap, and/or end.

Scriven believes that evaluation does not take place unless judgments have been passed by the evaluator. He maintains that the principal goal of evaluation is to answer questions regarding the real merit or worth of the program and that the evaluator is the best qualified to make these judgments and, in fact, must do so (Worthen and Sanders, 1973). Evaluation, according to this point of view, is a decision-oriented process. A close working relationship is needed between the evaluator and the decision maker to identify the decision situation, determine what data are needed, how such data will be collected, and how the data will be used by the decision makers. The evaluator's role and the decision maker's role are closely linked to provide maximum benefit from the evaluation (Wentling and Lawson, 1975).

Scriven's viewpoint is reflected in Worthen and Sanders' (1973) definition of evaluation. They stated:
Evaluation is the determination of the worth of a thing. It includes obtaining information for use in judging the worth of a program, product, procedure, or objective, or the potential utility of alternative approaches designed to attain specific objectives. (p. 19)

Worthen and Sanders go on to say that the evaluator will identify curriculum goals and "determine whether or not the goals were good for students, parents, and the community served by the curriculum." (p. 21)

The Phi Delta Kappa (PDK) National Study Commission on Education placed the evaluator in a more limited role. "His task is to critique the client's formulation and to propose alternative versions, but he must exercise care not to pre-empt the client's decision-making responsibility, for once he does so he loses his objectivity." (p. 42) The PDK's viewpoint is reflected in their definition of evaluation.

Education evaluation is the process of delineating, and providing useful information for judging decision alternatives. (p. 40)

The PDK's definition and Worthen and Sanders' definition both require collection and reporting of evaluation data. The main differences are that the PDK's definition does not consider the evaluator as a judgment maker; his role is mainly that of an information gatherer. The Worthen and Sanders' definition suggested that the information gathered is used by the evaluator to appraise or make judgments on the value of the program and, in the majority of instances, relate this appraisal in the form of conclusions and recommendations to the program decision makers (Wentling and Lawson, 1975).
In reality, the separation of the two roles (evaluator and decision-maker) is academic. Most decision-makers make their own evaluations simply because of the degree of importance of most decisions being made. Nevertheless, persons placed in this dual role of evaluator/decision-maker need to be aware of conflicts of interest inherent to this position (Phi Delta Kappa National Study Committee, 1971).

Federal mandate for evaluation

In 1965, for the first time, formal evaluation was mandated for some programs funded under the Elementary and Secondary Education Act (ESEA).

Although the federal government had required that evaluation be conducted to assess the outcome and the return on investment for particular programs, it provided few guidelines on how to conduct an evaluation. With no definition of evaluation, and no guide to evaluative procedure, many people were confused about the requirement. Even if the federal government had more specifically defined the requirements and guidelines, local personnel did not have training that would enable them to actually design and implement evaluation systems and programs (Wentling and Lawson, 1975, p. 8).

Evaluations were conducted in accordance with the Congressional mandate but most of them failed to provide the federal government with information which could be used to improve the programs (Worthen and Sanders, 1973). Steele (1973) reported the problems in more specific terms:

1. Administrators of the funding agency (the men in the middle) don't know what they want and require evaluation hoping that the programmer or an outside contractor will know what they need and provide it.
2. The funding agency has specific types of evaluation it wants, but either is unable to communicate these specifics clearly or expects something completely unrealistic given the state of development of the field of evaluation and/or the budget restraints of the program.

3. The funding agency is willing to let the programmer choose the type of evaluation investment that will be most valuable to the program, but fails to either communicate this latitude or to stand by earlier communications. (p. 10)

Reports submitted to Congress were based on judgmental data that could be used to support the contention that the program was succeeding as intended by Congress. These evaluations seemed to be based on whatever information was readily available and tended to appeal to the evaluator.

Local, state, and federal education agencies needed an evaluation instrument that they could all use and that would provide the federal government the data it needed to make decisions regarding the alteration, continuation, or termination of ESEA programs. Prior to this time, little effort had been made by scholars toward the development of generalized evaluation plans and systems that could be modified to fit local programs and still meet the requirements of the federal mandate (Worthen and Sanders, 1973). Virtually every leader in the field of education became involved in developing theories, taxonomies, instruments, or methods to be used for evaluating. These ambitious but disorganized attempts created more problems than they solved. The Phi Delta Kappa Commission listed as one of several problems, the "lack of certain crucial elements without which the science or art of evaluation cannot be expected to make significant forward strides" (Worthen
30

and Sanders, 1973, p. 8). The Phi Delta Kappa National Study Committee found these five elements to be most crucial:

1. A lack of adequate theory.

2. A lack of information on the kind of evaluation information that would be most useful.

3. A lack of appropriate instruments and designs.

4. A lack of mechanics for organizing, processing, and reporting.

5. A lack of trained personnel and no substantial agreement on their role and how they should be trained (Worthen and Sanders, 1973).

Evaluation theory needed to be identified and developed, useful frameworks and guidelines needed to be provided to evaluators, and strategies for training evaluation personnel also had to be researched and designed (Worthen and Sanders, 1973). "Clearly, if one attempted to identify the Achilles' heel in the field of education, it is most likely that evaluation practices would receive a large number of nominations" (Berk, 1981, p. 1). By the early and mid-1970s, several new associations with evaluation as a major focus had been formed with potential for solving some of the crucial problems.

When Title I appropriations came up for reevaluation in 1975, legislators called for more evidence of results. The new legislation that passed was more specific in its requirements for evaluations, calling for them to be made by competent and independent persons; stating that the federal Commissioner would provide State educational agencies with evaluation models; and that those models would specify objective
criteria, outline techniques, and provide methodology for producing
data that could be compared on a statewide or nationwide basis (Anderson
and Ball, 1978).

The PDK National Study Committee on Evaluation noted that evalu­
ation data must meet certain criteria to be of value to decision
makers. The committee formulated ten criteria which evaluation data
should meet. Three of these were listed as:

Relevance. Evaluation data area collected to meet certain
purposes, and if the data do not relate to those purposes,
they are useless. The criterion of relevance asks whether
or not the purposes are in fact served. An important conse­
quency of applying this criterion is that an evaluation cannot
sensibly be conducted in the absence of a detailed statement
of purposes of those persons to be served by the evaluation.

Importance. A great deal of information can be collected
which is nominally relevant to some purpose, but, obviously,
not all information is equally important. Evaluation informa­
tion must be culled to eliminate or disregard the least impor­
tant information and to highlight the most important informa­
tion. This weeding-out procedure demands the application
of significance judgments.

Scope. Information may be relevant and important but lack
sufficient scope to be useful. It may be the truth, so to
speak, but not the whole truth; it may be a related perception
but not the only perception (Stufflebeam, 1971, p. 28-29).

The committee went on to mention several promising approaches that
might be used to improve the evaluation process, one of which included
the use of standards that a program could be compared against.

Standards

A standard is defined as: "something set up and established by
authority as a rule for the measure of quantity, weight, extent, value
or quality" (Webster, 1979, p. 1125).

Stake argued for the use of standards as the basis of judging quality; however, he acknowledged that standards were difficult to find. "Some are available in check lists and accreditation schedules but most are to be found in the literature, buried in problem-oriented appeals for improvement" (Worthen and Sanders, 1973, p. 341).

Provus developed a model for evaluation which relied on the use of standards. Provus' approach to evaluation was to define program standards, look for a discrepancy between those standards and observations about the program, and inform the program developers on the discrepancy information. By this method, decisions could be made about the program's future, which Provus believed was the goal of evaluation (Worthen and Sanders, 1973).

Formal standards and evaluation criteria had been used by accrediting agencies since they were organized during the late 1800s. Peterson (1979) reported that comparatively simple sets of quantitative standards were used by those early accrediting agencies. Educational quality was determined by "such fundamental institutional characteristics as size of endowment, number of faculty, number of years of high school required for admission, and length of educational program" (p. 21). As schools became more complex and the interest in evaluation grew, the standards became more quantitative and more numerous. Criticism concerning the validity of these narrow and restrictive standards became so widespread that the North Central Association initiated a three-year study of its evaluative criteria. The results of the North
Central Association's study indicated that more qualitative standards and criteria would provide a better assessment of educational quality. The North Central Association replaced the quantitative standards with others considered more qualitative. "The adoption of qualitative standards by the North Central Association in 1934 was one of the most significant developments in the history of the accrediting movement" (Peterson, 1979, p. 22). The other regional accrediting agencies made similar changes in their standards so that today most standards are stated in qualitative terms. The remaining quantitative statements are offered as suggestions or recommendations.

Peterson (1979) made a comprehensive study of the standards used by higher education accrediting agencies. The content of ninety sets of standards from fifty-two agencies was examined in detail to identify major areas of emphasis, commonality, and differences among the standards. Peterson concluded that:

...the diversification which exists among these statements of standards makes it difficult to arrive at valid generalizations and conclusions. Nomenclature, format, and style vary widely. Some are called "standards"; others "criteria" or "essentials." Some are brief, concise statements; others are lengthy and detailed. Some describe qualities which characterize superior institutions or programs; others prescribe minimum standards which "shall" or "must" be met. Some employ only qualitative terms; others rely to a greater extent on quantitative measures. Some depend heavily upon the subjective judgment of an evaluation team; others structure evaluation upon more objective evidence. Some are nondirective concerning the institutional or program self-study; others have specific requirements as to its format and content... (p. 149-150).

The standards do not, of course, explain the basis upon which these specific requirements have been established or
validated. Nor is it clear why some agencies feel the need for arbitrary requirements while others state them in only general terms and others omit any mention of them. In any case, it is evident that the policies and requirements of accrediting agencies on these and similar issues vary widely... (p. 156).

Standards and guidelines represent only one aspect of the accrediting process. Of equal, or greater importance, are the requirements, procedures, and policies relating to other aspects of the accrediting process such as institutional self-study, the evaluation team visit, and the final decision-making process. It seems reasonable to assume that the data and conclusions of this study would undoubtedly be affected by an examination of any and all of such aspects. In other words, what actually happens in the accrediting process may, of course, be quite different from what is stated in the standards, since many thousands of individuals, with varying biases and backgrounds, are involved in the implementation of the published standards (p. 163).

Peterson's conclusion that methodologies and people play a larger role in the evaluation than do standards was supported by Nixon (1975). Nixon regarded methodology and people as two of the most important and least understood dimensions in the field of evaluation. He wrote that:

The problem of methodology can be overcome without great difficulty. The problem of people simply cannot be overcome in the same definitive way—it has to be optimally resolved for each situation.

The problem of people is important, because it is people who ultimately say what is valued and what is not. Also, it is people who command the resources and make the decisions which programs will be supported and which will be eliminated.

In thinking about the dimensions of methodology and people it is my observation that most human resources developers see the problem of evaluation as one of methodology rather than of people. I think this is a mistake because the methods and techniques developed by educators, psychologists and behavioral scientists for carrying out good evaluation studies are a matter of record. What is needed are some imaginative and creative adaptations of what is known to particularized situations.
I believe that people are the major problem. So long as we are distracted by demands for better evaluation methodology and ignore such important considerations as organizational politics and interpersonal relationships, our prospects for progress will be limited (p. xi-xii).

NCATE standards

Alan R. Tom (1980) reviewed and critiqued the standards used by the National Council for Accreditation of Teacher Education (NCATE) for the evaluation of teacher education programs. He carefully documented his contention that the quality of teacher education programs is determined solely in terms of the NCATE standards. Specifically, he pointed out four flaws in the standards which severely compromise the accuracy of those evaluations where the standards are applied to the program. According to his observation, the standards (1) are too many in number, (2) are too vague, (3) lack operational definitions, and (4) may not be valid for the purpose for which they are intended.

The NCATE standards are comprised of forty-nine statements defining program quality. Twenty-four of these are used to assess basic teacher education programs and twenty-five are applied to advanced programs. Tom pointed out that each of the forty-nine standards is accompanied by a preamble which describes the rationale, interpretation, and definitions of the standard. "The entire main body of the document, therefore, becomes part of the standard. As a result they entail approximately 12,000 words of definitions, statements, and generalizations" (p. 113). By including the preamble as part of the standard,
approximately 140 test conditions are possible for the basic standards and 170 are included in the advanced set.

The institution preparing a report is left in an untenable position. It must address the report not just to the ... standard but also to the preamble that justifies and describes the ... standard and the institution has no way of knowing which of the almost 400 expectations contained in the 12,000 words of the standards will be of concern to the visiting team and the council members (p. 113).

Tom also questioned the use of such words as "quality" and "systematic" which appear in the standards and are left completely undefined. He asked if quality refers to "teaching performance in relation to program objectives or to teaching performance as judged by administrators who hire these teachers--or both of these" (p. 114).

He made the critical observation that the standards do not define such operational terms as "judged acceptable" as it refers to the judgments made by the visiting team. The standards do not specify which element of the criteria is to be judged nor who is to make the judgment.

Since operational definitions are missing, judgment of whether a standard is met is determined basically by the extent to which practices within the institution are consistent with implicit operational definitions possessed by visiting team members and council members (p. 115).

Tom feels that these problems can be overcome "by reducing the number of standards, by developing clear statements, and by establishing operational definitions" (p. 115). However, he pointed out that: "The bedrock problem with the NCATE standards is that their validity has never been established" (p. 115). Validation of the standards was
accomplished through input of the NEA, AACTE, and a task force from higher education during the development of the standards. It was assumed that the standards represented a broad and diverse base of opinion about those elements which should be examined during the evaluation of teacher education programs. Tom asked, "Is consensus enough?" (p. 115) and added that the standards lack an adequate research base and merely represent a consensus among those who helped develop them.

Nunnally and Durham (1975) discussed validity issues at length and raised several points which must be considered when discussing the validity question. Nunnally and Durham stated:

Validation always requires empirical investigations, the nature of evidence required depending on type of validity. Validity is a matter of degree rather than an all-or-none property, and validation is an underlying process. . . . Strictly speaking one validates not the measuring instrument but rather the use to which the instrument is put (p. 290). When an instrument is intended to perform a prediction function, validity depends entirely on how well the instrument correlates with what it is intended to predict (a criterion), and consequently face validity is irrelevant. There are many instances in which an instrument looks as though it should correlate well with a criterion although the correlation is close to zero (p. 309).

Tom pointed out that 60% of the accreditation decisions are reversed by a second evaluation board and suggested that "there is evidence that the single largest determinant of whether an institution meets standards is the preconceptions held by individual NCATE evaluators (p. 114)."

Gubser (1980) rebutted Tom's critique of the NCATE standards. Gubser acknowledged that the standards are vague and noted that the council recognizes the problem and is working toward its resolution. Regarding
the validity of the standards, Gubser stated:

The validity of NCATE's standards has been questioned since the council was founded. The revised editions intended to clarify this have only attracted further criticism. Surely any criteria or measures related to professional judgment must be constantly questioned. To cite that fact as a weakness is hardly helpful. Of all people, educators should be aware that evaluations will always be questioned by those evaluated except perhaps by the recipients of high marks.

The essential purpose of accreditation is to provide judgments of program quality by professional peers representing as broad a diversity of interests as possible. These judgments are rendered not out of thin air, but within a framework of expectations that are sufficiently broad to accommodate complex programs.

The council has been particularly concerned that the standards represent the broadest possible base of professional knowledge and consensus.

Consensus validity has become a respected tool of all social science research. It is fundamental to testing and measurement in education. To challenge the standards on the basis that their validity is acquired primarily through broad professional consensus is, to put it plainly, silly.

One can also debate whether the NCATE standards are sufficiently demanding or too rigorous without questioning their validity. . . . Expectations can be set too low or too high, depending on one's point of view, without affecting the validity of the criteria designed to determine program quality (p. 118-119).

The literature pertaining to evaluation provided examples of similar controversies regarding the application of program standards. In 1972, the American Library Association (ALA) revised its standards for accrediting graduate library education programs. Grayson (1983) reported that the ALA Standards received considerable criticism from those within the library profession. There were those who considered the
ALA Standards as too restrictive; others felt that the Standards were too lenient. Grayson observed that: "Little is known about the correlation between instructional characteristics and the quality of instructional output. Relatively few standards currently used in accrediting institutions and specialized programs are formed on the basis of research" (p. 51).

Grayson made a comparative study of ALA accredited graduate library education programs with nonaccredited library programs which maintain associate membership in the Association of American Library Schools and apply the ALA Standards to their programs. The results of her investigation indicated that the ALA Standards can be used to identify differences between accredited and nonaccredited library programs when the ALA Standards are used as the evaluation criteria. Specifically, significant differences were detected in budgetary matters and in the emphasis which is placed on research activities.

Tamblyn (1983) also noted the need for experimental studies in the area of standards development. After a careful and extensive review of methods used to determine teacher education and certification standards in Alabama, she recommended that: "A coordinated major research effort should be directed toward development and validation of criteria for entrance into professional training programs, for initial and continuing practice, for evaluating programs of study that make quality distinctions, and for measuring teaching effectiveness" (p. 394).
Applied science standards

Standards for specific programs and curricular areas began to receive considerable attention from professional educators during the late 1970s. Major standards development efforts were undertaken by agricultural education and home economics as well as industrial education. The procedures used by these three areas were strikingly similar. All three involved the use of curriculum experts to identify and validate measures of quality for the respective curricular area. The instruments which were developed identified these three levels of achievement regarding each of the respective standards: Exceeds standard, Meets standard, Does not meet standard.

Development and validation of agricultural standards

The preliminary standards for agricultural education were drafted at a three-day conference held in Kansas City in 1976. According to Crawford (1977), the purpose of the conference was "to identify standards which could be used by the profession to encourage development of high quality programs in agriculture/agribusiness education" (p. 31). The 230 conference participants represented all levels of agricultural education as well as the agribusiness industry. Each of the participants was assigned to one of ten work groups which was instructed to develop a set of standards within the guidelines provided by the conference leaders. After the conference, the reports from the ten work groups were summarized by the conference secretary and returned to the group chairpersons for verification. The standards that had been identified were then prepared and listed in a final report. Iowa State University was
awarded a contract by the Educational Professional Development Assistance (EPDA) program to validate the standards. The process of validating the standards was explained by Crawford (1977).

All fifty states participated in the validation process. Of a total of 938 validation instruments mailed out to the state chairmen, 542 were returned. Participants were asked to rate each standard on a scale from 0 to 9; zero indicating "no importance" and 9 indicating "utmost importance." Mean scores were calculated for each standard and an analysis made of its importance.

One category of standards, classified as common to all programs, was rated by all respondents. Other categories were rated only by respondents who were directly involved in the category.

The validated standards were edited for grammar and clarification, and printed. . . (p. 32).

A series of regional conferences, workshops, and meetings were held to disseminate and implement the newly developed and validated standards.

Development and validation of home economics standards In the fall of 1979, the U.S. Office of Education awarded a contract to the Division of Home Economics Education (D.O.E.) at the University of Texas at Austin to develop standards and accompanying material for vocational home economics education. The 16 member project staff first requested standards and other appropriate material already being used in 50 states and 4 territories and conducted a search of the literature. From this, a preliminary set of standards and a handbook were developed. Six regional workshops with a total of 472 persons reviewed and critiqued the standards and handbook in the fall of 1980. Major revisions
resulting from the workshops were presented at the American Vocational Association's annual meeting in New Orleans. The New Orleans meeting provided additional input. A final draft of the standards and handbook was then reviewed by the advisory committee, the U.S. Department of Education project officer, and the D.O.E. vocational home economics program specialist. The resulting nine volumes each contain a handbook and a complete set of standards, and are designed for specific educational levels (elementary through adult education) and types of programs (consumer and occupational). The standards were voluntary but through planned awareness activities in all states and territories, they are in various stages of implementation with high expectations of acceptance at state and local levels nationwide (Griffin and Clayton, 1982).

Standards for Industrial Arts Programs

Evaluation developments in industrial arts closely paralleled the procedures and sequences which were taking place in other areas of education. New programs and curriculum were designed, tested, and implemented during the 1960s (Cochran, 1970). Renewed interest began to focus on evaluation activities in an effort to provide decision makers with information they needed to improve programs.

The 16th Yearbook of the American Council on Industrial Arts Teacher Education was devoted to improving evaluation by providing very general guidelines for conducting program assessments. Evaluation represented "... many complex difficulties not readily soluble through ordinary means" (Nelson, 1967, p. 5). The Yearbook provided a very
general framework for evaluation and avoided specific recommendations and checklists. Haynie (1978) wrote that, "Comprehensive educational program evaluation is a fairly new field, and even experts 'fly by the seat of their pants' when they evaluate a program" (p. 15). He also emphasized the need for program evaluation when he wrote: "We cannot afford to continue making changes in the name of progress without establishing where we are now and where we are going" (p. 15). Ziegler (1979) also observed that evaluation deserved more emphasis than it had received during the 1970s.

Several sets of program standards and objectives were developed for industrial arts during the 1960s and the 1970s (The Industrial Arts Education Division, American Vocational Association, 1961; American Vocational Association, 1968; American Council on Industrial Arts Teacher Education, 1973; and American Industrial Arts Association, 1979). The Standards for Industrial Arts Education Project Staff (1979) considered these efforts to:

... have generally been less than totally successful. Developed by volunteer committees, standards have lacked the rigorous development and validation necessary. They have not been widely disseminated nor accepted within the profession (p. 12).

Dugger (1980b) also noted:

these committees did not use nationwide data for their work. The necessary national data simply did not exist... A few individual states have developed program standards that are measurable, but none of these standards have been nationally accepted (p. 5-5).
Development and validation of the Industrial Arts Standards

Dugger recognized the need for a fully researched, up-to-date, and validated set of qualitative standards. He felt that when such standards were developed and accepted by the profession, they would promote the cohesiveness that industrial arts needed to meet the challenges of the twenty-first century. In addition: "They could also help to enhance and accelerate further development of I.A. education philosophies and programs in the total school curriculum" (Dugger, 1980b, p. 6).

In 1978, Dugger and his team were awarded a three-year contract by the U.S. Department of Education and Welfare to develop a set of standards for industrial arts education programs. "The overall purpose of this project was to develop standards and guidelines for the improvement of I.A. programs that fulfill the objectives of the Vocational Education Act of 1963, as amended by the Educational Amendments of 1976" (Dugger, 1980b, p. 5). The Standards for Industrial Arts Education Project Staff (1979) identified three objectives for the project. The objectives were:

1. To develop a data base on industrial arts programs.
2. To develop a set of standards and related handbooks for insuring quality industrial education programs.
3. To familiarize, publicize, and demonstrate the standards development for industrial arts programs (p. 13).

The development and validation of the standards was accomplished
through a three-phase program that extended from October, 1978 to September, 1981.

Phase I was designed to assess the state of industrial arts at the secondary level. The Standards Project Staff (1979) explained that:

... no current, accurate data exists in industrial arts on the number and nature of programs, teachers or students. The latest such information was published in 1966 from data collected in the 1962-63 school year by Schmitt and Pelley (1966) through the Office of Education, U.S. Department of Health, Education and Welfare. Since that time, no significant national studies have been conducted. Though accurate data may exist at the local level, it is often unavailable to curriculum developers or planners, particularly on a national scale. When such data has been made available, researchers have found it to be fragmented, a result of different reporting systems designed to obtain data for different purposes.

The development of a common data base, or giving a clear picture of the current state of the art, is a necessary prerequisite to understanding industrial arts. Once obtained, this data can be evaluated along with futuristic prospectives of technology and society for the development of exemplary program standards (p. 12).

To build a data base for the standards development, Dugger initiated a comprehensive national survey to assess the current status of industrial arts programs in secondary schools.

Two categories of surveys were used to collect the data. A national survey was used to collect information from (a) a random sample of schools that included industrial arts in their curricula, (b) schools that had American Industrial Arts Student Association (AIASA) clubs, and (c) schools that state I.A. supervisors and/or their staffs identified as having exemplary programs. The principal, guidance coordinator,
and the I.A. department chairperson from each school within these categories were asked to provide information concerning their industrial arts program.

A second survey instrument was designed to obtain demographic data and opinions from state and territorial supervisors.

A total of 2,235 public high schools were selected to provide information for the study. This included a sample of 1,404 schools selected at random from the 20,436 high schools in the United States that offered an I.A. curriculum, all of the 572 high schools that had AIASA affiliated student clubs, and each of the 342 schools which were selected as having exemplary I.A. programs. Exemplary programs were chosen by state and territorial supervisors. In some instances, the state supervisor identified school divisions and the local supervisor selected the exemplary school.

Of the total number of surveys sent to all three samples, 1,360 were returned. Of these, 1,306 provided usable data for the standards project. Fifty of the 53 surveys sent to state and territorial supervisors were returned with varying amounts of usable data.

Bame (1980) examined the results of the survey and made the following conclusions:

... industrial arts programs in public schools have not changed appreciably since 1962-63. In other ways, such as efforts to enroll females, important changes have been made.

... the exemplary schools, nominated by state and territorial supervisors, were truly more exemplary in many areas.
The major purpose of industrial arts, as reported by industrial arts chairpersons, principals and guidance coordinators, is (as it was in 1962-63) to develop skills in the use of common tools and machines.

Industrial arts remains most closely allied with general education.

The majority of industrial arts labs in the schools surveyed were not equipped to accommodate handicapped students.

The course content in industrial arts is perceived as its greatest strength (p. 16).

Phase II of the standards development project consisted of ten national workshops that incorporated the best thinking of more than 400 industrial arts professionals into the development and validation of the standards. The special concerns of the AIASA, sex equity, and students with special needs were addressed in a special workshop (Bame and Pinder, 1982).

Although specific standards concerning these three areas are infused throughout the 10 standards it was judged that particular emphasis should be placed on student organizations, sex equity, and special needs of students to assist the industrial arts profession in providing special attention to these topics (Dugger, Bame and Pinder, 1982, p. 9).

Developmental, prevalidation, and validation workshops as well as seminars were held to acquire a wide range of professional input. Dugger described the specific process used for developing and validating the standards. Approximately 88 classroom teachers, local supervisors, and teacher educators participated in four workshops, held at separate locations across the country. The purpose of these workshops was to develop the initial elements of the standards. "Here broad
standards for the profession as well as specific criterion for measuring those standards were defined" (Dugger, 1982b, p. 36).

The project advisory committee synthesized the materials resulting from the four workshops and the project staff revised the standards based on the recommendations of the advisory committee.

Additional content was added to the standards through prevalidation workshops. Each of these prevalidation workshops involved approximately 20 participants.

Seminars and hearings on the standards were conducted at the 1980 American Vocational Association (A.V.A.) convention and the 1981 American Industrial Arts Association (AIAA) conference. These hearings provided an opportunity for conference participants to review the newly developed standards and provide additional input.

The advisory committee was convened again to review, edit, and synthesize the standards.

"Three final validation workshops were held to provide an opportunity for professionals from widely separate geographic areas to review and validate the final draft of the standards" (Dugger, 1982b, p. 36). Workshop participants reviewed the standards for acceptability, comprehensiveness, and mutual exclusiveness of the elements.

In Phase III, four major documents were produced as a result of the standards setting project. These included:

1. Standards for Industrial Arts Programs
2. AIASA Guide for Industrial Arts Programs
3. Sex Equity Guide for Industrial Arts Programs
4. Special Needs Guide for Industrial Arts Programs

Phase III was initiated to familiarize, publicize, and demonstrate the Standards. To accomplish this Phase III objective, the standards project staff made numerous presentations at state and national meetings to generate interest in the project. These presentations also provided a means for receiving input from all factions within the profession. Several journal articles were also used to keep industrial arts professionals informed regarding the progress and plans of the Standards effort.

Five implementation workshops were held in cooperation with the American Industrial Arts Association. State-sponsored workshops were also held in Arizona, Tennessee, and Virginia. An account of these workshops was offered by Dugger, Bame, and Pinder (1982).

In each implementation workshop, participants were given an orientation session to the standards and guides. The participants formed small groups and used a case-study approach to assess an industrial arts program. The primary purpose of this role-playing activity was to educate participants about each of the standards as an assessment tool. Finally, participants were grouped by states, and each group developed their state plan for implementing the standards and guides along with a public relations plan for informing key people in a given state about the standards (p. 9).

California's plan for implementing the standards into its industrial arts program was described by Almeida (1982):

To validate the standards in California, a team consisting of industrial arts teachers, local and state industrial arts supervisors, industrial arts teacher educators, a school principal, and representatives from business and industry will be selected. The team will review one junior high school,
two senior high schools, and one college and/or university industrial arts teacher education program.

The team will apply each standard to the IA program in each of the selected schools and determine its validity. ... Once the validation has been completed and the necessary revisions are incorporated, the standards for California will be made available to members of the education field (p. 34).

Almeida stated that the standards will be particularly useful (1) for evaluating I.A. programs that are eligible for vocational funding; (2) as part of the school accreditation process, and (3) for training evaluation teams when assessments are requested at the local level.

Previous Research in Industrial Arts Evaluation

Manual and computer searches of the research literature indicated that research in the area of industrial arts evaluation has focused on student achievement, curriculum development, physical facilities, and instructional methodologies. These searches failed to identify any investigations involving the Industrial Arts Standards. This was not unexpected considering the relatively short history of the Standards.

Several studies have been undertaken to determine whether there is general agreement among industrial arts curriculum decision makers about what the discipline should be trying to accomplish in the total education of high school students.

Jennings (1968) conducted a study to: (1) identify student behaviors indicating that economic competence had been acquired through
exposure to industrial arts, and (2) determine whether high school industrial arts teachers and teacher educators considered the acquisition of economic competence to be important. Jennings hypothesized that differences in teaching circumstances and professional status affected the way industrial arts teachers and teacher educators responded to a list of 45 economic competence behavioral statements. When Jennings asked high school teachers to rank his 45 statements, he found that significant differences existed when the teachers were grouped according to the social-economic level of their students, class size, and institution where they earned their bachelor's degree. He also reported significant differences in the order in which industrial arts teachers and teacher educators ranked the economic competence statements.

A study was undertaken by Backus (1968) to determine whether selected school personnel agreed on the order of importance for industrial arts program objectives. School superintendents, industrial arts coordinators, and high school industrial arts teachers were asked to rate fifty-four statements of student behavior. The ratings were analyzed to determine the order of importance that each group of subjects placed on nine program objectives.

Backus found that high school teachers and industrial arts coordinators tended to agree on goal priorities. Agreement among coordinators employed in different districts was not as high as it was for industrial arts teachers employed in different districts. Superintendents from smaller school districts tended to agree with their subordinates about the priorities for industrial arts programs, but less agreement was
evident in larger districts.

Russell (1972) conducted an investigation in which he found that high school principals and industrial arts teacher educators differ in their views about priorities for industrial arts programs. Russell found that principals believed that occupational information, simple work habits, and social attitudes should be stressed. Teacher educators, however, believed that technical knowledge, concepts about American industry, and problem solving skills should receive emphasis.

The results of another study designed to identify the order of importance of the American Vocational Association (AVA) objectives for industrial arts were reported by Burns (1975). The opinions of principals, counselors, industrial arts teachers, and industrial arts teacher educators were surveyed in the study. Burns found that there were no significant differences in the perceived priorities for AVA industrial arts objectives among Mississippi school personnel.

Sucharski (1975) used three independent sets of goal statements to determine whether industrial arts teachers agree on philosophy, present program goals, and future direction for industrial arts programs. Sucharski found little agreement among the general population of industrial arts teachers surveyed in the study. However, he found general agreement within subgroups stratified by age, length of service, and grade level taught.

Hatch (1983) conducted a study to determine whether industrial arts practitioners consider the Standards criteria to be equally important. Three groups of industrial arts professionals were asked
to rate selected Standards on a 7-point scale of importance ranging from marginally important to critically important. Hatch compared the responses of a national sample of 100 industrial arts classroom teachers, 100 teachers from Iowa, and 41 Iowa teacher educators. He found that significant differences in importance ratings exist in all Standards areas for at least one of the three groups. He concluded that the results of his study indicate that the determination of which Standards are important must be left to classroom teachers. He also suggested that the survey profile presently used to report evaluation findings does not adequately reflect the differences in importance which teachers place on the Standards.

The results of these studies clearly indicated that professional role, degree status, length of professional service, and grade level taught affect the perceptions and decision of program evaluators.

Summary

The literature reviewed for this study clearly suggested that there is a need for accurate, consistent, and relevant evaluation of educational programs. It is critical for industrial arts to have specific program evaluation standards and procedures. Program planners must have such information to make informed management decisions. Program patrons and supporters are entitled to similar information so they can judge the quality of the program as well as that of management decisions. The amount and type of data that the evaluator collects has been subject to the preferences and interpretations of the evaluator.
The shortage of procedures for making systematic observations of educational activities is particularly dismaying because the site visit is a widely used evaluation method . . . and the visitors grasp at the slimmest shred of evidence for something to report (Stake, 1970, 192-193).

Standards are a means for focusing the evaluator's attention on pre-selected key elements of the program or process.

Standards must be specific enough to provide information which can be used to compare the results of the same program at different points in time or to make comparisons between programs, yet standards must be broad enough to allow for differences which are characteristic of individual programs. In many areas of education, agreement has not been reached with regard to what characteristics are most important in quality programs nor is there agreement about the degree of specificity that standards should possess (Gubser, 1980; Tom, 1980). The literature reviewed for this study does not offer a resolution to the controversy. The Industrial Arts Standards have broad professional input and have received wide acceptance within the professional community. Previous research suggested that evaluator's role may affect the evaluation ratings obtained with the standards. Standards and the variables which affect their use deserve careful study so they can be adjusted, if necessary, to provide accurate evaluation information.

The review of literature provided numerous insights into the problems involved in developing valid standards and accurate evaluation procedures. These insights proved useful in designing the study and
developing the instruments, and helped with the analysis and interpretation of the results.
CHAPTER III. METHODOLOGY

The literature pertaining to the development and application of educational standards suggests two important problems related to the use of the Industrial Arts Standards. The first problem examined by this study was to determine if industrial arts program evaluators reach similar conclusions about program quality when they apply the Standards criteria to a course or program. A second problem was to determine whether groups industrial arts professionals, namely, industrial arts high school teachers; high school supervisory personnel; and industrial arts teacher educators reach similar conclusions about program quality when they apply the Standards criteria to a program. This chapter describes the methods and procedures used to isolate and analyze the variables which bear directly upon these problems.

Population

Three groups of professional educators have primary responsibilities for the assessment of industrial arts programs. Classroom teachers make daily and yearly assessments of the quality of their programs and make or recommend changes based upon these assessments. Principals evaluate industrial arts programs as part of their overall job responsibilities and allocate resources based on their conclusions. In some instances, education department officials, at various levels, are required to assess the quality of industrial arts programs under their jurisdiction. Teacher educators are often called upon to serve as consultants or as members of accreditation teams. For these reasons, high
school teachers, principals and industrial arts supervisors, and industrial arts teacher educators were identified as subjects in this study.

The authors of the Standards for Industrial Arts Programs recommend that a team of individuals representing "industrial arts classroom teachers, school administrators, students, parents, business and industrial representatives, and other consultants" (Standards for Industrial Arts Programs, 1981, p. 8) be formed to evaluate an industrial arts program. They also suggest that the team should meet so members can familiarize themselves with the Standards and the evaluation process.

Students, parents, and business and industrial representatives were not included in this study for two reasons. Neither the time nor the financial resources were available to the researcher to identify members of these three groups who were knowledgeable enough to provide reliable judgments on the quality of industrial arts programs. Secondly, assuming willing participants from these groups could have been located, it would have taken an inordinate amount of their time to become familiar with the Standards and ten or more pages of written information which described an industrial arts program. For these reasons, this study included only subjects who had prior knowledge about the industrial arts discipline.

Selection of Sample

The following procedures were used to select subjects from the populations identified earlier. High school principals were selected
from Patterson's American Education. This reference provided the names and addresses of all high schools in the United States, as well as the names and positions of each school's administrative officials. Two random numbers were used to select each name taken from this source. The first number was used to select one of the 469 pages that contained the needed information, and the second number was used to identify a particular principal.

This same source and method was used to select industrial arts classroom teachers. Patterson's directory does not contain the names of individual high school faculty members. The first letters requesting participation were addressed to the "Industrial Arts Instructor" at the selected school.

A directory of state and federal industrial education supervisory personnel was provided in the October, 1983, issue of School Shop. Industrial arts supervisors were identified from this list and randomly selected as possible subjects.

The index of personnel from the Industrial Teacher Education Directory, 1983-84 provided the names of the 2,730 industrial education teacher educators in the United States. Numbers were taken from a random number table and used to select specific individuals listed in the directory.

Development of the Instruments

To gather data for this research, three written program descriptions were developed and tested. Each of the three programs represented
a different level of quality. Each was evaluated with a common set of selected Industrial Arts Standards. Data on the remaining variables was gathered by means of a questionnaire.

**Written program descriptions**

Several possible alternatives were considered for presenting information about program quality to the subjects used in this study. The decision was made to use written program descriptions because the other alternatives presented numerous logistical and financial difficulties that could not be resolved with available resources. Written programs also provided better control of the program quality variable and more information could be presented to the subject in less time. Selection of this alternative reduced the time and effort required on the part of the subjects who participated in the study and probably improved the number of responses.

The Industrial Arts Standards, accreditation self studies and reports, written school district policies, state and district curriculum guides and high school courses of study were examined to identify possible information to include in the written program descriptions. The information contained in the program descriptions was similar in format and content to that found in these documents.

Identical information describing the community, school district, high school, and industrial arts facilities was provided in all three program descriptions. These variables almost certainly affect decisions about program quality and needed to be controlled.
A neophyte evaluator might well seize upon some external criteria against which to perform the process without realizing that the very essence of a program resides uniquely in the teaching activities and the ways in which facilities and resources are employed in the process. Good instruction often has been provided by outstanding teachers who lacked adequate facilities and the ordinary resources (Nelson, 1967, p. 5).

The differences in scope and content which were written into the program descriptions were based, in part, on the findings of a study conducted by Dixon and Dugger (1980). Dixon and Dugger asked supervisors to identify and rate the characteristics of exemplary industrial arts programs. According to state supervisors: "the three main characteristics of an exemplary program (in rank order) were: (a) having a dedicated and prepared IA teacher, (b) having a well-equipped laboratory, and (c) using a variety of effective teaching methods" (p. 26). The supervisors also mentioned: (1) a well-rounded curriculum, (2) relevance to industry, (3) written course objectives, (4) incorporation of innovative ideas and materials, (5) low student/teacher ratio and, (6) future-oriented content as characteristics of exemplary programs. These characteristics served as the basis for adjusting program quality. In another section of this same study, Dixon and Dugger reported that general woodworking, general metals, general I.A., architectural drafting, and mechanical drawing are most frequently offered in the high school curriculum. Significant numbers of industrial arts chairpersons reported tentative plans to include plastics and graphic arts as resources become available. These findings provided the rationale for including specific courses in each of the three programs.
Program I (Appendix A) described a limited industrial arts curriculum which consisted of woodworking and drafting courses in which skill development activities were stressed. Program II (Appendix A) offered additional courses in metals, electricity, and power and energy. The drafting and woodworking courses encompassed additional activities which offered students an opportunity to explore newer technologies related to these areas. Program III (Appendix A) offered graphic arts and plastics courses in addition to those presented in Program II. All of the courses in Program III reduced the emphasis on skill development and placed increased emphasis on discovery activities that stressed the mathematical, scientific, and technological principles of the area. The descriptions were also adjusted to reflect differences in department budgets, activities, policies, philosophies, and staff qualifications and development. Strengths, as well as weaknesses, were written into each of the three descriptions to present a realistic description of an industrial arts program and reduce the "halo effect."

Validation of program differences The following procedure was used to validate the differences in quality of the program descriptions. Eight junior-senior industrial arts majors and two graduate students from Northwest Missouri State University participated in the validation process. Each student was given all three programs in random order, asked to inspect each of them, and rank them in ascending order: 1. lowest quality; 2. medium quality; and 3. highest quality. All ten student judges ranked Program I and 1, Program II as 2, and Program III as 3.
Selection of standards for study

Ideally, all of the 235 Standards should be used to assess the quality of an industrial arts program. However, this study required that each of the volunteer subjects review ten or more pages of written information describing an industrial arts program and assess the information based on the criteria set forth in the Standard statements. It became clear that excessive demands would have been placed on the subject's time had all 235 Standards been used to assess a written program description. The following procedure was used to identify 30 of the 235 Standards statements for use in this study.

The scope of this study was limited, by the researcher, to the first five Standards topics: Philosophy, Instructional Program, Student Populations Served, Instructional Staff, and Administration and Supervision. All nine of the Standards from topic area 3 and ten or eleven randomly selected Standards from areas 1, 2, 4, and 5 were selected by the researcher. These were assembled into a list of 52 Standards criteria and submitted to an eight member jury of industrial education and technology graduate students at Iowa State University for evaluation.

The jury members were asked to rate each of the 52 Standards on a five point subjectivity scale. They were instructed to rate Standards criterion "low" if they felt that the criterion relied mainly on objective information and a low degree of professional judgment for assessing a program.

Jury members were instructed to rate Standard criterion "high"
if they required the use of subjective data and a high degree of professional judgment to make a determination about program quality. Seven members of the jury rated each Standard. The ratings were tabulated and the Standards that received the highest "professional judgment" ratings were used for this study.

The directions, preliminary information, and selected Standards were taken verbatim from Standards for Industrial Arts Programs and assembled into an abbreviated Standards instrument (Appendix B) to be used by the subjects for assessing the quality of the written program descriptions.

Questionnaire

A questionnaire (Appendix C) was developed to gather data about each of the remaining variables encompassed by this study. Subjects were asked to provide information regarding their gender, degree status, job role, professional experience, number and types of courses taught, school enrollment, and amount of industrial experience.

Human Subjects Committee

Research guidelines have been established at Iowa State University which require prior approval for all research which involves the use of human subjects. The research proposal, research questionnaire, Standards rating instrument, and the three program descriptions were submitted to the Human Subjects Committee for approval.
Pilot testing

Ten upper division teacher education majors tested the data gathering procedures used for this study. Each student was asked to complete the questionnaire, evaluate one of the programs with the Standards instrument, and critique the exercise and to identify areas that needed further clarification. Their suggestions were very helpful for refining and clarifying the final instruments.

Two members of the industrial arts faculty at Northwest Missouri State University were timed as they completed the questionnaire and evaluated the longest of the three programs. Both faculty members completed the assignment in less than one hour. Therefore, it was assumed that most subjects would be able to provide their data in one hour or less.

Data Collection

Initial contact with each potential subject was made by first class mail. The letter (Appendix C) informed the potential subject about the purpose of the study, what would be required if he/she agreed to participate, and the estimated time needed to complete the questionnaire and evaluate the written program. Letters were addressed to each of the principals, state supervisors, and teacher educators by name. Letters sent to high school teachers were addressed to each of the principals, state supervisors, and teacher educators by name. Letters sent to high school teachers were addressed to the "Industrial Arts Instructor" since the source from which the schools were selected did not
provide the names of instructional staff members.

Each person contacted by mail was asked to complete and return a three-question short form (Appendix D) in the enclosed, stamped envelope. The form requested each potential participant to (1) check the appropriate statement indicating whether he/she would be able to participate in the study, (2) check the statement indicating whether he/she wanted to receive an abstract of the findings, and (3) make any corrections on the mailing label which was used to address the materials sent to those who agreed to participate.

At the end of three weeks, follow-up letters and a duplicate copy of the response form were sent to those who had not responded to the first mailing.

Five hundred forty-six potential subjects were contacted by the first mailing. Four hundred forty-seven (81.8%) returned the enclosed form. Two hundred thirty-four (42%) of those who returned the form agreed to participate in the study. Table 1 shows the number and percent of respondents from the study populations who expressed a willingness to participate in this study.

Two requests were returned by the post office marked "no forwarding address." Seventeen principals returned the form with a note indicating that their school did not have an industrial arts program. Six members of the teacher educator group indicated that they were not involved with industrial arts and did not feel qualified to participate in the study.
Table 1. Number of respondents that agreed to participate in the study

<table>
<thead>
<tr>
<th>Evaluator group</th>
<th>Requested to Participate</th>
<th>Agreed to Participate</th>
<th>Percent Participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.S. IA Teachers</td>
<td>160</td>
<td>86</td>
<td>53.7</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.S. Principals</td>
<td>160</td>
<td>42</td>
<td>26.3</td>
</tr>
<tr>
<td>IA Supervisors</td>
<td>74</td>
<td>34</td>
<td>45.9</td>
</tr>
<tr>
<td>IA Teacher Educators</td>
<td>160</td>
<td>72</td>
<td>45.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>554</td>
<td>234</td>
<td>42.2</td>
</tr>
</tbody>
</table>

One of the three program descriptions, the Standards rating instrument, and the questionnaire were mailed to each subject who indicated a willingness to participate in this research. Program I, II, or III was assigned to each subject by the order in which affirmative responses were received, and by the group to which each respondent belonged. For example, the first high school industrial arts teacher, the first principal, etc. was assigned to evaluate Program I. The second teacher, principal, etc. evaluated Program II. This method assured that each program was evenly distributed within the three groups of evaluators.

A stamped self-addressed envelope was provided for the return of the questionnaire and the Standards rating instrument. The return envelopes were coded so that non-respondents could be identified and contacted at the end of three weeks. At the end of the three-week period, follow-up letters (Appendix D) were sent to those who had not returned their data. Table 2 shows the number and percent of responses received.
from each group of subjects.

One hundred seventy-nine (76.4%) of the 234 respondents returned the questionnaire and evaluation instrument. One respondent returned the materials with a note explaining that his school did not have an industrial arts program. A second instrument was returned with no usable data.

Table 2. Number of returns from evaluator groups

<table>
<thead>
<tr>
<th>Evaluator Group</th>
<th>Agreed to Participate</th>
<th>Returns</th>
<th>Percent Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.S. IA Teachers</td>
<td>86</td>
<td>59</td>
<td>86.6</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.S. Principals</td>
<td>42</td>
<td>27</td>
<td>64.3</td>
</tr>
<tr>
<td>IA Supervisors</td>
<td>34</td>
<td>30</td>
<td>88.2</td>
</tr>
<tr>
<td>IA Teacher Educators</td>
<td>72</td>
<td>61</td>
<td>84.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>234</td>
<td>177</td>
<td></td>
</tr>
</tbody>
</table>

One hundred seventy-seven respondents from four subsamples within the professional education community provided data for this study. Table 3 shows the number of responses that were received from each of the study samples. The table also displays the number of respondents from each subsample that evaluated each of the programs.

Data tabulation

The overall program rating was obtained by the same method used to score a program when the full set of Standards is used to evaluate
Table 3. Role of respondents who evaluated Programs I, II, and III

<table>
<thead>
<tr>
<th>Evaluator's Role</th>
<th>Prog I</th>
<th>Prog II</th>
<th>Prog III</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.S. IA Teacher</td>
<td>21</td>
<td>18</td>
<td>22</td>
<td>61</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.S. Principal</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>IA Supervisor</td>
<td>15</td>
<td>8</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>IA Teacher Educator</td>
<td>18</td>
<td>21</td>
<td>21</td>
<td>60</td>
</tr>
<tr>
<td>TOTAL</td>
<td>64</td>
<td>56</td>
<td>57</td>
<td>177</td>
</tr>
</tbody>
</table>

a program. Each Standard was marked "Below Standard," "Meets Standard," or "Exceeds Standard" by the program evaluator. The overall rating was obtained from the returns by summing Standards statements which were marked in the "Meets" or "Exceeds" categories. The respondents were encouraged to mark one of the three categories, however, in some instances one or more of the items were left blank. These were counted in the "Below Standard" category under the assumption that when there is not enough evidence to place a program attribute in the "Meets" or "Exceeds" category, it must be below standard. By scoring each of the Standards rating instruments in this manner, a rating score ranging from a low of 0 to a high of 30 was obtained from each respondent.

Other data received from the respondents were coded and stored in a computer at Iowa State University for further analysis.
Research Design

The purpose of this study was to determine whether the Industrial Arts Standards were able to detect differences in the quality of industrial arts programs. The literature suggested that various populations hold different opinions regarding the philosophy, objectives, and content base for industrial arts programs. Studies conducted by Jennings (1968), Backus (1968), Russell (1972), Sucharski (1975), and Hatch (1983) found that different groups of professional educators hold different views about the priorities for the industrial arts discipline. This study was conducted to determine if these differences play a significant role when the Industrial Arts Standards are used as the criteria for program evaluation.

Variables included in this study

Two independent variables, program differences and evaluator's role, were examined to determine if they had a significant effect on the dependent variable, evaluator rating. Differences in gender, degree status, years of professional experience, years of tenure in present position, area(s) of teaching or administrative expertise, school enrollment, and industrial experience are common to all evaluators. These covariables were analyzed to determine if they have a significant effect on the dependent variable.

The research questions suggested by the literature reviewed for this study resulted in the formulation of five research hypotheses.
Research hypothesis I:

It was hypothesized that the mean value of ratings obtained from the evaluation of three different industrial arts programs which were different in quality would not differ significantly, at the 95 percent level of confidence, when the Industrial Arts Standards were used as the evaluation criteria.

Statistical hypothesis:

\[ H_{01}: u_1 = u_2 = u_3, \text{ or all group affects } A_i = 0 \text{ for } i = 1 \text{ to } 3 \]
\[ H_{A1}: u_1 \neq u_2 \neq u_3, \text{ or all group affects } A_i \neq 0 \text{ for } i = 1 \text{ to } 3 \]

Research hypothesis II:

It was hypothesized that there was no significant difference between the mean values of program ratings obtained from high school teachers, supervisory personnel, and industrial arts teacher educators when the Industrial Arts Standards were used to evaluate industrial arts programs.

Statistical hypothesis:

\[ H_{02}: u_1 = u_2 = u_3, \text{ or all group affects } B_j = 0 \text{ for } i = 1 \text{ to } 3 \]
\[ H_{A2}: u_1 \neq u_2 \neq u_3, \text{ or all group affects } B_j \neq 0 \text{ for } i = 1 \text{ to } 3 \]

Research hypothesis III:

It was hypothesized that there was no significant interaction between evaluator's role and the program quality level at the 95 percent level of confidence.
Statistical hypothesis:

\[ H_{03}: u_{ij} = u_{..} + a_i + B_j \text{ for all } ij, \text{ or all } (A \times B)_{ij} = 0 \]

\[ H_{A3}: u_{ij} \neq u_{..} + a_i + B_j \text{ for some } ij, \text{ of all } (A \times B)_{ij} \neq 0 \]

Data analysis

The following statistical procedures were used to analyze the variables included in hypotheses I, II, and III:

Two-way analysis of variance (ANOVA) procedures were conducted to test for:

a. Significant differences between the mean ratings obtained for programs I, II, and III.

b. Significant differences between the mean ratings obtained from high school IA teachers, supervisory personnel, and teacher educators.

c. Significant interaction between program level and evaluator role.

The statistical model was:

\[ X_{ijk} = u_{..} + A_i + B_j + (A \times B)_{ij} + e_{ijk} \]
\[ (i = 1, 2, 3) \ (j = 1, 2, 3) \ (k = 1, \ldots, 126) \]

The variables included in the model were:

\[ X_{ij} = \text{rating of program } i \text{ by evaluator in role } j \]

\[ u_{..} = \text{overall mean of the criterion variable} \]

\[ A_i = \text{effect of } i\text{.th program quality level} \]

\[ B_j = \text{effect of } j\text{.th evaluator role} \]

\[ (A \times B)_{ij} = \text{interaction of program level and evaluator's role} \]
\[ e_{ijk} = \text{error} \]

The statistical test was:

\[
\frac{MS_B}{MS_W}
\]

\( F = \text{test value for the analysis} \)

\( MS_B = \text{Mean sum of squares between groups} \)

\( MS_W = \text{Mean sum of squares within groups} \)

The critical value for testing each hypothesis is given by the equation:

\[
F(\text{critical}) = F(k-1 \text{ and } N-k) \quad \alpha = .05
\]

\( k = \text{number of groups included in the analysis} \)

\( N = \text{number of subjects included in the analysis} \)

The two-way ANOVA procedures required equal numbers of observations for each program-role cell. The data for this analysis were "balanced" by using a computer program to identify the numbers in the smallest program-role cell. Observations from the larger cells were selected at random and deleted from the data set to produce equal frequencies in the nine cells. This procedure resulted in a 3 (program) by 3 (role) ANOVA table that contained 14 observations in each cell.

Research hypothesis IV:

It was hypothesized that the standardized regression coefficient (\( \beta \)) for evaluators role would not differ significantly from zero, at the 95 percent level of confidence, after the effects of gender, degree status, years of professional experience, years of tenure in present position, area(s) of professional expertise, school enrollment, and
Statistical hypothesis:
\[ H_0^4: B_j = 0 \quad (j = 1 \text{ to } 7) \]
\[ H_{A4}: B_j \neq 0 \quad (j = 1 \text{ to } 7) \]
(j = jth standardized regression coefficient)

Research hypothesis V:
It was hypothesized that the standardized regression coefficient \( \beta \) for program level would not differ significantly from zero, at the 95 percent level of confidence, after the effects of degree status, years of professional experience, years of tenure in present position, area(s) of professional expertise, school enrollment, industrial experience, and professional role had been taken into account.

Statistical hypothesis:
\[ H_0^5: B_j = 0 \quad (j = 1 \text{ to } 7) \]
\[ H_{A5}: B_j \neq 0 \quad (j = 1 \text{ to } 7) \]
(j = jth standardized regression coefficient)

A product-moment correlation matrix was constructed between all dependent variables used in this study. The contribution that a predictor variable makes to the \( R^2 \) is partly dependent upon its correlation with other predictor variables which are included in the model. The increase in variation which an independent variable contributes to the total sum of squares must be viewed in the context of its relationship to the other variables in the model (Neter and Wasserman, 1974).

Under these hypotheses: \( H_0: \rho = 0 \), the test statistic was:
Multiple regression procedure was conducted to test for a significant increase in the $R^2$ (coefficient of determination) for each of the variables identified in the hypothesis. A separate multiple regression analysis was made for each variable as it was added to the model. (Note: All of the interaction variables were added to the regression analysis in a single step.)

The general model used to investigate hypothesis IV and V was:

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_1X_9 + B_{10}X_{11}X_{10} + B_{11}X_{12}X_9 + B_{12}X_{12}X_{10} + B_{13}X_{11}X_6 + B_{14}X_{11}X_7 + B_{15}X_{11}X_8 + B_{16}X_{12}X_6 + B_{17}X_{12}X_7 + B_{18}X_{12}X_1 + B_{19}X_{11}X_1 + B_{20}X_{12}X_1 + B_{21}X_9 + B_{22}X_{10} + B_{23}X_{11} + B_{24}X_{12} + e$$

Variables included in the model:

- $Y$ = Rating of program by evaluator.
- $B_n$ = Regression coefficient.
- $X_1$ = Degree status. Less than B.S. = 1, B.S. = 2, M.S. = 3, Specialists = 4, Ph.D. = 5
- $X_2$ = Years of teaching experience.
- $X_3$ = Years employed in present position.
- $X_4$ = Years of industrial experience.
- $X_5$ = Enrollment of school(s) in which respondent is currently teaching or supervising.
- $X_6$ = Teaching area. Manufacturing = 1, Power and energy = 0, Communication - 0, Not applicable = 0.
- $X_7$ = Teaching area. Manufacturing = 0, Power and energy = 1,
Communication = 0, Not applicable = 0

$X_8 = \text{Teaching area. Manufacturing} = 0, \text{Power and energy} = 0, \text{Communication} = 1, \text{Not applicable} = 0$

$X_9 = \text{Evaluator's role. Teacher} = 1, \text{Supervisor} = 0, \text{Teacher educator} = 0$

$X_{10} = \text{Evaluator's role. Teacher} = 0, \text{Supervisor} = 1, \text{Teacher educator} = 0$

$X_{11} = \text{Program quality. Level 1} = 1, \text{Level 2} = 0, \text{Level 3} = 0.$

$X_{12} = \text{Program quality. Level 1} = 0, \text{Level 2} = 1, \text{Level 3} = 0.$

e = \text{Error.}$

The Wherry-Doolittle procedure was used to test whether the $R^2$ increase for each of the variables was significant (Hinkle, Wiersma, and Jars, 1979, p. 407).

The statistical test was:

\[
\frac{(R_2^2 - R_1^2)}{(k_1 - k_2)} / \left( \frac{1 - R_2^2}{n - k_1 - 1} \right)
\]

$F = \text{test for the analysis}$

$R = \text{Pearson product-moment correlation coefficient}$

$k = \text{number of predictors included in the analysis}$

$n = \text{number of subjects included in the analysis}$

The critical value for testing $R_1 - R_2$ is given by the equation:

\[
F(\text{critical}) = F(k_1 - k_2 \text{ and } n - k_1 - 1; \alpha = .05)
\]
Analysis of the significant covariables

The covariables that produced a significant change in the $R^2$ value were subjected to additional analysis to determine whether the interaction of these variables with program quality affect the ratings of programs. The SAS procedures used to tabulate ANOVA cell frequencies revealed that some cells contained very few observations. Efforts to balance the cells, as required by the ANOVA procedure, would have resulted in the loss of so much data that accurate analysis would have been impossible. To resolve this problem, the SAS General Linear Model (GLM) procedure was used to obtain an analysis of variance for each of the significant covariables. GLM procedures allowed the use of unbalanced data for the ANOVA analysis.

The statistical model used to evaluate the hypotheses was:

$$X_{ijk} = u + A_i + B_j + (A \times B)_{ij} + e_{ijk}$$

$(i = 1, 2, 3) \quad (j = 1, 2, 3) \quad (k = 1, \ldots, n)$

Variables included in the model:

$X_{ij}$ = rating of program $i$ by evaluator $j$

$u..$ = overall mean of the dependent variable

$A_i$ = effect of $i$.th program quality level

$B_j$ = effect of $j$.th level of significant covariable

$(A \times B)_{ij} =$ interaction of program level and significant covariable

$e_{ijk} =$ error

The statistical test was:
The critical value for testing each covariable was:

\[ F(\text{critical}) = F(k-1 \text{ and } N-k), \alpha = .05 \]

\( k \) = number of groups included in the analysis

\( N \) = number of subjects included in the analysis

Data analysis

The data gathered for this study were analyzed with Statistical Analysis System (S.A.S.) and with Statistical Package for the Social Sciences (S.P.S.S.) procedures at Iowa State University.

Conclusions and recommendations were formulated on the basis of the results of the various statistical analysis and interpretation of the results.
CHAPTER IV. FINDINGS

The primary problem of this study was to determine whether program evaluators reach similar conclusions about the quality of an industrial arts program when they use the Industrial Arts Standards as judgment criteria. A second problem was to determine whether groups of industrial arts teacher educators, high school teachers, and supervisory personnel reach the same conclusions about the quality of an industrial arts program when using the Industrial Arts Standards as the evaluation criteria.

This study used the following groups and procedures to investigate these problems. High school industrial arts classroom teachers, high school principals, state level and school district supervisory personnel, and industrial arts teacher educators were randomly selected from their respective national populations. Subjects from the three groups were asked to evaluate one of three written descriptions of an industrial arts program by completing a rating instrument which contained 30 of the 235 Industrial Art Standards. The respondents were also asked to provide information regarding their degree status, professional role, area of teaching expertise, years of teaching experience, school enrollments, and industrial experience. The information obtained from participants was analyzed according to the procedures previously described, and the findings are presented in this chapter.

Description of the Sample

Fifty-nine high school industrial arts classroom teachers, twenty-seven high school principals, thirty secondary and state level
supervisors and sixty-one industrial arts teacher educators provided usable data for this study.

Tables 4 through 10 present demographic information about the study respondents.

Table 4. Degree status of respondents

<table>
<thead>
<tr>
<th>Degree</th>
<th>Number of Respondents</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than Baccalaureate</td>
<td>3</td>
<td>1.7</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>27</td>
<td>15.3</td>
</tr>
<tr>
<td>Master's</td>
<td>92</td>
<td>51.9</td>
</tr>
<tr>
<td>Specialists</td>
<td>11</td>
<td>6.2</td>
</tr>
<tr>
<td>Doctorate</td>
<td>44</td>
<td>24.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>177</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 5. Total years of professional experience of respondents

<table>
<thead>
<tr>
<th>Total years in Education</th>
<th>Number of Respondents</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5</td>
<td>12</td>
<td>6.8</td>
</tr>
<tr>
<td>6 - 10</td>
<td>29</td>
<td>16.4</td>
</tr>
<tr>
<td>11 - 15</td>
<td>34</td>
<td>19.2</td>
</tr>
<tr>
<td>16 - 20</td>
<td>34</td>
<td>19.2</td>
</tr>
<tr>
<td>21 - 25</td>
<td>26</td>
<td>14.6</td>
</tr>
<tr>
<td>26 - 30</td>
<td>29</td>
<td>16.4</td>
</tr>
<tr>
<td>31 - 35</td>
<td>12</td>
<td>6.8</td>
</tr>
<tr>
<td>36 - 40</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>177</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 6. Respondents' length of employment at their present positions

<table>
<thead>
<tr>
<th>Years employed at Present Position</th>
<th>Number of Respondents</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5</td>
<td>57</td>
<td>32.2</td>
</tr>
<tr>
<td>6 - 10</td>
<td>33</td>
<td>18.6</td>
</tr>
<tr>
<td>11 - 15</td>
<td>33</td>
<td>18.6</td>
</tr>
<tr>
<td>16 - 20</td>
<td>34</td>
<td>19.2</td>
</tr>
<tr>
<td>21 - 25</td>
<td>8</td>
<td>4.5</td>
</tr>
<tr>
<td>26 - 30</td>
<td>9</td>
<td>5.1</td>
</tr>
<tr>
<td>31 - 35</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>36 - 40</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>177</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 7. Industrial experience of respondents

<table>
<thead>
<tr>
<th>Years of Industrial Experience</th>
<th>Number of Respondents</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>33</td>
<td>18.6</td>
</tr>
<tr>
<td>1 - 5</td>
<td>92</td>
<td>52.0</td>
</tr>
<tr>
<td>6 - 10</td>
<td>28</td>
<td>15.8</td>
</tr>
<tr>
<td>11 - 15</td>
<td>10</td>
<td>5.7</td>
</tr>
<tr>
<td>16 - 20</td>
<td>8</td>
<td>4.5</td>
</tr>
<tr>
<td>21 - 25</td>
<td>3</td>
<td>1.7</td>
</tr>
<tr>
<td>26 - 30</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>31 - 35</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>177</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 8. Enrollment of school(s) where respondent was teaching and/or supervising

<table>
<thead>
<tr>
<th>Enrollment of School(s)</th>
<th>Number of Respondents</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>6</td>
<td>3.4</td>
</tr>
<tr>
<td>101 - 250</td>
<td>16</td>
<td>9.0</td>
</tr>
<tr>
<td>251 - 500</td>
<td>18</td>
<td>10.2</td>
</tr>
<tr>
<td>501 - 750</td>
<td>15</td>
<td>8.5</td>
</tr>
<tr>
<td>751 - 1,000</td>
<td>13</td>
<td>7.3</td>
</tr>
<tr>
<td>1,001 - 5,000</td>
<td>55</td>
<td>31.1</td>
</tr>
<tr>
<td>5,001 - 10,000</td>
<td>15</td>
<td>8.5</td>
</tr>
<tr>
<td>more than 10,000</td>
<td>22</td>
<td>12.4</td>
</tr>
<tr>
<td>no data reported</td>
<td>17</td>
<td>9.6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>177</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 9. Respondents' area of teaching or administrative emphasis

<table>
<thead>
<tr>
<th>Area</th>
<th>Number of Respondents</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic Communications</td>
<td>21</td>
<td>11.9</td>
</tr>
<tr>
<td>Energy and Power</td>
<td>9</td>
<td>5.1</td>
</tr>
<tr>
<td>Industrial Materials and Processes</td>
<td>38</td>
<td>21.5</td>
</tr>
<tr>
<td>Two or more areas</td>
<td>109</td>
<td>61.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>177</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 10. Professional role of respondents

<table>
<thead>
<tr>
<th>Role Classification</th>
<th>Number of Respondents</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Teacher</td>
<td>59</td>
<td>33.3</td>
</tr>
<tr>
<td>High School Principal</td>
<td>27</td>
<td>15.3</td>
</tr>
<tr>
<td>IA Supervisor</td>
<td>30</td>
<td>16.9</td>
</tr>
<tr>
<td>Teacher Educator</td>
<td>61</td>
<td>34.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>177</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Research Hypothesis I

It was hypothesized that the mean value of ratings obtained from the three different industrial arts programs would not differ significantly when the Industrial Arts Standards were used as the evaluation criteria.

Three different industrial arts program descriptions were evaluated by subjects from three groups of professional educators: high school industrial arts classroom teachers, high school supervisors and principals, and industrial arts teacher educators. Figure 1 shows how the ratings for each of the three programs were distributed.

The mean ratings for each of the program descriptions are displayed in Table 11. These findings show that the study respondents ranked the program descriptions in the same order of quality as the jury of college students who ranked them by direct comparison.
Figure 1. Distribution of respondents ratings of programs I, II, & III
Table 11. Comparison of mean ratings, standard deviations and ranges of ratings for Programs I, II, and III by high school teachers, supervisory personnel, and teacher educators for all participants

<table>
<thead>
<tr>
<th>Program</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>64</td>
<td>17.87</td>
<td>8.72</td>
<td>0 - 29</td>
</tr>
<tr>
<td>High School Teachers</td>
<td>20</td>
<td>20.60</td>
<td>4.86</td>
<td>12 - 27</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td>26</td>
<td>19.57</td>
<td>9.67</td>
<td>1 - 29</td>
</tr>
<tr>
<td>Teacher Educators</td>
<td>18</td>
<td>12.38</td>
<td>8.55</td>
<td>0 - 26</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program II</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>56</td>
<td>20.70</td>
<td>6.59</td>
<td>3 - 30</td>
</tr>
<tr>
<td>High School Teachers</td>
<td>18</td>
<td>21.67</td>
<td>5.01</td>
<td>13 - 29</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td>17</td>
<td>22.23</td>
<td>6.71</td>
<td>13 - 30</td>
</tr>
<tr>
<td>Teacher Educators</td>
<td>21</td>
<td>18.61</td>
<td>7.40</td>
<td>3 - 29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program III</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>57</td>
<td>22.81</td>
<td>5.79</td>
<td>7 - 30</td>
</tr>
<tr>
<td>High School Teachers</td>
<td>21</td>
<td>25.47</td>
<td>3.24</td>
<td>17 - 30</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td>14</td>
<td>22.07</td>
<td>5.99</td>
<td>8 - 30</td>
</tr>
<tr>
<td>Teacher Educators</td>
<td>22</td>
<td>20.73</td>
<td>6.71</td>
<td>7 - 30</td>
</tr>
</tbody>
</table>
Program III, judged highest in quality by the jury, received the highest overall mean score (22.81) from the study respondents. Program II represented a medium quality program and received a lower overall mean score (20.70). Program I was lowest in quality, according to the jury, and received the lowest overall mean score (17.87). The standard deviation and range of scores became smaller as the quality level of the programs increased.

Research Hypothesis II

It was hypothesized that there would be no significant difference among the mean values of program ratings obtained from high school teachers, industrial arts supervisory personnel, and industrial arts teacher educators when the Industrial Arts Standards were used to evaluate industrial arts programs.

High school industrial arts teachers, supervisory personnel, and industrial arts teacher educators evaluated three different industrial arts program descriptions with a rating instrument comprised of 30 Industrial Arts Standards. Table 11 shows how subjects from each role group rated the three programs.

The means contained in Table 11 show that high school teachers and teacher educators ranked the program descriptions in the same quality order as the jury of college students who validated the quality level by direct comparison. The means obtained from supervisory personnel show that they ranked Program II slightly higher than Program III.
Other notable differences among the program ratings can be identified in Table 11. Teacher educators rated each of the three programs lower than did the other two evaluator groups. The ratings received by Program I illustrate the largest difference. High school teachers and supervisory personnel rated Program I with means of 20.60 and 19.57, respectively. In comparison, teacher educators gave Program I a considerably lower mean rating of 12.38.

The information contained in Table 11 also shows that the teacher educators gave all three programs mean ratings within 8.35 points of each other. The mean ratings obtained from the high school teachers were within a 4.87 point range, and the means ratings obtained from the supervisory personnel were all within 2.66 points of each other.

The two-way analysis of variance (ANOVA) statistical procedure was selected to test hypothesis I, II, and III. This procedure required equal numbers of ratings from each of the three evaluator groups. This requirement was met by deleting randomly selected evaluator data from the larger groups until all groups contained equal numbers of evaluators. The results of this balancing process are presented in Table 12.

Comparisons of Tables 11 and 12 show that the following differences resulted from the deletion of fifty-one files from the data set.

1. Overall program means changed as much as 0.87 points.
2. Overall program standard deviations changed as much as 0.15 points.
3. Overall ranges changed as much as 1 point.
4. Group means changed as much as 2.2 points.
Table 12. Comparison of mean ratings, standard deviations, and range of ratings for Programs I, II, and III by high school teachers, supervisory personnel, and teacher educators

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>42</td>
<td>17.97</td>
<td>8.67</td>
<td>0 - 29</td>
</tr>
<tr>
<td>High School Teachers</td>
<td>14</td>
<td>20.00</td>
<td>4.39</td>
<td>12 - 26</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td>14</td>
<td>21.79</td>
<td>9.01</td>
<td>1 - 29</td>
</tr>
<tr>
<td>Teacher Educators</td>
<td>14</td>
<td>12.14</td>
<td>8.94</td>
<td>0 - 26</td>
</tr>
<tr>
<td><strong>Program II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>42</td>
<td>21.57</td>
<td>6.54</td>
<td>3 - 30</td>
</tr>
<tr>
<td>High School Teachers</td>
<td>14</td>
<td>21.57</td>
<td>5.18</td>
<td>13 - 29</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td>14</td>
<td>24.07</td>
<td>5.90</td>
<td>15 - 30</td>
</tr>
<tr>
<td>Teacher Educators</td>
<td>14</td>
<td>19.07</td>
<td>7.73</td>
<td>3 - 29</td>
</tr>
<tr>
<td><strong>Program III</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>42</td>
<td>22.81</td>
<td>5.64</td>
<td>8 - 30</td>
</tr>
<tr>
<td>High School Teachers</td>
<td>14</td>
<td>25.21</td>
<td>3.72</td>
<td>17 - 30</td>
</tr>
<tr>
<td>Supervisory Personnel</td>
<td>14</td>
<td>22.07</td>
<td>5.99</td>
<td>8 - 30</td>
</tr>
<tr>
<td>Teacher Educators</td>
<td>14</td>
<td>21.14</td>
<td>6.40</td>
<td>11 - 30</td>
</tr>
</tbody>
</table>
5. Group standard deviations changed as much as 0.81 points.
6. Group ranges changed as much as 4 points.

Table 13 displays the results of the two-way analysis of variance (ANOVA) procedure used to test whether there were statistical differences among the program means displayed in Table 12.

Table 13. ANOVA for ratings of program quality for Programs I, II, and III and evaluators classified by role

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>PR &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>8</td>
<td>1568.85</td>
<td>196.11</td>
<td>4.49</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>117</td>
<td>5106.35</td>
<td>43.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>2</td>
<td>529.47</td>
<td>264.73</td>
<td>6.07</td>
<td>0.0031</td>
</tr>
<tr>
<td>Role</td>
<td>2</td>
<td>703.04</td>
<td>351.52</td>
<td>8.05</td>
<td>0.0005</td>
</tr>
<tr>
<td>Interaction</td>
<td>4</td>
<td>336.33</td>
<td>84.08</td>
<td>1.93</td>
<td>0.1106</td>
</tr>
<tr>
<td>TOTAL</td>
<td>125</td>
<td>6675.21</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The F value for program level of 6.07, p <= .0031, indicated that statistically significant differences exist among the program means. A post hoc (Duncan) analysis showed significant differences between the means of Programs I and III, and Programs I and II. The difference between the means of programs II and III was not significant.

The F value for evaluator role of 8.05, p <= .0005 (Table 13) indicated that significant statistical differences exist among the program means obtained from the three evaluator groups. The post hoc (Duncan) analysis showed significant differences between teacher educators and
supervisory personnel, and between teacher educators and high school teachers. There were no significant differences between the ratings obtained from high school teachers and supervisory personnel.

Research Hypothesis III

It was hypothesized that there was no significant interaction between the evaluator's role and program quality level.

The F value for the interaction of evaluator role and program quality was 1.93, p <= 0.110 which failed to reveal significance at the α = .05 level.

Research Hypotheses IV and V

It was hypothesized that the standardized regression coefficient (B) for evaluators role does not differ significantly from zero, at the 95 percent level of confidence, after the effects of degree status, years of professional experience, years of tenure in present position, area(s) of professional expertise, school population, and industrial experience have been taken into account.

It was hypothesized that the standardized regression coefficient (g) for program level does not differ significantly from zero, at the 95 percent level of confidence, after the effects of degree status, years of professional experience, years of tenure in present position, area(s) of professional expertise, school population, industrial experience, and professional role have been taken into account.

An evaluator's role is related, in part, to degree status, years of professional experience, length of tenure at present position, amount
of industrial experience, area(s) of expertise, and population of the school where the individual is employed.

The contribution that a predictor variable makes to the regression is partly dependent upon its correlation with the other predictor variables. The intercorrelations for each of the predictor variables and the interactions are presented in Appendix E.

Multiple regression procedures were employed to test hypotheses IV and V. The analysis was conducted to determine whether evaluator role and program level make significant contributions to the explained variation in program ratings after the effects of the covariables listed above had been taken into account. Each of the variables was added to the regression equation in the order listed in Table 14. The professional role and program variables were added to the equation last so that the contributions that these variables make to the variability of program ratings could be identified and tested after the effects of the covariables had been removed.

Table 14 shows the $R^2$ values that resulted from the stepwise addition of each variable to the regression equation. (See Appendix F for summary regression tables.) The column headed "Change in $R^2$", (Table 14) shows the increases in the explained sum of squares as the component of the total variation which is attributable to the addition of each variable. (Note: Gender was not included in the analysis since all but two of the respondents were male.) The $F$ ratios, used to test whether the changes in the $R^2$ values were large enough to be significant, are also displayed in Table 14.
Table 14. R² values for each predictor and F test for change in R² value

<table>
<thead>
<tr>
<th>Step</th>
<th>Predictors Added</th>
<th>Total R-Sq.</th>
<th>Change in R-Sq.</th>
<th>F-test for Change in R-Sq.</th>
<th>df₁</th>
<th>df₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Degree</td>
<td>0.106</td>
<td>0.106</td>
<td>14.811*</td>
<td>1</td>
<td>125</td>
</tr>
<tr>
<td>2</td>
<td>Years Total Experience</td>
<td>0.106</td>
<td>0.000</td>
<td>0.008</td>
<td>1</td>
<td>124</td>
</tr>
<tr>
<td>3</td>
<td>Years in Present Position</td>
<td>0.161</td>
<td>0.055</td>
<td>8.079*</td>
<td>1</td>
<td>123</td>
</tr>
<tr>
<td>4</td>
<td>Industrial Experience</td>
<td>0.161</td>
<td>0.000</td>
<td>0.000</td>
<td>1</td>
<td>122</td>
</tr>
<tr>
<td>5</td>
<td>School Population</td>
<td>0.168</td>
<td>0.006</td>
<td>0.937</td>
<td>1</td>
<td>121</td>
</tr>
<tr>
<td>6</td>
<td>Area of Expertise</td>
<td>0.187</td>
<td>0.019</td>
<td>0.938</td>
<td>3</td>
<td>118</td>
</tr>
<tr>
<td>7</td>
<td>Interactions</td>
<td>0.382</td>
<td>0.195</td>
<td>2.551*</td>
<td>13</td>
<td>105</td>
</tr>
<tr>
<td>8</td>
<td>Professional Role</td>
<td>0.421</td>
<td>0.039</td>
<td>2.456*</td>
<td>3</td>
<td>102</td>
</tr>
<tr>
<td>9</td>
<td>Program</td>
<td>0.469</td>
<td>0.048</td>
<td>4.566*</td>
<td>2</td>
<td>100</td>
</tr>
</tbody>
</table>

*p <= .05.

The coefficient of determination for the regression model which included all of the variables (full model) was 0.469 which indicates that 47 percent of an evaluator's rating of an industrial arts program can be explained by the variables included in this study. The F statistic for the full model was 3.40 which was significant at the alpha = .05 level of confidence (See Appendix F, Table 9).
Evaluator's role was selected as the eighth variable to be included in the succession of restricted models. Table 14 shows that evaluator's professional role contributes 3.9 percent to the total variation of the criterion variable (program rating) after the contributions for degree status, years of professional experience, length of tenure at present position, industrial experience, school population, and area of expertise were taken into account. The F ratio of 2.45 associated with the change in $R^2$ for evaluator's role was large enough to be significant at the $\alpha = .05$ level.

Evaluation of program quality was the last predictor variable to be included in the model. Evaluation of program quality contributed 4.8 percent to the variation in program ratings after the other predictor variables were taken into account. The F value of 4.56 associated with program quality was significant at the $\alpha = .05$ level.

Significant F values for the change in $R^2$ also resulted from the addition of degree status, years employed in present position, and the interaction variables to the model. F values for these variables were significant at the $\alpha = .05$.

The remaining variables: Total years of professional experience, years of industrial experience, school population, and area of teaching expertise did not produce a significant increase in the coefficient of determination.

Analysis of Significant Covariables

The results of the regression analysis procedure (Table 14) showed that two variables, degree status and years of tenure in present position,
produced significant changes in the R-square value. The following sections describe the procedures used to analyze these variables.

Degree status variable

Table 4 shows that eighty-three percent of the subjects who evaluated one of the three program descriptions hold advanced degrees; fifteen percent of the respondents have completed a baccalaureate degree, and less than two percent have less than bachelor's degree status. Two of the degree status categories, less than bachelor's and specialists, were excluded from this analysis since insufficient data were obtained from these populations.

Table 15 shows how evaluators from the degree status categories bachelor's, master's, and doctorate, rated program descriptions I, II, and III with the Standards criteria. The table also reports the standard deviation and range of ratings obtained from each of the evaluators classified by degree status.

Subjects from each of the degree groups listed in Table 15 rated one of the three program descriptions with 30 selected Standards criteria. The mean ratings show that all degree groups ranked the programs in the same order as did the jury of college students who ranked the same programs by direct comparison. Program III received the highest ratings from each of the degree groups. Program II received only slightly lower ratings than Program III, and Program I was rated lowest.

The bachelor's degree group rated all three programs higher than did the other degree groups. Program I was rated 20.42, Program II was rated 21.40, and Program III was rated 25.50 by the bachelor's degree
<table>
<thead>
<tr>
<th>Program I</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>55</td>
<td>17.47</td>
<td>8.88</td>
<td>0 - 29</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>7</td>
<td>20.42</td>
<td>6.07</td>
<td>12 - 29</td>
</tr>
<tr>
<td>Master's degree</td>
<td>34</td>
<td>18.91</td>
<td>7.99</td>
<td>1 - 29</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>14</td>
<td>12.50</td>
<td>10.57</td>
<td>0 - 29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program II</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>53</td>
<td>20.58</td>
<td>6.55</td>
<td>3 - 30</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>10</td>
<td>21.40</td>
<td>5.52</td>
<td>14 - 29</td>
</tr>
<tr>
<td>Master's degree</td>
<td>29</td>
<td>21.10</td>
<td>6.44</td>
<td>7 - 30</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>14</td>
<td>18.92</td>
<td>7.57</td>
<td>3 - 29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program III</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>55</td>
<td>22.65</td>
<td>5.80</td>
<td>7 - 30</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>10</td>
<td>25.50</td>
<td>3.71</td>
<td>17 - 29</td>
</tr>
<tr>
<td>Master's degree</td>
<td>29</td>
<td>22.93</td>
<td>6.27</td>
<td>7 - 29</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>16</td>
<td>20.37</td>
<td>5.43</td>
<td>12 - 30</td>
</tr>
</tbody>
</table>
group. The greatest differences among the mean ratings occurred between Programs II and III. Programs I and II were rated very close together. The ratings obtained from the bachelor's group also showed a smaller range and standard deviation when compared with those of the other degree groups.

Evaluators who hold doctoral degrees rated each of the programs lower than did the other degree groups. Program I received a mean rating of 12.5 from the doctorates which was 6.4 points below the rating obtained from the master's degree group and 7.9 points below the ratings obtained from the bachelor's degree group. The differences between the mean ratings obtained from the doctorates and the other groups became much smaller when Program II was rated with the Standards. A 2.48 point difference was observed between the means of the doctorate and bachelor's ratings when both groups evaluated Program II. The differences between the means of the doctorate and bachelor's groups increased to 5.13 points when they evaluated program III with the thirty Standards criteria.

The ranges and standard deviations for all three degree groups became smaller as the level of program was increased.

Further analysis of the degree status data was conducted to determine whether the interaction between the degree status variable and the program level variable was significant.

General Linear Model (GLM) procedures (Ray, 1982) were used to make the analysis since other ANOVA procedures require the use of balanced data. One hundred of the 163 observations would have been deleted from the data set to accommodate the ANOVA analysis. For this reason, the
GLM procedure was used to analyze the interaction of the degree status and program level variables. The results of the GLM analysis are reported in Table 16.

Table 16 shows that the interaction for degree status and program level was not significant. The F value for degree status of 5.64, p <= .0043 indicated that significant statistical differences exist among program ratings of evaluators grouped according to degree status for at least one of the degree groups. This finding is consistent with the findings presented in Table 14. The post hoc (Scheffe) analysis showed that significant differences exist between the program ratings obtained from

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>PR &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>8</td>
<td>1445.06</td>
<td>180.63</td>
<td>3.65</td>
<td>0.0006</td>
</tr>
<tr>
<td>Error</td>
<td>154</td>
<td>7624.07</td>
<td>49.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>2</td>
<td>748.12</td>
<td></td>
<td>7.56</td>
<td>0.0007</td>
</tr>
<tr>
<td>Degree Status</td>
<td>2</td>
<td>558.07</td>
<td></td>
<td>5.64</td>
<td>0.0043</td>
</tr>
<tr>
<td>Interaction</td>
<td>4</td>
<td>138.85</td>
<td></td>
<td>0.70</td>
<td>0.5923</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>162</td>
<td><strong>9069.14</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
evaluators who have master's degrees and evaluators who have doctorate degrees. Statistically significant differences were also found between the ratings obtained from evaluators who hold bachelor's degrees and those who hold doctorates at the $\alpha = .05$ level. The difference in program ratings obtained from evaluators at the bachelor's degree level and those at the master's degree level of degree status failed to show statistical significance.

The $F$ value for program level of 7.56, $p \leq .0007$ indicated that significant statistical differences existed among the program levels, which was also consistent with the findings reported on Tables 13 and 14.

**Years of experience in present position**

The years of experience in present position was the third variable to be added to the regression analysis (Table 14). The results of the analysis showed that program evaluator's length of tenure in his/her present position contributed 5.5 percent to the variation in program ratings. The $F$ statistic of 8.07 was large enough to be statistically significant at the $\alpha = .05$ level.

Table 6 shows that 32.2 percent of the subjects have been employed in their present positions for less than 5 years. Sixty-eight percent of the respondents have less than 15 years of tenure in their present positions. Only 11.3 percent of the respondents have been employed in their present positions for more than 20 years.

General Linear Model (GLM) statistical analysis procedures (Ray, 1982) were used to test whether there was a significant interaction
between the length of tenure in present position variable and the program level variable. In order to apply this procedure to the data, it was necessary to divide the study respondents into three approximately equal size groups. To obtain nearly equal size groups, the respondents were divided into three groups based on length of tenure in present position. The first group included those respondents with five years or less experience in their present position. The second group consisted of subjects who had between six and fourteen years experience. The final group consisted of those study respondents who had more than fifteen years of experience in their present teaching or administrative positions. The results of this procedure are displayed in Table 17. This classification balanced the data as nearly as possible so that the GLM procedure could be used to analyze the years of experience in present position variable.

Subjects from each of the evaluator groups listed on Table 17 rated one of the three program descriptions with 30 selected Standards criteria. The means show that each group of study respondents ranked the programs in the same order of quality as did the jury of college students who ranked the programs by direct comparison. Program III received the highest ratings, Program II received lower ratings than Program III, and Program I received the lowest ratings.

The evaluators with 1-5 years of experience in their present positions gave Program I higher ratings and Programs II and III lower ratings than did evaluators with more experience. This group of evaluators also rated all three programs within two points of each other. The range and standard deviation of their ratings for Programs II and III were larger
Table 17. Comparison of means, standard deviation and range of ratings of Programs I, II, and III by evaluators classified according to years of experience in present position

<table>
<thead>
<tr>
<th>Program</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>64</td>
<td>17.87</td>
<td>8.72</td>
<td>0 - 29</td>
</tr>
<tr>
<td>1 - 5 years exp.</td>
<td>24</td>
<td>19.04</td>
<td>8.99</td>
<td>1 - 29</td>
</tr>
<tr>
<td>6 - 14 years exp.</td>
<td>24</td>
<td>17.91</td>
<td>7.56</td>
<td>0 - 28</td>
</tr>
<tr>
<td>15 or more years exp.</td>
<td>16</td>
<td>16.06</td>
<td>10.11</td>
<td>2 - 29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>56</td>
<td>20.69</td>
<td>6.59</td>
<td>3 - 30</td>
</tr>
<tr>
<td>1 - 5 years exp.</td>
<td>17</td>
<td>19.76</td>
<td>8.05</td>
<td>3 - 30</td>
</tr>
<tr>
<td>6 - 14 years exp.</td>
<td>20</td>
<td>21.25</td>
<td>5.19</td>
<td>14 - 29</td>
</tr>
<tr>
<td>15 or more years exp.</td>
<td>19</td>
<td>20.94</td>
<td>6.72</td>
<td>9 - 29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>57</td>
<td>22.80</td>
<td>5.78</td>
<td>7 - 30</td>
</tr>
<tr>
<td>1 - 5 years exp.</td>
<td>16</td>
<td>20.93</td>
<td>6.95</td>
<td>7 - 30</td>
</tr>
<tr>
<td>6 - 14 years exp.</td>
<td>17</td>
<td>22.76</td>
<td>4.72</td>
<td>12 - 29</td>
</tr>
<tr>
<td>15 or more years exp.</td>
<td>24</td>
<td>24.08</td>
<td>5.50</td>
<td>8 - 30</td>
</tr>
</tbody>
</table>
when compared with those of the other evaluator groups listed on Table 17.

The evaluator group with fifteen or more years of experience in their present teaching or administrative positions rated Program I and Program III with means 8.02 points apart. This same group of evaluators rated Program I lower than the other evaluator groups and give Program III its highest ratings. They rated Program II higher than the group with 1-5 years of experience in their present position but lower than the evaluators with 6-14 years of experience in their present positions.

The ranges and standard deviations for each group of evaluators tended to become smaller as the program quality level increased.

The results of the GLM analysis used to determine whether the interaction between the length of tenure in present position variable and the program level variable is significant are reported in Table 18.

Table 18 shows that the interaction of evaluations tenure in his or her present position and program level was not significant.

Table 18 also shows that the F value for years of experience in present position of 0.08, \( p \leq 0.923 \). This indicated that statistically significant differences do not exist among the program ratings of evaluators grouped according to years of experience in their present position. This finding contradicts the finding obtained from the regression analysis in Table 14. The reclassification of the respondents into equal groups may account for the discrepancy. Reclassification of a continuous variable into categories can account for a significant loss of statistical precision.
Table 18. GLM analysis of ratings of program quality for Programs I, II, and III by evaluators classified according to years of experience in their present positions

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>PR &lt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>8</td>
<td>945.26</td>
<td>118.15</td>
<td>2.24</td>
<td>0.0268</td>
</tr>
<tr>
<td>Error</td>
<td>168</td>
<td>8857.31</td>
<td>22.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>2</td>
<td>742.85</td>
<td></td>
<td>7.05</td>
<td>0.0012</td>
</tr>
<tr>
<td>Years present position</td>
<td>2</td>
<td>8.37</td>
<td></td>
<td>0.08</td>
<td>0.9237</td>
</tr>
<tr>
<td>Interaction</td>
<td>4</td>
<td>194.03</td>
<td></td>
<td>0.92</td>
<td>0.4537</td>
</tr>
<tr>
<td>TOTAL</td>
<td>176</td>
<td>9802.57</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The data reported on Table 18 also show that the F value of 7.05 p <= .0012 for program level was statistically significant. This finding is consistent with the findings reported on Table 14.
CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was designed to investigate whether the Industrial Arts Standards criterion can be used to make accurate assessments of program quality. This study also examined several other factors that have been found to affect the evaluator's assessment of program quality. The previous chapters describe how this study was organized to conduct the investigation.

The previous chapters include:

1. An introduction outlining the differences of professional opinion that led to the formulation of the research problem; and the hypotheses, methodologies, and analysis techniques used to research the problem.

2. A review of literature pertaining to the history and use of standards, the increased importance that has been placed on standards, and a review of previous research pertaining to professional assessment of objectives and standards for industrial arts programs.

3. A description of the methodology and procedures used to gather data and the analysis techniques used to treat the data.

4. A presentation of the findings describing the results obtained from the analysis of the data.

The purpose of this chapter is to summarize the findings of this study and draw basic conclusions implied by the findings reported in Chapter IV. Finally, several recommendations are presented based on the
conclusions of this study.

Restatement of the problem

The primary problem of this study was to investigate and to determine if industrial arts program evaluators make similar judgments about the worth of industrial arts programs when the Industrial Arts Standards are used as the evaluation criteria.

A second problem was to investigate and to determine if the evaluator's role affects the ratings that he or she assigns to industrial arts programs.

Conclusions

The conclusions of this study are presented in terms of the research hypotheses. Each hypothesis is restated and followed by a conclusion based on the findings presented in Chapter IV. A discussion of the implications related to each conclusion is included where appropriate.

The conclusions and interpretations in this study are based on the results obtained from testing 30 (12.7%) of the original 235 Industrial Arts Standards Statements that make up the total evaluation instrument. The conclusions and interpretations are presented within this constraint.

Hypothesis I

It was hypothesized that the mean value of ratings obtained from the evaluation of three different industrial arts programs which are different in quality would not differ significantly, at the 95 percent level of confidence, when the selected Industrial Arts Standards are used as
the evaluation criteria.

**Conclusion**

Based on the findings presented in Chapter IV, the null hypothesis was rejected. The program evaluators assigned lower ratings to lower quality programs and higher ratings to higher quality programs when they used the Industrial Arts Standards as the evaluation criteria.

**Discussion**

Hypothesis I was developed and tested to determine whether uniform ratings of program quality could be obtained when the Industrial Arts Standards were used as the evaluation criteria. Recent literature suggested that the Standards will be used by evaluators with diverse opinions regarding the priorities, goals, and objectives for industrial arts programs.

The program means, reported in Table 11 indicate that overall ratings obtained from groups of evaluators correspond to the level of program quality. However, the means appear to occur within a very narrow range. All three program means were within five points of each other on a 30-point scale. The difference between programs I and II was 3.6 points and the difference between programs II and III was 1.2 points.

The analysis of variance and the post hoc test indicate that the evaluators included in this study detected only broad differences in program quality when they used the thirty selected Standards as the evaluation criteria. The statistical differences between Programs I and II, and Programs I and III were large enough to be significant. The
statistical difference between Programs II and III was not large enough to be significant which suggests that programs of low quality can be distinguished from programs of high quality. These differences were not as distinguishable between medium and high quality programs.

A possible lack of differences between the written program descriptions might account for a lack of statistical difference between Programs II and III. However, a lack of differences between the written programs does not seem to explain the wide range of ratings that each program received.

The ratings that Program I received ranged from a low of 0 to a high of 29. This seems to suggest that there was very little agreement among program evaluators regarding the quality of this particular program. The range of ratings for Program III was somewhat narrower, extending from a low of 8 to a high of 30. Rating ranges of this magnitude may cause program decision makers to rely more on other sources of program evaluation and less on those using the Standards as the primary assessment tool.

It appears that if a three or four member evaluation team were to be randomly selected from the populations used in this study, the members would have difficulty arriving at a consensus about how to rate low quality programs. This team may find more agreement among themselves if they rate a higher quality program.

Hypothesis II

It was hypothesized that there would be no significant difference between the mean values of program ratings obtained from high school
teachers, supervisory personnel, and industrial arts teacher educators when the Industrial Arts Standards were used to evaluate industrial arts programs.

Conclusion II

Based on the findings presented in Chapter IV, the null hypothesis was rejected. The findings presented in Tables 12 and 13 indicate that the program evaluator's role does have a significant effect on program ratings when the Industrial Arts Standards are used as the evaluation criteria.

Discussion

This conclusion is supported by findings of previous studies. Jennings (1968), Backus (1968), Russell (1972), and Sucharski (1975) found that different role groups come to different conclusions when they evaluated industrial arts program priorities, goals, and objectives. It appears that these differences of opinion extend to the evaluation of industrial arts programs.

The findings reported in Chapter IV suggest that there was not general agreement between teacher educators and other evaluator groups regarding the evaluation ratings assigned to industrial arts programs. The differences were more apparent when lower quality programs were assessed, and tend to become smaller when medium and high quality programs were evaluated. The results also indicated that there was less agreement
among teacher educators than among other evaluator groups regarding the assignment of ratings.

Part of the variation in the ratings obtained from the supervisory personnel group may have been attributed to the classification methods used for this study. To complete the analysis, it was necessary to classify both principals and industrial arts supervisors into a single group. This procedure may have resulted in a larger rating variance for the combined group than existed for either of the two smaller groups prior to combining their responses.

High school industrial arts classroom teachers were in more general agreement among themselves regarding the assignment of ratings to particular quality levels of industrial arts programs. This agreement remained almost constant for all three levels of program quality. This seems to indicate that high school industrial arts classroom teachers would provide more consistent evaluation information concerning the quality of high school industrial arts programs. The range of scores obtained from this group was still large enough that it may cause program decision makers to rely more on information obtained from additional sources and place less reliance on information obtained with the Standards.

Hypothesis III

It was hypothesized that there was not significant interaction between the evaluator’s role and their evaluation of the program quality level.
Conclusion III

Based on the findings reported in Table 13, the null hypothesis was accepted. There was no significant interaction between the evaluator's role and the program quality level that affects the ratings assigned to industrial arts programs.

Hypothesis IV

It was hypothesized that the standardized regression coefficient for evaluator's role does not differ significantly from zero after the effects of degree status, years of professional experience, years of tenure in present position, area(s) of professional experience, school population, and industrial experience have all been taken into account.

Conclusion IV

Based on the findings reported in Table 14, the null hypothesis was rejected. The standardized regression coefficient for evaluator's role was not equal to zero. The evaluator's role does make a significant contribution to the variance of the program ratings after the effects of the variables listed above have been taken into account.

Hypothesis V

It was hypothesized that the standardized regression coefficient for program level would not differ significantly from zero after the effects of degree status, years of professional experience, years of tenure in present position, area(s) of professional expertise, school enrollment, industrial experience, and role of the evaluator had been taken into account.
Conclusion V

Based on the findings reported in Table 14, the null hypothesis was rejected. The standardized regression coefficient for program level was not equal to zero. The program level does make a significant contribution to the variance of the program ratings after the effects of the variables listed above have been taken into account.

Discussion

The analysis used to test hypotheses IV and V revealed that three variables in addition to the evaluator's role and the program level variables produce significant changes in the $R^2$ value (Table 14). These included: degree status, years of tenure in present position, and the interactions included in the analysis. Separate analysis of the degree status variable and the years of tenure in present position variable showed there was no significant interaction between either of these variables and program quality level.

Degree The findings presented in Chapter IV show that there were no significant differences between the ratings of Programs I and II or between Programs II and III when rated by evaluators classified by degree status. The difference between Programs I and III was large enough to be significant. This finding corresponds to that obtained when the evaluators were classified by role.

The findings also show significant differences between the ratings obtained from evaluators who hold doctoral degrees and those who have lower degree status. This difference seems to have resulted from the lower ratings that those evaluators with doctoral degrees assigned to
each of the programs. It was also observed that evaluators with doctoral
degree status appear to have widely divergent opinions about how each
of the programs should be rated.

There appears to be more agreement among the evaluators who hold
Bachelor's degrees regarding the ratings that each of the three programs
should receive. The mean ratings of Programs I and II by the Bachelor's
degree group indicates that they did not detect much difference between
these programs, however, they were in more agreement about the ratings
that should be assigned to Programs I and II when compared to the other
evaluator groups. The evaluators with Bachelor's degree status who evalu­
ated Program III seemed to be in much more agreement about the program's
rating. It appears that more uniform ratings of program quality can be
obtained from evaluators with bachelor degree status.

Years of experience in present position  The analysis used to
test whether there was a significant interaction between the years of
experience in present position variable and the program variable failed
to show a significant difference between the ratings obtained from evalu­
ators classified by years of experience in their present positions. This
finding contradicts that obtained from the analysis of the regression
coeffi- cients.

It seems plausible to assume that the process used to reclassify
the respondents into three categories based on years of experience in
their present positions resulted in the loss of statistical precision.

Attempts to interpret the differences between the ratings obtained
from these groups would be based on speculation.
Interactions  The interactions between program level and role, program level and area of expertise, and program and degree status were examined in the analysis of the regression coefficients. The results obtained from the analysis of the regression coefficients show that one or more of these interactions made a significant contribution to the change in the $R^2$ value. As stated above, separate analysis of the degree status and the years in present position variables indicate that there was no significant interaction between either of these variables and program level.

Unfortunately, the interactions of program and area(s) of expertise could not be analyzed because of the distribution of the data. Sixty-one percent of the respondents listed two or more areas of expertise. There did not appear to be any way that this data could be organized so that meaningful statistical analysis could be conducted. The effect of the evaluator's area(s) of expertise on program ratings appears to warrant further investigation.

Recommendations

The Industrial Arts Standards describe 235 criteria that should be utilized in the assessment of any high school industrial arts program. The respondents who participated as program evaluators for this investigation arrived at different conclusions about program quality when they applied thirty of the Standards criteria to identical evidence. Therefore, the following recommendations seem appropriate.
Recommendation one

Additional investigations are needed to test and evaluate the Standards not included in this study. The findings obtained from these potential studies will serve to confirm or refute the findings of this investigation. In either case, the information base needed to design, develop, test, and implement standards will be expanded as a result of additional research.

Studies are also needed to identify specific Industrial Arts Standards that produce uniform ratings. The results of these studies should be of great value to both standards developers and users.

Recommendation two

Controlled field tests and on-site visits need to be conducted to determine whether the Standards produce valid and reliable assessments of program quality.

Recommendation three

Investigations are needed to determine whether graphic and/or electronic descriptions of actual programs can elicit evaluation ratings that are correlated with those obtained from on-site visits. Video tape vignettes of actual programs may provide the means for overcoming the logistical and experimental control problems associated with evaluation research. Information obtained from such studies may provide the foundation for extensive research into the fundamental problems associated with program evaluation.
Recommendation four

Program evaluators who use the Standards need to be informed on how to accurately assess a course or a program. Different evaluators may attach different meanings to criteria defined in the Standards. They may also use different kinds or amounts of information in the evaluations called for in the Standards Statements.

Recommendation five

Additional investigations are needed to identify and quantify other variables which may affect the program ratings when the Standards are used. The evaluator's educational background and the social-economic status of the students enrolled in the program may have a direct effect on the program ratings.
REFERENCES


Baron, J. B., and Baron, R. M. In search of standards. New Directions for Program Evaluation, 1980, 7, 85-99.


Burns, W. B. The priority of industrial arts objectives and their degree of attainment as perceived by selected school personnel in Mississippi. (Doctoral dissertation, University of Southern Mississippi, 1975).-Dissertation Abstracts International, 1975, 36, 4. (University Microfilm No. 2076-A)


*Standards for Industrial Arts Programs*. Blacksburg, Virginia: Virginia Polytechnic Institute and State University, 1981.


Swanson, R. A. (Ed.) A view of industry. Division of Industrial Education, University of Minnesota, 1983.


ACKNOWLEDGMENTS

The author is indebted to numerous individuals who contributed so much to his education and professional development at Iowa State University.

I wish to extend my sincere gratitude and appreciation to the members of my graduate committee, Dr. Ross Engel, Dr. Trevor Howe, Dr. Keith McRoberts, Dr. William Miller, Dr. John Riley, and Dr. William Wolansky for guiding my graduate program and research efforts.

I owe an enormous debt of gratitude to Dr. William Miller. His assistance, support, and inexhaustible patience has benefited me immensely. I sincerely hope that I will be able to imitate his example when working with students under my direction.

I am indebted to my advisor, Dr. William Wolansky, for his encouragement and many hours of assistance. I am grateful for having had the opportunity to study under the direction of such an outstanding educator.

A special thank you goes to my wife, Carolyn, and our children, Andy and Stacey, for their patience, understanding, and cooperation; and to my parents, Tony Sr. and Esther, for their encouragement.
PROGRAM DESCRIPTION

COMMUNITY PROFILE

City 10,970 11,635
County 25,769 25,229

Location: Midwestern city located 70 miles south of a metropolitan area with a population of 43,000.

Commercial Services:
Financial:
4 banks with assets of $217 million
2 savings and loan associations

Industrial:
1 machine shop
1 electrical motor repair

Community Facilities:
3 shopping centers
3 department stores
20 churches (19 protestant, 1 Catholic)

Health Services:
1 hospital - 134 beds
21 medical personnel (11 MD's, 4 DC's, 6 dentists, and 5 DVM's)

Labor: (civilian labor force (August, 1983) 12,130
Unemployed 582
Unemployed as % of work force 4.8
Total employed (August, 1983) 7,278
Manufacturing employment 2,005
Nonmanufacturing employment 5,274

Major employers:

<table>
<thead>
<tr>
<th>Name</th>
<th>Product / Service</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acme Box &amp; Carton</td>
<td>Paper packing products</td>
<td>97</td>
</tr>
<tr>
<td>2. Sports Apparel Inc.</td>
<td>Sport &amp; leisure uniforms</td>
<td>42 72</td>
</tr>
<tr>
<td>3. Upland Building Materials</td>
<td>Concrete &amp; clay building materials</td>
<td>21 14</td>
</tr>
<tr>
<td>4. American Electrical Control</td>
<td>Electrical switching &amp; control equipment</td>
<td>605 83</td>
</tr>
<tr>
<td>5. National Products Packing</td>
<td>Canned meat products</td>
<td>60 87</td>
</tr>
<tr>
<td>6. Aluminum Cookware, Inc.</td>
<td>Commercial and household utensils</td>
<td>19 3</td>
</tr>
<tr>
<td>7. Rapid Cut</td>
<td>Butcher saws</td>
<td>5 1</td>
</tr>
<tr>
<td>8. United Packing</td>
<td>Meat products</td>
<td>51 11</td>
</tr>
<tr>
<td>9. Kerr Advertising</td>
<td>Specialty notebook binders</td>
<td>87 12</td>
</tr>
</tbody>
</table>

Educational Facilities:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Teachers</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public schools: (Classification AAA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>2</td>
<td>40</td>
<td>609</td>
</tr>
<tr>
<td>Junior High</td>
<td>1</td>
<td>37</td>
<td>535</td>
</tr>
<tr>
<td>High School</td>
<td>1</td>
<td>41</td>
<td>669</td>
</tr>
<tr>
<td>Private Schools:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>1</td>
<td>21</td>
<td>372</td>
</tr>
</tbody>
</table>
Parental Occupations, Educational Level

<table>
<thead>
<tr>
<th>Occupational Level</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>21.1%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Manager, Proprietor</td>
<td>23.9%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Clerical</td>
<td>.7%</td>
<td>27.1%</td>
</tr>
<tr>
<td>Skilled Worker</td>
<td>34.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td>9.0%</td>
<td>14.8%</td>
</tr>
<tr>
<td>Unskilled</td>
<td>2.7%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Other</td>
<td>8.1%</td>
<td>32.2%</td>
</tr>
</tbody>
</table>

Educational Level of Parents

<table>
<thead>
<tr>
<th>Level</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>11.2%</td>
<td>10.8%</td>
</tr>
<tr>
<td>High School</td>
<td>22.6%</td>
<td>43.4%</td>
</tr>
<tr>
<td>2 Years of College</td>
<td>28.7%</td>
<td>24.3%</td>
</tr>
<tr>
<td>4 Years of College</td>
<td>15.7%</td>
<td>11.4%</td>
</tr>
<tr>
<td>More than 4 yrs. of College</td>
<td>9.2%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Other</td>
<td>2.6%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

(Survey taken from graduating class of 1981)

Follow-up of 1983 Graduates

<table>
<thead>
<tr>
<th>Continued Education</th>
<th>Entered Work Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 year college or university</td>
<td>51.4% Farm</td>
</tr>
<tr>
<td>Community/Jr. college</td>
<td>1.4% Sales</td>
</tr>
<tr>
<td>Other post secondary (Business college or</td>
<td>1.9% Service</td>
</tr>
<tr>
<td>technical school)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>54.7%</td>
</tr>
</tbody>
</table>

Educational Philosophy of the School

The school district affirms its commitment to help each child develop to his/her fullest potential as a mature individual and a contributing member of a free society. The school district acknowledges that it must develop an educational program which meets the needs of the community it serves. Toward this end, a school program will be developed which meets the intellectual, social, physical, and aesthetic needs of students.

The program will be directed toward the common needs of all children while at the same time recognizing the unique differences and needs of each child.

Objectives of the School

1. Teach each student how to read effectively, write accurately, and speak the English language clearly.
2. Develop the ability to think logically and to solve mathematical problems.
3. Promote the abilities associated with listening and observing.
4. Create a desire to learn beyond the formal classroom setting.
5. Promote an appreciation of our cultural heritage.
6. Help each child develop a positive self image of his/her worth as an individual.
7. Provide for differences among individuals.
8. Help each student become an intelligent consumer and an efficient producer.
9. Help each student develop the ability to carry out responsibilities without direct supervision.
10. Develop a pride in workmanship, scholarship, and respect for physical and mental labor in all fields.
11. Provide guidance which will help each student in the selection of an occupation.
12. Assist each student in planning his/her economic life.
13. Guide and help each child in assuming his/her responsibilities in our working democracy.
14. Expose each child to the workings of democracy.
15. Each course within the school program must be adjusted to meet children's needs, abilities, interests, and maturation.
SCHOOL DISTRICT ORGANIZATIONAL OUTLINE

Citizens

Central Office:
- Business Manager
- Secondary Curriculum Coordinator
- Secretarial Staff
  - Director of Buildings & Grounds
  - Mechanics
  - Bus Drivers
- Transportation Director of
- Bus Drivers

Board of Directors
- Superintendent of Schools
- Elementary Schools
- Junior High School
- Senior High School

<table>
<thead>
<tr>
<th>Elementary Schools</th>
<th>Junior High School</th>
<th>Senior High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elem. Curr. Dir.</td>
<td>Principal</td>
<td>Principal</td>
</tr>
<tr>
<td>Principals</td>
<td>Ass't Principal</td>
<td>Ass't Principal</td>
</tr>
<tr>
<td>Social Worker</td>
<td>Teachers</td>
<td>Teachers</td>
</tr>
<tr>
<td>Teachers</td>
<td>Secretaries</td>
<td>Secretaries</td>
</tr>
<tr>
<td>Secretaries</td>
<td>Clerks</td>
<td>Clerks</td>
</tr>
<tr>
<td>Custodians</td>
<td>Cooks</td>
<td>Cooks</td>
</tr>
<tr>
<td>Clerks</td>
<td>Custodians</td>
<td>Custodians</td>
</tr>
<tr>
<td>Nurses</td>
<td>Nurse</td>
<td>Nurse</td>
</tr>
<tr>
<td>Cooks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students</td>
<td>Students</td>
<td>Students</td>
</tr>
</tbody>
</table>

GENERAL DESCRIPTION OF THE HIGH SCHOOL CURRICULUM

Art
Semester offerings include fundamentals of art, crafts, and art projects. The instructor is professionally involved in the promotion of art activities on both the community and state levels. He is admired for his work which is currently being offered for sale in four national art galleries.

Business Education
The business department has two full-time staff members and a full-time distributive education coordinator. The teachers are well qualified and bring outside expertise to the classroom. The curriculum includes office education, bookkeeping, and business law.

Driver Education
The driver education department consists of one full-time instructor. He is in charge of a three-phase program consisting of classroom, simulation, and behind-the-wheel training. All three phases are offered in both the summer and the regular school year. The program exceeds the minimum requirements established by the state.

Communication Skills
Three English teachers staff the English department. The individualized reading program has received national recognition and has been used as a model for other programs. It has received excellent feedback from the students and the demand for the course consistently exceeds capacity. Other courses include communication as problem solving, everyday writing, listening skills, and technical report writing. Seventy-five percent of the students who attend college take two or more years of English.

Home Economics
The home economics curriculum includes these seven semester classes: two levels of clothing construction, two levels of foods, and one level each of child development, interior decoration, and textile design. There is evidence of extensive use of community resources, films, labs, discussions, individualized projects, and field trips. Students seem enthusiastic about the program and their interest extends beyond the classroom.

Industrial Arts
The industrial arts program is comprised of drafting, woodworking, metals, electronics, and power courses which enroll 239 (34%) of the school's 669 students. The courses are taught by two full-time instructors who are well qualified and bring outside expertise to their classrooms. A third member is shared with the physical education department where his primary responsibilities are teaching health education classes.
Foreign Language
The foreign language courses enroll about 10 percent of the student body in three levels of French and 2 levels of Spanish. These courses are taught by two part-time instructors. The French instructor is shared with the junior high school, and the Spanish teacher’s primary work responsibilities are in the school’s library.

Mathematics
Six courses are offered by the mathematics department. Basic math is provided as a terminal course for less capable students. Personal finance and everyday problems involving the use of math are stressed in this course. Most of the students take Algebra I and geometry during their high school careers. Algebra II is offered at the 11th grade level and advanced math is taught at the 12th grade level. The advanced mathematics course includes trigonometry, pre-calculus, and calculus. Three Apple computers are available for student use. The instructors are currently exploring how to best expand the use of computers in the mathematics program.

Music
Both choral and instrumental music programs comprise the music curriculum. Approximately thirty students take choral music as an elective. Eighty-five students take part in the instrumental program. The marching band enjoys the enthusiastic support of the community. During the past ten years, the marching band has participated in several bowl parades and won seven state-wide music contests. Each summer, the music department involves about seventy-five students in an eight week course which results in the production of a major musical play. Productions such as Oklahoma, West Side Story, and Annie have been well received by the community.

Physical Education
The physical education curriculum stresses team, individual, and life-time recreational activities. All 10th graders who are able are required to participate in the year long physical education class. Similar courses are electives at the 11th and 12th grade levels. The department conducts an extensive intramural program in flag football, basketball, volleyball, and track.

Science
The high school science program offers three laboratory science courses. Biology is a required course for all 10th grade students. Two levels of biology are taught. One level is geared to meet the needs of less academically talented students; the other is designed primarily for students planning post high school education. Chemistry is recommended to students who plan to continue their formal education. There are two separate offerings of physical science. Physical Science II is a continuation of junior high physical science, and is offered to those students who wish to take project physics. Project physics requires a strong background in mathematics and is elected by students who are considering a career in a science related area.

Social Studies
Two required courses and three electives make up the social science program. A semester course in civics is required in the sophomore year. A year long course in current world events is required for all seniors. The social studies electives include world history, sociology, and mini-courses. Six week mini-courses are offered in geography, economics, psychology, and personal relationships.

Accomplishments of Man: This very popular social studies course is restricted to students with at least a B average. The course is taught through the English, social studies, and art departments. The literary, artistic, political, and social accomplishments of mankind are traced from Ancient Greece to the present.

Special Education
Nine students are currently enrolled in the special education program which is staffed by one full-time teacher. Each student attends his/her special education class for two hours each day, and is scheduled for a two hour period of individualized instruction each week. All special education students are encouraged to take regular classes. Each student is assigned a work station within the school during his/her sophomore and junior years. The library, cafeteria, administrative office, school nurse, and maintenance provide work stations for these students. Most of the special education students are given some work experience in the community during their senior year.
Expenditure of high school per student in average daily attendance—$2,450.00

Department Budget

Each year, the building principal allocates money to each department based on funds available and on his assessment of departmental needs. The department has a 1983-84 budget of $2,425. This year’s budget is about the same as it has been for the past five years. The money allotted to the department is used to purchase supplies, replace tools, and make repairs. Although the budget has not been large enough to purchase major items, a few hand powered tools and a few small tools have been added in the department.

Industrial Arts Facilities and Equipment

Physical Plant

The high school was constructed during the 1960’s and reflects the architectural style used at that time. Except for changes to improve heating efficiency, the building has not needed any major renovation.

The industrial arts, home economics, and music departments are housed in one of three wings which are joined to the central support area. The central support area contains the administrative offices, nurses office, guidance complex, library, and cafeteria.

The general unit shop concept was used in the design of the industrial arts classrooms. Each classroom-laboratory has provisions for an instructor’s office, planning-library facilities, and storage for supplies. The staff, and other professionals who have visited the physical plant, agree that it provides an excellent learning environment.

Tools and Equipment

The majority of the tools and equipment used for instructional purposes were purchased about the time that the high school was constructed. The tools and machines are kept in good working condition by the staff. The laboratories are cleaned and maintained regularly by the school custodians.

The staff has evaluated the tools and equipment in each of the laboratories and concludes that all the units contained in the program of study can be effectively taught with the tools, machines, and teaching aids on hand.

School District Policies Affecting the Industrial Arts Staff and Program

327.2 Personnel Evaluation
The Board of Directors shall employ, retain, and promote only the most qualified personnel. The administration shall submit written, annual evaluations for each professional staff member to the superintendent’s office by the first of February. The principal or his/her assistant shall formally observe each teacher in the performance of his or her professional duties at least two(2) times each year.

410.1 Use of School Property
Under no circumstances is it considered acceptable for any staff member to use school facilities or property for private profit.
1206.5 Injury or Illness at School
Students who become ill or injured at school may be given first aid. In cases of serious illness or injury, the pupil will be transported to the hospital or doctor's office by ambulance or other suitable means of transportation. When possible, the parent or guardian will be notified and instructions requested regarding further action.

1206.6 Accident Reports
Accidents shall be reported to the building principal within one (1) working day of the occurrence. Each accident shall be reported on the accident report form.

Building Policies Affecting the Industrial Arts Staff and Program

H.S. 67.1 An up-to-date course of study is to be kept on general file by the administrative office for each course currently offered.

H.S. 67.5 A copy of the final examination given in each course is to be kept on file with the office secretary.

H.S. 90.4 Written permission must be obtained from each student's parent or guardian before he/she is permitted to operate industrial arts power equipment or driver training vehicles.

H.S. 92.1 Written permission must be obtained from the parent or guardian of each student participating in school sponsored trips during school hours.

Department Philosophy
Industrial arts is an important part of a student's total education. The subject matter offered through the industrial arts curriculum will provide each student with an insight into the tools, machines, processes, and materials used by society to provide goods and services. These insights will be enhanced through a variety of hands-on experiences which are representative of modern industry.

The industrial arts curriculum will provide each student with the knowledge, attitudes, and safe working habits which will enable him/her to make a wise career choice and become a contributing member of society.

Department Objectives
The industrial arts program should do the following:
1. Provide information and representative experiences from major occupational areas found in American industry.
2. Help each student develop an appreciation of good craftsmanship and pride in doing a job to the best of his/her ability.
3. Develop each student's knowledge to a point where he/she can intelligently select, purchase, use, and maintain industrial products.
4. Develop each student's psychomotor skills so that he/she can use machines and tools safely and effectively.
5. Develop safe working attitudes and practices.
6. Develop skills which each student can apply toward vocational and recreational activities.
7. Expose the spectrum of American industry, its organization, occupations, raw materials, operations, processes, and products.
8. Promote proper social and work relationships with others.
9. Provide experiences and activities which relate industrial arts to the other areas of the school program.
Department Activities

Meetings

The members of the department meet on a monthly schedule to discuss matters of concern to the industrial arts department. The minutes of each meeting are forwarded to the principal and the district curriculum coordinator. These minutes show what the main topics of discussion were during the past year.

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td>Fire drill, eye protection, and laboratory safety</td>
</tr>
<tr>
<td>October</td>
<td>Discussion and planning for the department's activities during the annual &quot;Parent's Night&quot; held each November</td>
</tr>
<tr>
<td>November</td>
<td>Hall duty - how the areas adjacent to the industrial arts classrooms and laboratories can be properly monitored</td>
</tr>
<tr>
<td>December</td>
<td>Use of the school computer located in the library</td>
</tr>
<tr>
<td>January</td>
<td>Review of program objectives*</td>
</tr>
<tr>
<td>February</td>
<td>Preparation for the Guidance Department bulletin board</td>
</tr>
<tr>
<td>March</td>
<td>Preparation for the Regional Awards Contest</td>
</tr>
<tr>
<td>April</td>
<td>Discussion and preparation of budget requests</td>
</tr>
<tr>
<td>May</td>
<td>Effects of Junior High curriculum changes on the Senior High industrial arts program*</td>
</tr>
</tbody>
</table>

* The January and May meetings include the instructors from the junior high school and are held as part of the school district's workshop days. The purpose of these meetings is to promote program coordination between the two schools.

State Awards Contest

The Industrial Arts Awards Contest is held each May under the auspices of the State Industrial Arts Association. All industrial arts students are encouraged to enter their work in the regional contest. The winning entries from the eight regional contests compete at the statewide contest.

Last year, three students from the high school won two seconds and one third place award at the regional contest. A student from Mr. A's woodworking class received a second place award for his laminated wood project. A second place and a third place award were won by two students in architectural drawing for their house plans.

Departmental Bulletin Board

For two weeks each spring, the 4' X 8' bulletin board in the main hallway of the school is used by the industrial arts department to promote its program. The display includes at least one still photograph of the activities conducted in every class. Each photograph or group of photographs is captioned with the course description.

Parent's Night

The parents and patrons of the high school are encouraged to attend the open house held each November. The industrial arts teachers are available in their classrooms or laboratories to explain the program and answer any questions that parents might have. The parents are asked to make future appointments with the individual teacher if they want to discuss their student's progress or problems more specifically.
## Industrial Arts Staff Qualifications and Activities 1982-83

**Teacher A:**
- **Education:** B.S. + 20 graduate hrs. (M.S. expected, 1985)
- **Experience:** 9 years (4 years at this school)
- **Teaching responsibilities:** General metals and woods
- **Professional membership(s):** Local Ind. Arts Assoc., S.E. Regional Ind. Arts Assoc.*
- **Meetings attended:** Oct. & April meetings of Local I.A. Assoc.

**Teacher B:**
- **Education:** B.S. (Major-Coaching, Minor-Ind. Arts)
- **Experience:** 3 years (3 years at this school)
- **Teaching responsibilities:** Metals (2/5 time), Phys. Educ. (3/5 time)
- **Professional membership(s):** State Athletic Assoc., Western Valley Athletic Assoc.
- **Professional meetings:** Attends quarterly meetings of the Western Valley coaches

**Teacher C:**
- **Education:** M.Ed. + 9 graduate hrs.
- **Experience:** 27 years (12 in this district)
- **Teaching responsibilities:** Drafting (4/5 time), Dept. chairman (1/5 time)
- **Professional meetings:** Oct. & April meetings of S.E. Regional I.A. Assoc., AVA (Fall, 1982), AIAA (Spr. 1983)
- **Offices held:** Immediate past president of S.E. Regional I.A. Assoc.
  Program Planning Committee of S.E. Regional I.A. Assoc.

* The S.E. Regional Industrial Arts Association is one of seven regional subdivisions of the state industrial arts organization. Any industrial educator who teaches within the six county region is eligible for membership. The organization meets twice a year at one of the member schools. The business meetings are usually concerned with the annual I.A. Project Contest. Each business meeting is followed by a program which features speakers from industry, workshops, or a presentation by one of the members.

### Industrial Arts Curriculum

The industrial arts curriculum extends from grade seven through grade twelve. The junior high school curriculum (grades 7, 8, and 9) includes required courses in drafting, hand woodworking, and crafts. The senior high school industrial arts curriculum is comprised of six courses. This curriculum enrolls 34 percent of the student body. Twenty percent of the school's graduates have industrial arts credit on their final transcripts because most students who enroll in industrial arts take more than one course.
Drafting

Course Description
Beginning Drafting (1 year) A mechanical drawing course designed to meet the needs of those students who will continue their education or enter the work force upon graduation. Areas of study include drafting techniques, working assembly, cams and gears, sheetmetal, and pictorial drawings. (Source: Guidance brochure)

Enrollment
Grades: 10, 11, 12
Male: 52 Female: 15
Sections: 3

Text
Drafting for Industry, Walter C. Brown
Goodheart-Willcox

Course Planning
The instructor uses a list of objectives and a brief course outline for planning the course instruction. Daily lesson plans are prepared a week in advance. Each lesson plan details the learning activities for each day and lists the student's assignments.

Objectives
This drafting course will:
1. Develop the student's ability to communicate ideas through drawings.
2. Develop the student's ability to read and interpret drawings.
3. Develop a degree of skill with the use of drafting tools and materials.
4. Develop understanding of how drawings are used to communicate ideas.
5. Utilize tables, handbooks, and manuals to solve graphic problems.
6. Develop the ability to cooperate with others.
7. Apply problem solving processes to drafting problems.

Course Content
Job opportunities in drafting
Job titles
Training required
Freehand sketching
Geometric constructions
Lettering
Orthographic projection
Single view drawings
Multi-view drawings
Principle views
Equipment and methods
Dimensioning practice
Notes and abbreviations
Section views
Cams
Gears

Activities
Project
Three to five drawings are assigned for each unit of instruction. The instructor reviews each drawing with the student and makes suggestions for improvement.
Architectural Drawing

Course Description
Architectural Drafting (1 year) A course in designing and drawing a complete set of house plans, including floor, foundation, elevations, detail, and perspective drawing. Prerequisite: Machine Drafting. (Source: Guidance brochure)

Course Enrollments
Grades: 10, 11, 12  Class size: 16-20
Male: 32  Female: 8  Periods/week: 5
Sections: 2  Minutes/week: 250

Text
Architectural Drafting Functional Planning and Creative Design  
Geo. K. Stegman and Harry J. Stegman, American Technical Publishers

Course Planning
Course of Study (1983)
1. Course objectives
2. Units of instruction
3. Student activities
4. Classroom policies
5. Student evaluation methods
6. Materials and equipment needed to conduct course

Course Objectives
The purpose of the course is to:
1. Develop an appreciation of planning requirements that must precede the construction of a family dwelling.
2. Develop knowledge, skill, and judgment to the extent of his/her interest and ability.
3. Recognize the elements of good architectural design.
4. Develop a knowledge of home construction.

Course Content
- Site selection
- Floor plan
- Foundation plan
- Wall section
- Fireplace details
- Stair details
- Major elevations
- Window and door details
- Kitchen and bath elevations
- Framing plan
- Electrical plan
- Plot and plat drawings
- Perspective drawings

Activities
Project
Each student designs a single family dwelling which meets the parameters set by the instructor.
After the design is approved, the student draws a set of plans which could be used to construct the home.
Woodworking

Course Description
Woodworking (1 year). The course includes the study and use of woodworking hand tools, portable electric power tools, woodworking machines, and wood finishing techniques.

Enrollment
Grades: 10, 11, 12
Male: 12, Female: 8
Sections: 2
Class size: 12-16
Periods/week: 5
Minutes/week: 250

Text
American Technical Publishers

Course Planning
Course of Study (1981)
Instructor's philosophy
Course objectives
Classroom administration policies
Safety standards
Instructional units
Grading standards
Instructional sheets

Objectives
1. Students will develop safe work habits when using woodworking tools and machines.
2. Students will develop understanding and skills in the proper use of woodworking tools and machines.
3. Students will develop an understanding of the materials and methods used in working with wood.
4. Students will explore the occupational choices that are available in the woodworking and related industries.
5. Students will develop an appreciation for orderly procedures when working with wood.
6. Students will develop consumer knowledge about the purchase and use of wood products.

Course Content
Shop orientation and safety
Project planning
Design
Working drawings
Material selection
Wood technology
Review of hand tool methods
Portable power tools
Table saw operations
Band saw operations
Jointer operations
Drill press operations
Adhesives
Clamping and gluing
Wood finishing
Abrasives
Stains and bleaches
Fillers
Finishes
Wood lamination
Bending methods
Bending forms
Practical molding
Uses of wood waste
Equipment
Pattern making
Test pattern in foundry
Construction
Building practices
Rough framing
Wall framing
Roof framing
Finishing

Activities
Project
Every student completes each of the following assignments.
1. Select, design, and build a cabinet or furniture making project.
2. Select and build a project using one of the wood bending methods.
3. Select, design, build, and test a wood pattern. (Casting are made from the patterns in the metal shop foundry.)

Experimental
1. Design, build, and test a wood truss. (The trusses are built to a specified scale and static tested. The students compete among themselves to build the strongest truss using the least material.)
Metals

Course Description
General Metals (1 year) An introductory course in metal working. Sheet metal, machine tools, arc welding, gas welding, foundry, forging, and heat treatment of metals are covered. (Source: Guidance brochure)

Enrollment
Grades: 10, 11, 12 Class size: 22
Male: 22 Female: 0 Periods/week: 5
Sections: 1 Minutes/week: 250

Text
Metalworking: An Introduction, Gregory S. Graham
Breton Publishers

Course Planning
Course of Study (1980)
1. Shop safety
2. General objectives
3. Course content
4. Class management procedures

Objectives
1. Develop and explore vocational interests in the general metals area.
2. Develop attitudes of safety while operating metal working equipment.
3. Develop problem solving abilities which are related to the tools, materials, and processes of metal working.

Course Content
Safety
Shop procedures
Parent's permission slip
Introduction
Explanation of shop procedures
Classroom
Project selection
Grading
Clean-up
Sheet metal
Activities
Developments
Seams & edges
Cutting
Folding
Joining sheet metal
Arc welding
Activities
Equipment
Adjustment of equipment
Butt, corner, vertical, and horizontal welds
Electrode selection
Oxyacetylene welding
Activities
Equipment
Safety
Adjustment of equipment
Butt, corner, horizontal, and vertical welding
Cutting
Brazing

Machine tools
Lathe
Speed and feed
Tool geometry
Turning
Knurling
Tapering
Threading
File & polish
Parting

Foundry
Objectives
Class activities
Safety
Project selection
Mold making
Cleaning and finishing castings

Forging
Objectives
Activities
Forging cold chisel
Hardening and tempering operations

Activities
Project
Every student is required to complete the assigned projects in each area. The required projects include:
Sheet metal- post lamp
Machine- punch set
Foundry- books ends
Welding- prepare butt, corner, horizontal, and vertical welds
Electricity-Electronics

Course Description
Electricity and Electronics (1 year) A course which includes the study of A.C. and D.C. circuits used in electrical equipment and appliances. The methods used to generate, transmit, control, and connect electrical energy into heat, light, sound, and mechanical force are explored.

Enrollment
Grades: 11, 12
Male: 24 Female: 4
Sections: 2
Class size: 12-16
Periods/week: 5
Minutes/week: 250

Text
Basic Electricity and Electronics, William B. Steinburg & Walter B. Ford
American Technical Publishers

Course Planning
Major objectives
List of instructional units
Behavioral objective(s) for each unit of instruction
List of student activities
Schedule of instruction
Schedule of classroom and laboratory assignments

Objectives
The purpose of the course is to:
1. Develop in each student an understanding of electrical concepts, theories, principles, and laws.
2. Develop safe work habits when working with electricity.
3. Develop an interest in electricity as a leisure-time activity.
4. Develop an understanding of electrical circuits, drawings, and terminology.
5. Develop individual potentials which are necessary for employment or additional training in the field.

Course Content
Static electricity
Atomic theory
Electrical measurement
Volts
Amps
Coulomb
Ohm (resistance)
Watt
A.C. current
Transformers
Relays
Induction
A.C. motors
Vacuum tubes
Solid state electronics
Transistors
Watt
D.C. circuits
Cells and batteries
Magnetism
Telegraph-telephone
D.C. motors
Generation of electricity
A.F., IF, and RF circuits
Sound equipment

Activities
Experimental method
A commercially available training system is used by the instructor to demonstrate the electrical principles of each unit. Groups of students use the laboratory manual to assemble the appropriate components, record data, and answer relevant questions about the circuit.
Power and Energy

Course Description
Power Mechanics (1 year) A study of the scientific principles applied to the production, storage, transmission, and use of energy. Small gasoline engines and automotive repair is stressed. (Source: Guidance brochure)

Enrollment
Grades: 11, 12
Male: 67 Female: 3
Sections: 3

Text(s)
Auto Service and Repair
Martin W. Stokel
Goodheart-Willcox Co. Inc.

Small Gas Engines
Alfred C. Roth (and) Ronald J. Baird
Goodheart-Willcox Co. Inc.

Course Planning
Course of Study (1982)
1. Course objectives
2. Units of instruction
3. Student activities
4. Sample worksheets
5. Classroom policies

Objectives
Each student should have an opportunity to:
1. Develop an understanding of the importance and utilization of energy in our society.
2. Develop an understanding of devices used to convert one form of energy to another.
3. Develop a useful knowledge in the selection, use, and repair of energy power units.

Course Content
Sources of energy
Energy systems
Energy consumption
Energy conservation
Solar energy
Power producing devices
History
External combustion engines
Steam engine
Steam turbine
Internal combustion engines
Reaction engines
Jet
Rocket
Piston engines
Gasoline
Diesel
Engine systems
Cooling systems
Lubrication systems
Electrical systems
Clutches
Standard transmissions
Axles and differentials
Wheels, tires, and brakes
Motorcycle repair and overhaul
Body and fender repair

Activities
Project
Each student does the following:
1. Builds a model solar collector
2. Disassembles and reassembles a small gasoline engine
3. Overhauls his or her own small engine
4. Works with three other class members to disassemble and reassemble an automobile engine
5. Repairs his/her own car, as needed.
PROGRAM DESCRIPTION

COMMUNITY PROFILE

City 10,970 11,435
County 25,769 25,229

Location: Midwestern city located 70 miles south of a metropolitan area with a population of 43,000.

Commercial Services:
Financial:
4 banks with assets of $217 million
2 savings and loan associations

Industrial:
1 machine shop
1 electrical motor repair

Community Facilities:
3 shopping centers
3 department stores
20 churches (19 protestant, 1 Catholic)

Health Services:
1 hospital - 134 beds
21 medical personnel (11 MD's, 4 DC's, 6 dentists, and 5 DVM's)

Labor: (civilian labor force (August, 1983) 12,130
Unemployed 582
Unemployed as % of work force 4.8
Total employed (August, 1983) 7,278
Manufacturing employment 2,005
Nonmanufacturing employment 5,734

Major employers:

<table>
<thead>
<tr>
<th>Name</th>
<th>Product / Service</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acme Box &amp; Carton</td>
<td>Paper packing products</td>
<td>male 97</td>
</tr>
<tr>
<td>2. Sports Apparel Inc.</td>
<td>Sport &amp; leisure uniforms</td>
<td>female 72</td>
</tr>
<tr>
<td>3. Upland Building Materials</td>
<td>Concrete &amp; clay building materials</td>
<td>21 14</td>
</tr>
<tr>
<td>4. American Electrical Control</td>
<td>Electrical switching &amp; control equipment</td>
<td>605 83</td>
</tr>
<tr>
<td>5. National Products Packing</td>
<td>Canned meat products</td>
<td>60 87</td>
</tr>
<tr>
<td>6. Aluminum Cookware, Inc.</td>
<td>Commercial and household utensils</td>
<td>19 3</td>
</tr>
<tr>
<td>7. Rapid Cut</td>
<td>Butcher saws</td>
<td>5 1</td>
</tr>
<tr>
<td>8. United Packing</td>
<td>Meat products</td>
<td>51 11</td>
</tr>
<tr>
<td>9. Kerr Advertising</td>
<td>Specialty notebook binders</td>
<td>87 12</td>
</tr>
</tbody>
</table>

Educational Facilities:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Teachers</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Schools: (Classification AAA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>2</td>
<td>40</td>
<td>609</td>
</tr>
<tr>
<td>Junior High</td>
<td>1</td>
<td>37</td>
<td>535</td>
</tr>
<tr>
<td>High School</td>
<td>1</td>
<td>41</td>
<td>669</td>
</tr>
<tr>
<td>Private Schools:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>1</td>
<td>21</td>
<td>372</td>
</tr>
</tbody>
</table>
Parental Occupations, Educational Level

<table>
<thead>
<tr>
<th>Occupational Level</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>21.1%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Manager, Proprietor</td>
<td>23.9%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Clerical</td>
<td>.7%</td>
<td>27.1%</td>
</tr>
<tr>
<td>Skilled Worker</td>
<td>34.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td>9.0%</td>
<td>14.8%</td>
</tr>
<tr>
<td>Unskilled</td>
<td>2.7%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Other</td>
<td>8.1%</td>
<td>32.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational Level of Parents</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>11.2%</td>
<td>10.8%</td>
</tr>
<tr>
<td>High School</td>
<td>22.6%</td>
<td>43.4%</td>
</tr>
<tr>
<td>2 Years of College</td>
<td>28.7%</td>
<td>24.3%</td>
</tr>
<tr>
<td>4 Years of College</td>
<td>15.7%</td>
<td>11.4%</td>
</tr>
<tr>
<td>More than 4 yrs. of College</td>
<td>9.2%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Other</td>
<td>2.6%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

(Survey taken from graduating class of 1981)

Follow-up of 1983 Graduates

<table>
<thead>
<tr>
<th>Continued Education</th>
<th>Entered Work Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 year college or university</td>
<td>Farm .93%</td>
</tr>
<tr>
<td>Community/Jr. college</td>
<td>Sales 2.33%</td>
</tr>
<tr>
<td>Other post secondary (Business college or technical school)</td>
<td>Service 5.4%</td>
</tr>
<tr>
<td></td>
<td>Military 3.73%</td>
</tr>
<tr>
<td></td>
<td>Laborers 7.0%</td>
</tr>
<tr>
<td></td>
<td>Homemaker 1.4%</td>
</tr>
<tr>
<td></td>
<td>Unemployed 7.0%</td>
</tr>
<tr>
<td></td>
<td>Unknown 17.2%</td>
</tr>
</tbody>
</table>

Total 54.7% 44.99%

Educational Philosophy of the School

The school district affirms its commitment to help each child develop to his/her fullest potential as a mature individual and a contributing member of a free society. The school district acknowledges that it must develop an educational program which meets the needs of the community it serves. Toward this end, a school program will be developed which meets the intellectual, social, physical, and aesthetic needs of students.

The program will be directed toward the common needs of all children while at the same time recognizing the unique differences and needs of each child.

Objectives of the School

1. Teach each student how to read effectively, write accurately, and speak the English language clearly.
2. Develop the ability to think logically and to solve mathematical problems.
3. Promote the abilities associated with listening and observing.
4. Create a desire to learn beyond the formal classroom setting.
5. Promote an appreciation of our cultural heritage.
6. Help each child develop a positive self image of his/her worth as an individual.
7. Provide for differences among individuals.
8. Help each student become an intelligent consumer and an efficient producer.
9. Help each student develop the ability to carry out responsibilities without direct supervision.
10. Develop a pride in workmanship, scholarship, and respect for physical and mental labor in all fields.
11. Provide guidance which will help each student in the selection of an occupation.
12. Assist each student in planning his/her economic life.
13. Guide and help each child in assuming his/her responsibilities in our working democracy.
14. Expose each child to the workings of democracy.
15. Each course within the school program must be adjusted to meet children's needs, abilities, interests, and maturation.
SCHOOL DISTRICT ORGANIZATIONAL OUTLINE

Citizens

Board of Directors
Superintendent of Schools

Central Office:  
Superintendent of Elementary Schools  
Superintendent of Junior High School  
Superintendent of Senior High School

<table>
<thead>
<tr>
<th>Central Office</th>
<th>Elementary Schools</th>
<th>Junior High School</th>
<th>Senior High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Manager</td>
<td>Elem. Curr. Dir.</td>
<td>Principal</td>
<td>Principal</td>
</tr>
<tr>
<td>Secondary Curriculum Coordinator</td>
<td>Principals</td>
<td>Ass't Principal</td>
<td>Ass't Principal</td>
</tr>
<tr>
<td>Transportation Director of Buildings &amp; Grounds</td>
<td>Social Worker</td>
<td>Teachers</td>
<td>Teachers</td>
</tr>
<tr>
<td>Mechanics</td>
<td>Custodians</td>
<td>Secretaries</td>
<td>Secretaries</td>
</tr>
<tr>
<td>Bus Drivers</td>
<td>Clerks</td>
<td>Clerks</td>
<td>Clerks</td>
</tr>
<tr>
<td></td>
<td>Cooks</td>
<td>Cooks</td>
<td>Cooks</td>
</tr>
<tr>
<td></td>
<td>Students</td>
<td>Students</td>
<td>Students</td>
</tr>
</tbody>
</table>

GENERAL DESCRIPTION OF THE HIGH SCHOOL CURRICULUM

Art
Semester offerings include fundamentals of art, crafts, and art projects. The instructor is professionally involved in the promotion of art activities on both the community and state levels. He is admired for his work which is currently being offered for sale in four national art galleries.

Business Education
The business department has two full time staff members and a full time distributive education coordinator. The teachers are well qualified and bring outside expertise to the classroom. The curriculum includes office education, bookkeeping, and business law.

Driver Education
The driver education department consists of one full time instructor. He is in charge of a three phase program consisting of classroom, simulation, and behind-the-wheel training. All three phases are offered in both the summer and the regular school year. The program exceeds the minimum requirements established by the state.

Communication Skills
Three English teachers staff the English department. The individualized reading program has received national recognition and has been used as a model for other programs. It has received excellent feedback from the students and the demand for the course consistently exceeds capacity. Other courses include communication as problem solving, everyday writing, listening skills, and technical report writing. Seventy-five percent of the students who attend college take two or more years of English.

Home Economics
The home economics curriculum includes these seven semester classes: two levels of clothing construction, two levels of foods, and one level each of child development, interior decoration, and textile design. There is evidence of extensive use of community resources, films, labs, discussions, individualized projects, and field trips. Students seem enthusiastic about the program and their interest extends beyond the classroom.

Industrial Arts
The industrial arts program is comprised of eight courses. These are: mechanical drawing, architectural drawing, woodworking, metal working, electricity-electronics, power & energy, graphic arts, and plastics. The program enrolls 255 (36%) of the school’s 669 students. The courses are taught by three instructors who are well qualified and bring outside expertise to the classroom. The staff has been working to increase the appeal of the industrial arts curriculum to a wider segment of the student population. Their efforts have resulted in a slight increase in industrial arts enrollments during the past two years.
Foreign Language
The foreign language courses enroll about 10 percent of the student body in three levels of French and 2 levels of Spanish. These courses are taught by two part time instructors. The French instructor is shared with the junior high school, and the Spanish teacher’s primary work responsibilities are in the school’s library.

Mathematics
Six courses are offered by the mathematics department. Basic math is provided as a terminal course for less capable students. Personal finance and everyday problems involving the use of math are stressed in this course. Most of the students take Algebra I and geometry during their high school careers. Algebra II is offered at the 11th grade level and advanced math is taught at the 12th grade level. The advanced mathematics course includes trigonometry, pre-calculus, and calculus. Three Apple computers are available for student use. The instructors are currently exploring how to best expand the use of computers in the mathematics program.

Music
Both choral and instrumental music programs comprise the music curriculum. Approximately thirty students take choral music as an elective. Eighty-five students take part in the instrumental program. The marching band enjoys the enthusiastic support of the community. During the past ten years, the marching band has participated in several bowl parades and won seven state-wide music contests. Each summer, the music department involves about seventy-five students in an eight week course which results in the production of a major musical play. Productions such as Oklahoma, West Side Story, and Annie have been well received by the community.

Physical Education
The physical education curriculum stresses team, individual, and lifetime recreational activities. All 10th graders who are able are required to participate in the year long physical education class. Similar courses are electives at the 11th and 12th grade levels. The department conducts an extensive intramural program in flag football, basketball, volleyball, and track.

Science
The high school science program offers three laboratory science courses. Biology is a required course for all 10th grade students. Two levels of biology are taught. One level is geared to meet the needs of less academically talented students; the other is designed primarily for students planning post high school education. Chemistry is recommended to students who plan to continue their formal education. There are two separate offerings of physical science. Physical Science II is a continuation of junior high physical science, and is offered to those students who wish to take project physics. Project physics requires a strong background in mathematics and is elected by students who are considering a career in a science related area.

Social Studies
Two required courses and three electives make up the social science program. A semester course in civics is required in the sophomore year. A year long course in current world events is required for all seniors. The social studies electives include world history, sociology, and mini-courses. Six week mini-courses are offered in geography, economics, psychology, and personal relationships.

Accomplishments of Man: This very popular social studies course is restricted to students with at least a B average. The course is team taught through the English, social studies, and art departments. The literary, artistic, political, and social accomplishments of mankind are traced from Ancient Greece to the present.

Special Education
Nine students are currently enrolled in the special education program which is staffed by one full time teacher. Each student attends his/her special education class for two hours each day, and is scheduled for a two hour period of individualized instruction each week. All special education students are encouraged to take regular classes. Each student is assigned a work station within the school during his/her sophomore and junior years. The library, cafeteria, administrative office, school nurse, and maintenance provide work stations for these students. Most of the special education students are given some work experience in the community during their senior year.
Expenditure of high school per student in average daily attendance—$2,450.00

Department Budget

The industrial arts budget has been approximately $6,000 a year for the past 7 years. Based on the assumption that the amount of money budgeted will remain constant for the near future, the department has developed a three year budget plan. Each of the department members lists and presents his equipment needs. The industrial arts staff then ranks the individual priorities. As money becomes available, the first priority is funded, then the second, and so on. The instructors feel that the plan offers these distinct advantages: The budget plan makes possible the purchase of equipment that might not be possible otherwise. The individual instructor must consider each request carefully if it is to receive the support of the other staff members.

Industrial Arts Facilities and Equipment

Physical plant

The high school was constructed during the 1960's and reflects the architectural style used at that time. Except for changes to improve heating efficiency, the building has not needed any major renovation.

The industrial arts, home economics, and music departments are housed in one of three wings which are joined to the central support area. The central area contains the administrative offices, nurse's office, guidance complex, library, and cafeteria.

The general unit shop concept was used in the design of the industrial arts classrooms. Each classroom-laboratory has provisions for an instructor's office, planning-library facilities, and storage for supplies. The staff, and other professionals who have visited the physical plant, agree that it provides an excellent learning environment.

Tools and Equipment

The majority of the tools and equipment used for instructional purposes were purchased at about the time that the high school was constructed. The tools and machines are kept in good working condition by the staff. The laboratories are cleaned and maintained regularly by the school custodians.

The staff has evaluated the tools and equipment in each of the laboratories and concludes that all the units contained in the program of study can be effectively taught with the tools, machines, and teaching aids on hand.

School District Policies Affecting the Industrial Arts Staff and Program

327.2 Personnel Evaluation

The Board of Directors shall employ, retain, and promote only the most qualified personnel. The administration shall submit written, annual evaluations for each professional staff member to the superintendent's office by the first of February. The principal or his/her assistant shall formally observe each teacher in the performance of his or her professional duties at least two (2) times each year.

410.1 Use of School Property

Under no circumstances is it considered acceptable for any staff member to use school facilities or property for private profit.

1206.5 Injury or Illness at School

Students who become ill or injured at school may be given first aid. In cases of serious illness or injury, the pupil will be transported to the hospital or doctor's office by ambulance or other suitable means of transportation. Where possible, the parent or guardian will be notified and instructions requested regarding further action.
1206.6 Accident Reports
Accidents shall be reported to the building principal within one (1) working day of the occurrence. Each accident shall be reported on the accident report form.

Building Policies Affecting the Industrial Arts Staff and Program

H.S. 67.1 An up-to-date course of study is to be kept in general file in the administrative office for each course currently offered.

H.S. 67.5 A copy of the final examination given in each course is to be kept on file with the office secretary.

H.S. 90.4 Written permission must be obtained from each student’s parent or guardian before he/she is permitted to operate industrial arts power equipment or driver training vehicles.

H.S. 92.1 Written permission must be obtained from the parent or guardian of each student participating in school sponsored trips during school hours.

Department Philosophy
At the beginning of the twentieth century, occupational choices were limited for most people. The family unit provided most of the training and skills as occupations were passed from one generation to the next. A worker often performed all of the operations which were needed to process raw materials into finished goods. Industrialization brought about a division of labor and a complex array of technologies for processing the materials that society used.

The educational system was created and modified to help people adjust to the changes brought about by the industrialization of society. Educational opportunities were also extended to include women, the poor, minorities, and the handicapped. The success of the educational system has been due, in part, to the contribution that industrial arts programs make to the total school curriculum.

In order to fully participate in a democratic society, the student needs to know how society communicates its ideas and produces its structures, goods, and services. Industrial arts offers each student an opportunity to develop an insight into these complex industrial and technical activities. The program also provides knowledge, skills, and work habits which help students enter an occupation or select meaningful leisure time activities.

Department Objectives
The industrial arts program should do the following:
1. Provide information and representative experiences from major occupational areas found in American industry.
2. Help each student develop an appreciation of good craftsmanship and pride in doing a job to the best of his/her ability.
3. Explore the spectrum of American industry, its organization, occupations, raw materials, operations, and products.
4. Develop the student’s knowledge to a point where he/she can intelligently select, purchase, use, and maintain industrial products.
5. Develop the students’ psychomotor skills so that they can use tools and machines safely and effectively.
6. Develop safe work practices and attitudes.
7. Promote proper social and work relationships with others.
8. Provide experiences and activities which relate industrial arts to other areas of the school program.
9. Develop skills which each student can apply toward vocational and recreational activities.
10. Develop the students’ knowledge about the mental and psychomotor skill requirements for a variety of occupations.
11. Develop each student’s skills and knowledge so that he/she will be able to enter an advanced vocational technical training school.
12. Provide each student with opportunities to apply his/her problem solving ability in a creative manner.
13. Develop an understanding of the role automation has in our industrial society.
14. Develop an understanding of the activities that must be carried on to mass produce a product.
15. Develop an understanding of how the computer and related devices are changing the work place.
DEPARTMENT ACTIVITIES

Meetings
The members of the department meet on a monthly schedule to discuss matters of concern to the industrial arts department. The minutes of each meeting are forwarded to the principal and the district curriculum coordinator. These minutes show that the department considered the following topics during the 1982-83 school year.

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Topic(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td>Fire drill, eye protection, and laboratory safety</td>
</tr>
<tr>
<td>October</td>
<td>Discussion and planning for department's activities during the annual &quot;Parent's Night&quot; held each November</td>
</tr>
<tr>
<td>November</td>
<td>Hall duty— how the areas adjacent to the industrial arts classrooms and laboratories can be properly monitored</td>
</tr>
<tr>
<td>December</td>
<td>Scheduling and use of the department computer</td>
</tr>
<tr>
<td>January</td>
<td>Review of program objectives*</td>
</tr>
<tr>
<td>February</td>
<td>Preparation for the Guidance Department bulletin board</td>
</tr>
<tr>
<td>March</td>
<td>Preparation for the Regional Awards Contest</td>
</tr>
<tr>
<td>April</td>
<td>Discussion and preparation of budget requests</td>
</tr>
<tr>
<td>May</td>
<td>Effects of Junior High curriculum changes on the Senior High industrial arts program*</td>
</tr>
</tbody>
</table>

* The January and May meetings include the instructors from the junior high school and are held as part of the school district's workshop days. The purpose of these meetings is to promote program coordination between the two schools.

State Awards Contest
The Industrial Arts Awards Contest is held each May under the auspices of the State Industrial Arts Association. All industrial arts students are encouraged to enter their work in the regional contest. The winning entries from the eight regional contests compete in the statewide contest.

Last year, three students from the high school won first, second, and third place awards at the regional contest. A student from Mr. C's woodworking class received a first place award for his wood waste project. A second place and a third place award were won by two students in architectural drawing for their house plans.

Department Bulletin Board
For two weeks each spring, the 4’ x 8’ bulletin board in the main hallway of the school is used by the industrial arts department to promote its courses. The display includes at least one still photograph of the activities conducted in every class. Each photograph or group of photographs is captioned with the course description.

Parent's Night
The parents and patrons of the high school are encouraged to attend the open house held each November. The industrial arts teachers are available in their classrooms or laboratories to explain the program and answer any questions that parents might have.

Tri-Conferences
Each year, the school schedules a formal conference between each student, his or her parents, and one of the student's teachers. The purpose of the tri-conference is to provide parents with an opportunity to discuss their child's progress with a member of the high school faculty. The 15 minute conferences are held early in the second semester and the student is expected to attend with his/her parents in order to receive his/her first semester grade report.

The conferences are scheduled over two evenings and provide each of the I.A. staff members with an opportunity to meet and talk with 15 to 20 sets of parents. Although the instructors are not able to meet with the parents of all their students, they feel that it is an excellent opportunity to discuss the student's progress and problems as well as the industrial program.
## INDUSTRIAL ARTS STAFF QUALIFICATIONS AND ACTIVITIES 1982-83

### Teacher A:
- **Education:** B.S. + 35 hrs. Major in Industrial Arts
- **Experience:** 18 years (7 years at this school)
- **Teaching Responsibilities:** Drafting
- **Offices Held:** Building representative for local association.
- **Professional Meetings 1982-83:** Oct. and April meetings of S.E. Regional IA Assoc.

### Teacher B:
- **Education:** M.Ed. in Industrial Education
- **Experience:** 14 years (4 years at this school)
- **Teaching Responsibilities:** Power mechanics
- **Offices Held:** Building representative for local association.
- **Professional Meetings 1982-83:** Oct. and April meetings of S.E. Regional IA Assoc., (Lion’s Club—Pres. 1892)

### Teacher C:
- **Education:** M.Ed. + 9 graduate hrs.
- **Experience:** 27 years (12 yrs. in this district)
- **Teaching responsibilities:** 4/5 woodworking, 1/5 department chairman
- **Professional Meetings 1982-83:** Oct. and April meetings of Local IA Assoc., AIAA, Spring, 1983, & AVA Fall, 1982
- **Offices held:** Immediate past president of S.E. Regional IA Assoc.
- **Professional Meetings 1982-83:** Oct. and April meetings of Local IA Assoc., AIAA, Spring, 1983, & AVA Fall, 1982

---

*The Southeast Regional Industrial Arts Assoc. is one of seven regional subdivisions of the state industrial arts organization. Any industrial arts educator who teaches within the six county region is eligible for membership. The organization meets twice a year at one of the member schools. The business meetings are usually concerned with the annual I.A. Project Contest. Each business meeting is followed by a program which features speakers from industry, workshops, or a presentation by one of the members.*

---

### Industrial Arts Curriculum

The industrial arts curriculum extends from grade seven through grade twelve. The junior high school curriculum (grades 7, 8, and 9) includes required courses in drafting, hand woodworking, and crafts. The senior high school industrial arts curriculum is comprised of eight courses grouped under three headings. These clusters include: graphic communications, power and energy, and materials and processes.

The industrial arts curriculum enrolls 40 percent of the student body. Thirty percent of the school's graduates have industrial arts credit on their final transcripts because most students who enroll in industrial arts take more than one course.
INDUSTRIAL ARTS COURSES

Machine Drafting

Course Description
Machine Drafting (1 yr.) A mechanical drawing course designed to meet the needs of those students who will continue their education or enter the work force upon graduation. Areas of study include drafting techniques, working drawings, assembly drawings, and pictorial drawings.

Course Enrollments
Grades: 10, 11, 12
Male: 43  Female: 22
Sections: 3

Class size: 18-24
Periods/week: 5
Minutes/week: 250

Text
Drafting for Industry, Walter C. Brown; Goodheart-Willcox

Course Planning
Course of Study (1982)
1. Course objectives
2. Units of instruction
3. Student activities
4. List of behavioral objectives

Course Objectives
This course will:
1. Develop the student's ability to communicate ideas through drawings.
2. Develop the student's ability to read and interpret drawings.
3. Develop a degree of skill with the use of drafting tools and materials.
4. Understand how drawings are used to communicate ideas.
5. Utilize tables, handbooks, and manuals to solve graphic problems.
6. Develop the ability to cooperate with others.
7. Apply problem solving processes to drafting problems.

Course Content
Job opportunities in drafting
Freehand sketching
Lettering
Orthographic projection
Single view drawings
Multi-view drawings
Equipment and methods
Dimensioning practice
Section views
Graphic geometry
Production drawings
Assembly drawings
Bill of materials
Fasteners
Methods of reproducing drawings
Pictorial drawings
Oblique drawings
Isometric drawings
Pictorial drawings
Rendering
Sheetmetal drawing

Activities
Project
Each student prepares 1 to 3 drawings illustrating the principles covered in each unit. The last 8 weeks of the course are used to make and render a pictorial drawing.
Architectural Drawing

Course description
Architectural Drafting (1 year) A course in designing and drawing a complete set of house plans including floor, foundation, elevations, detail, and perspective drawings.
Prerequisite: Machine Drafting. (Source: Guidance brochure)

Enrollment
Grades: 11, 12  Class size: 17
Male: 12  Female: 5
Sections: 1  Periods/week: 5
Minutes/week: 250

Text:
Architectural Drafting Functional Planning and Creative Design
Geo. K. Stegman and Harry J. Stegman
American Technical Pub.

Course Planning
Course of Study
1. Course objectives  5. Evaluation procedures and standards
2. List of behavioral objectives  6. Course assignments
3. List of instructional units  7. Instructional time schedule
4. Sample form used for drawing evaluation

Objectives
Develop an appreciation of planning requirements that must precede the construction of a family dwelling.
Develop knowledge, skill, and judgment to the extent of each student's interest and ability.
Develop ability to recognize the elements of good architectural design.
Develop a knowledge of home construction.

Course Content
Site selection  Kitchen and bath elevations
Floor plan  Framing plan
Foundation plan  Electrical plan
Wall section  Plot and plat drawings
Fireplace details  Perspective drawings
Stair details  House models
Major elevations  Housing cost
Window and door details  Building codes
Door and window schedule  Commercial structures

Activities
Project
Each student designs and draws the plans (14 drawings) for a single family dwelling which meets the specifications set by the instructor.
Students visit a home under construction and write a report on construction methods.
Students estimate the cost of the home that he/she designed using current material prices.
Students report on ways to improve the heating efficiency of their homes.
Every student builds a model of his/her own design.
Woodworking Course Description

Woodworking Technology: The course is designed to develop an understanding of the woodworking industry. The use of woodworking hand tools, portable electric power tools, and machines is stressed. Skills and knowledge acquired will be used to mass produce a marketable wood item.
(Source: Guidance brochure)

Course Enrollments
Grades: 10, 11, 12
Male: 36 Female: 2
Sections: 2
Class size: 12-16
Periods/week: 5
Minutes/week: 250

Text

Course Planning
Course of Study (1981)
1. Rationale for course
2. Philosophy of instructor
3. Safety
4. General course objectives
5. Units of instruction
6. Time schedule
7. Evaluation policies and procedures
8. Student reference materials

Course Objectives
1. Students will develop safe work habits when using woodworking tools and machines.
2. Students will develop understanding and skills in the proper use of woodworking tools and machines.
3. Students will develop an understanding of the materials and methods used in working with wood.
4. Students will develop an appreciation of orderly procedures when working with wood.
5. Students will explore the occupational choices that are available in the woodworking and related industries.
6. Students will develop consumer knowledge about the purchase and use of wood products.

Course Content
Shop orientation and safety
Project planning
Design
Working Drawings
Material selection
Dimension lumber
Plywood
Other wood products
Review of hand wood tools
Portable power tools
Table saw operations
Band saw operations
Jointer
Wood lathe
Drill press
Adhesives
Clamping and gluing
Wood finishing
Abrasives
Stains and bleaches
Fillers
Finishes
Wood lamination
Bending methods
Bending forms
Particle molding
Wood paste
Dies
Equipment
Molding materials
Mass production
Planning
Product research
Market research
Resource scheduling
Organization
Process analyzing
Time study methods
Work sampling
Materials handling
Control
Quality control

Activities
Project—1st semester
Attention is focused on the development of woodworking skills.
Each student selects and constructs one or two wood projects.
Mass production—2nd semester
All members of the class work together to plan, manage, finance, manufacture, and market a salable wood item.
Electricity-Electronics

Course Description
Electricity and Electronics (1 year) A course which includes the study of A.C. and D.C. circuits used in electrical equipment and appliances. The methods used to generate, transmit, control, and convert electrical energy into heat, light, sound, and mechanical force are explored. (Source: Guidance brochure)

Course Enrollments
Grades: 10, 11, 12
Male: 17 Female: 10
Sections: 2
Class size: 12-15
Periods/week: 5
Minutes/week: 250

Text
Basic Electricity and Electronics, William B. Steinburg, & Walter B. Ford: American Technical Publishers

Course Planning
Course of Study
1. Rationale for course
2. Objectives
3. Course content
4. Two to five behavioral objectives for each content area
5. Student activities for each unit

General Objectives
The purpose of the course is to:
1. Develop in each student an understanding of electrical concepts, theories, principles, and laws.
2. Develop safe work habits when working with electricity.
3. Develop an interest in electricity as a leisure time activity.
4. Develop an understanding of electrical circuits, drawings, and terminology.
5. Develop individual potentials which are necessary for employment or for additional training in the field.

Course Content
Static electricity
Atomic theory
Electrical measurement
Volts
Amps
Coulomb
D.C. circuits
Cells and batteries
Telegraph-telephone
D.C. motors
Generation of electricity
A.C. current
Transformers
Relays
Capacitors
A.C. motors
Semi-conductors
Resistors
Transistors
Integrated circuits
Communication
Radio
AF, IF, & RF circuits
Sound equipment
Analog systems and computers
Residential wiring

Activities
Experimental
Exercises and experiments from a published series.
Experiments developed by the instructor for students who need additional depth in an area.
Metals

Course Description
General Metals (1 year) An introductory course in metal working. Sheetmetal, machine tools, arc welding, gas welding, foundry, forging, and heat treatment of metals are covered.

Course Enrollments
Grades: 10, 11, 12
Male: 37 Female: 0
Sections: 2
Class size: 17-20
Periods /week: 5
Minutes/week: 250

Text:
Metalworking: An Introduction, Gregory S. Graham: Benton Publishers

Course Planning
Course of Study (1982)
Introduction and instr's philosophy
Benefits to the student
General objectives
Course content
Behavioral objective(s) for each unit
Student activities
Sample operation sheets
Classroom management procedures

Objectives
Develop and explore vocational interests in the general metal area.
Develop attitudes of safety while operating metal working equipment.
Develop problem solving abilities which are related to the tools, materials, and processes of metal working.
Develop an understanding of the activities used in mass production.
Develop an understanding of the role that computers and computer controlled devices play in mass production.

Course Content

Safety
Introduction
Introduction
Introduction
Parental permission

Introduction
Procedures
Classroom
Project selection
Grading
Clean-up

Sheetmetal
Behaviorsal objectives (4)
Developments
Seams and edges
Cutting
Folding
Joining
Arc Welding
Behaviorsal objectives (5)
Equipment
Assembly
Adjustment of equipment
Welds
Butt, corner, Vert., Horiz.
Electrode selection
Gas Welding
Welds:
Butt, corner, Vert., & horiz.
Cutting
Brazing

Machine Tools
Behavioral objectives (16)
Lathe
Speed and Feed
High speed tools
Carbide cutting tools
Tool geometry
Turning
Knife
Tapering
Threading
File and polish
Parting
Milling machine
Behavioral objectives (5)
Flat milling
Hilling tapers
Assembly

Forging
Behavioral objectives (15)
Hand forging
Forging cold chisel
Hardening & tempering
Industrial forging
Dyes
Forging machines
Metal production
Behavioral objectives (7)
Cast iron (film)
Steel
Alloy steel
Aluminum
Copper (film)
Heat treatent of metal
Behavioral objectives (12)
Iron carbon diagrams
Effect of carbon
Effect of other elements
Industrial processes
Occupations

Mass production
Behavioral objectives (9)
Assembly lines
Automation
Quality control
Computers & robots
Inventory control
Cost estimation
metals can't

Activities

Project

Every student is required to complete the assigned project(s) in each area. The required projects include:

- Sheetmetal—box, funnel, post lamp
- Machine—meat tenderizing hammer
- Foundry—Book ends
- Welding—Prepare flat, flat corner, horizontal, and vertical welds

Experimental

Test welds using different electrodes and welding conditions.

Mass production

Weather vanes are mass produced during the final six weeks of the semester. Students work in groups to plan and organize the project which includes casting, machining, welding, finishing, and assembly operations.
Power and Energy

Course Description
Power (1 yr.) A study of the scientific principles that are applied to the production, storage, transmission, and use of energy. The economic and social effects of energy utilization are also considered. (Source: Guidance brochure)

Enrollment
Grades: 11, 12  Grade: 12
Male: 48  Female: 0
Sections: 2  Class size: 18-26
Periods/week: 5  Minutes/week: 250

Text
None. (Several references are used including reference books, service manuals, and teacher-made materials.)

Course Planning
Course of Study (1983)
Rationale for teaching power
Philosophy of instructor
General course objectives
Units of instruction
Behavioral objectives for each unit
Student activities
Instructional time schedule
Classroom management policies and procedures
List of instructional aids
Evaluation policies

Objectives
Develop an understanding of the importance and utilization of energy in our society.
Develop an understanding of devices used to convert one form of energy to another.
Develop an understanding of the principles used in the efficient use of energy.
Develop a useful knowledge in the selection, use, and repair of energy power units.

Course Content

<table>
<thead>
<tr>
<th>Sources of energy</th>
<th>Power producing devices</th>
<th>Measuring power output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinetic</td>
<td>History</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>Thermal</td>
<td>External combustion engines</td>
<td>Transmission of power</td>
</tr>
<tr>
<td>Chemical</td>
<td>Steam engine</td>
<td>Mechanical</td>
</tr>
<tr>
<td>Fossil</td>
<td>Steam turbine</td>
<td>Hydraulic</td>
</tr>
<tr>
<td>Geothermal</td>
<td>Turbines</td>
<td>Brake systems</td>
</tr>
<tr>
<td>Gravitational</td>
<td>Internal combustion engines</td>
<td>Torque converters</td>
</tr>
<tr>
<td>Sound</td>
<td>Reaction engines</td>
<td>Control</td>
</tr>
<tr>
<td>Radiant</td>
<td>Piston</td>
<td>Pneumatic</td>
</tr>
<tr>
<td>Electrical</td>
<td>Gasoline</td>
<td>Vacuum systems</td>
</tr>
<tr>
<td>Energy systems</td>
<td>Diesel</td>
<td>Pressure control</td>
</tr>
<tr>
<td>Energy consumption</td>
<td>Ignition</td>
<td>Energy storage</td>
</tr>
<tr>
<td>Friction</td>
<td>Fuel</td>
<td></td>
</tr>
<tr>
<td>Solar energy</td>
<td>Cooling</td>
<td></td>
</tr>
<tr>
<td>Conservation of energy</td>
<td>Lubrication</td>
<td></td>
</tr>
</tbody>
</table>

Activities
Experimental
Groups of three or four students work together to prepare written answers to questions related to the current unit of instruction. The 3 categories of experiments used by the instructor are:

Physics: experiments in force, friction, heat convection, etc.
Commercially available simulation equipment: experiments in hydraulics, pneumatics, and power.
Automotive and household equipment: application of the principles to power-steering units, heat pumps, etc.
Plastics

Course Description
Plastics (1 yr.) A course designed to explore the methods used by industry to fabricate plastic materials. Materials and processes used to form both thermoset and thermoplastic are investigated. The student will acquire a knowledge of reinforcing, laminating, compression, injecting, and extrusion methods. (Source: Guidance brochure)

Enrollment
Grades: 11, 12
Male: 16 Female: 0
Sections: 1
Class size: 16
Periods/week: 5
Minutes/week: 250

Text
Industrial Plastics, Ronald Baird and David Baird; Goodheart-Willcox

Course Planning
Course of Study (1982)
Instructor's philosophy
Rules for safety
General objectives
Classroom procedures & policies
Course content
Instructional time schedule
Student evaluation procedures

Objectives
Develop each student's knowledge of how plastic products are used in our society.
Develop an appreciation of the contributions that plastics make to the success of other products.
Learn how to select plastic materials for given uses and processing methods.
Develop each individual's understanding of the science and processes used in the manufacture of plastic items.
Learn the safe and proper use of plastic forming machines and equipment.
Learn basic plastic die and mold making procedures.

Course Content
Introduction
History and importance of plastics
Plastic products
Properties
Mechanical, electrical, thermal, chemical, and optical
Identification and classification
Thermoset materials
Epoxy plastics
Silicones
Phenolic compounds
Polyester and alkyd resins
Thermoplastic materials
Cellulosics
Polyethylene and polypropylene
Polyurethane and ABS plastics
Acrylic
Vinyl

Thermoforming methods
Mold making
Vacuum forming
Drape vacuum forming
Air pressure forming
Molding
Injection
Extrusion
Blow molding
Compression molding
Expandable polystyrene beads
Expandable polyurethane resin
Laminates
Bonding
Cohesive bonding
Adhesive bonding
Welding (hot gas)

Activities
Project (individual and group)
Every student is required to produce at least one example using each of the plastic materials included in the course. Students also work in two or three member teams to plan, develop, and produce a plastic article of their own choosing. Part of this assignment includes regular reports to the class on their progress. Last year, the students mass produced plastic coasters which they presented to the parents who visited the industrial arts department during Open House.
Graphic Arts

Course Description
Graphic Arts (1 yr.) A survey of the major materials, tools, and processes used in graphic communication. Emphasis is placed on message preparation, reproductive processes, and photography. (Source: Guidance brochure)

Enrollment
Grades: 10, 11, 12
Male: 17, Female: 0
Sections: 1

Text
Graphic Arts Fundamentals, John R. Walker; Goodheart-Willcox

Course Planning
Course of Study (1980)
Instructor's philosophy
General objectives
Course content
Sample test questions
Grading procedures

Objectives
Every student should:
1. Experience and explore the major activities conducted in the field of graphic arts.
2. Work in a neat, orderly, and efficient manner.
3. Develop an interest in graphic arts as an occupation.
4. Develop a knowledge of the materials, tools, and processes used by the graphic arts industry.
5. Develop safe attitudes toward himself and others.
6. Develop an aesthetic appreciation in planning and designing graphic arts materials.

Course Content
Layout and design
Printing layouts
Linoleum block printing
Tools and equipment
Design and layout
Silk screen printing
Design and layout techniques
Cutting stencil
Photo silk screen
Printing techniques
Papers and ink
Size and kinds of paper
Printing inks
Pigments
Vehicles
Dryers
Special purpose inks
Relief printing
Design and layout
Type composition
Platen press
Rubber stamp printing
Offset lithography
Photography
Composition
Camera operation
Film
Developing and fixing film
Printing processes
Photographic papers
Contact printing
Enlargement
Automated graphics
Computer aided graphics

Activities
Project
Each student designs, lays out, and prints at least one example from each of the following categories: 1) business cards, 2) greeting cards, and 3) date book/calendar.
PROGRAM DESCRIPTION

COMMUNITY PROFILE

City 10,970 11,435
County 25,769 25,229

Location: Midwestern city located 70 miles south of a metropolitan area with a population of 43,000.

Commercial Services:
  Financial:
    4 banks with assets of $217 million
    2 savings and loan associations
  Industrial:
    1 machine shop
    1 electrical motor repair
  Community Facilities:
    3 shopping centers
    3 department stores
    20 churches (19 protestant, 1 Catholic)

Health Services:
  1 hospital - 134 beds
  21 medical personnel (11 MD's, 4 DC's, 6 dentists, and 5 DVM's)

Labor: (civilian labor force (August, 1983) 12,130
  Unemployed 582
  Unemployed as % of work force 4.8
  Total employed (August, 1983) 7,278
  Manufacturing employment 2,005
  Nonmanufacturing employment 5,273

Major employers:

<table>
<thead>
<tr>
<th>Number</th>
<th>Product / Service</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Paper packing products</td>
<td>97 male 72 female</td>
</tr>
<tr>
<td>2.</td>
<td>Sport &amp; leisure uniforms</td>
<td>42 male 14 female</td>
</tr>
<tr>
<td>3.</td>
<td>Concrete &amp; clay building materials</td>
<td>21 male 14 female</td>
</tr>
<tr>
<td>4.</td>
<td>Electrical switching &amp; control equipment</td>
<td>605 male 83 female</td>
</tr>
<tr>
<td>5.</td>
<td>Canned meat products</td>
<td>60 male 87 female</td>
</tr>
<tr>
<td>6.</td>
<td>Commercial and household utensils</td>
<td>19 male 3 female</td>
</tr>
<tr>
<td>7.</td>
<td>Butcher saws</td>
<td>5 male 1 female</td>
</tr>
<tr>
<td>8.</td>
<td>Meat products</td>
<td>51 male 11 female</td>
</tr>
<tr>
<td>9.</td>
<td>Specialty notebook binders</td>
<td>87 male 12 female</td>
</tr>
</tbody>
</table>

Educational Facilities:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Teachers</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Schools: (Classification AAA)</td>
<td>1-2</td>
<td>40</td>
<td>609</td>
</tr>
<tr>
<td>Elementary</td>
<td></td>
<td>37</td>
<td>535</td>
</tr>
<tr>
<td>Junior High</td>
<td></td>
<td>41</td>
<td>669</td>
</tr>
<tr>
<td>High School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Schools:</td>
<td></td>
<td>21</td>
<td>372</td>
</tr>
<tr>
<td>Elementary</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Parental Occupations, Educational Level

<table>
<thead>
<tr>
<th>Occupational Level</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>21.1%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Manager, Proprietor</td>
<td>23.9%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Clerical</td>
<td>7.7%</td>
<td>27.1%</td>
</tr>
<tr>
<td>Skilled Worker</td>
<td>34.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td>9.0%</td>
<td>14.8%</td>
</tr>
<tr>
<td>Unskilled</td>
<td>2.7%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Other</td>
<td>8.1%</td>
<td>32.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational Level of Parents</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>11.2%</td>
<td>10.8%</td>
</tr>
<tr>
<td>High School</td>
<td>22.6%</td>
<td>43.4%</td>
</tr>
<tr>
<td>2 Years of College</td>
<td>28.7%</td>
<td>24.3%</td>
</tr>
<tr>
<td>4 Years of College</td>
<td>15.7%</td>
<td>11.4%</td>
</tr>
<tr>
<td>More than 4 yrs. of College</td>
<td>9.2%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Other</td>
<td>2.6%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

(Survey taken from graduating class of 1981)

Follow-up of 1983 Graduates

<table>
<thead>
<tr>
<th>Continued Education</th>
<th>Entered Work Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 year college or university</td>
<td>51.4%</td>
</tr>
<tr>
<td>Community/Jr. college</td>
<td>1.4%</td>
</tr>
<tr>
<td>Other post secondary</td>
<td>1.9%</td>
</tr>
<tr>
<td>(Business college or technical school)</td>
<td></td>
</tr>
<tr>
<td>Farm</td>
<td>.93%</td>
</tr>
<tr>
<td>Sales</td>
<td>2.3%</td>
</tr>
<tr>
<td>Service</td>
<td>5.4%</td>
</tr>
<tr>
<td>Military</td>
<td>3.7%</td>
</tr>
<tr>
<td>Laborers</td>
<td>7.0%</td>
</tr>
<tr>
<td>Homemakers</td>
<td>1.4%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>7.0%</td>
</tr>
<tr>
<td>Unknown</td>
<td>17.2%</td>
</tr>
<tr>
<td>Total</td>
<td>54.7%</td>
</tr>
<tr>
<td></td>
<td>44.99%</td>
</tr>
</tbody>
</table>

Educational Philosophy of the School

The school district affirms its commitment to help each child develop to his/her fullest potential as a mature individual and a contributing member of a free society. The school district acknowledges that it must develop an educational program which meets the needs of the community it serves. Toward this end, a school program will be developed which meets the intellectual, social, physical, and aesthetic needs of students.

The program will be directed toward the common needs of all children while at the same time recognizing the unique differences and needs of each child.

Objectives of the School

1. Teach each student how to read effectively, write accurately, and speak the English language clearly.
2. Develop the ability to think logically and to solve mathematical problems.
3. Promote the abilities associated with listening and observing.
4. Create a desire to learn beyond the formal classroom setting.
5. Promote an appreciation of our cultural heritage.
6. Help each child develop a positive self image of his/her worth as an individual.
7. Provide for differences among individuals.
8. Help each student become an intelligent consumer and an efficient producer.
9. Help each student develop the ability to carry out responsibilities without direct supervision.
10. Develop a pride in workmanship, scholarship, and respect for physical and mental labor in all fields.
11. Provide guidance which will help each student in the selection of an occupation.
12. Assist each student in planning his/her economic life.
13. Guide and help each child in assuming his/her responsibilities in our working democracy.
14. Expose each child to the workings of democracy.
15. Each course within the school program must be adjusted to meet children's needs, abilities, interests, and maturation.
GENERAL DESCRIPTION OF THE HIGH SCHOOL CURRICULUM

Art
Semester offerings include fundamentals of art, crafts, and art projects. The instructor is professionally involved in the promotion of art activities on both the community and state levels. He is admired for his work which is currently being offered for sale in four national art galleries.

Business Education
The business department has two full-time staff members and a full-time distributive education coordinator. The teachers are well qualified and bring outside expertise to the classroom. The curriculum includes office education, bookkeeping, and business law.

Driver Education
The driver education department consists of one full-time instructor. He is in charge of a three-phase program consisting of classroom, simulation, and behind-the-wheel training. All three phases are offered in both the summer and the regular school year. The program exceeds the minimum requirements established by the state.

Communication Skills
Three English teachers staff the English department. The individualized reading program has received national recognition and has been used as a model for other programs. It has received excellent feedback from the students and the demand for the course consistently exceeds capacity. Other courses include communication as problem solving, everyday writing, listening skills, and technical report writing. Seventy-five percent of the students who attend college take two or more years of English.

Home Economics
The home economics curriculum includes seven semester classes: two levels of clothing construction, two levels of foods, and one level each of child development, interior decoration, and textile design. There is evidence of extensive use of community resources, films, labs, discussions, individualized projects, and field trips. Students seem enthusiastic about the program and their interest extends beyond the classroom.

Industrial Arts
The industrial arts program is comprised of two drafting and two woodworking courses which enroll 163 (24%) of the school's 669 students. The courses are taught by two instructors. The drafting instructor is shared with the P.E. department where his primary responsibilities are coaching football and track. The woodworking instructor is recognized throughout the community as a master cabinet maker and brings his outside expertise to the classroom.
Foreign Language
The foreign language courses enroll about 10 percent of the student body in three levels of French and 2 levels of Spanish. These courses are taught by two part time instructors. The French instructor is shared with the junior high school, and the Spanish teacher’s primary work responsibilities are in the school’s library.

Mathematics
Six courses are offered by the mathematics department. Basic math is provided as a terminal course for less capable students. Personal finance and everyday problems involving the use of math are stressed in this course. Most of the students take Algebra I and geometry during their high school careers. Algebra II is offered at the 11th grade level and advanced math is taught at the 12th grade level. The advanced mathematics course includes trigonometry, pre-calculus, and calculus. Three Apple computers are available for student use. The instructors are currently exploring how to best expand the use of computers in the mathematics program.

Music
Both choral and instrumental music programs comprise the music curriculum. Approximately thirty students take choral music as an elective. Eighty-five students take part in the instrumental program. The marching band enjoys the enthusiastic support of the community. During the past ten years, the marching band has participated in several bowl parades and won seven state-wide music contests. Each summer, the music department involves about seventy-five students in an eight week course which results in the production of a major musical play. Productions such as Oklahoma, West Side Story, and Annie have been well received by the community.

Physical Education
The physical education curriculum stresses team, individual, and life-time recreational activities. All 10th graders who are able are required to participate in the year long physical education class. Similar courses are electives at the 11th and 12th grade levels. The department conducts an extensive Intramural program in flag football, basketball, volleyball, and track.

Science
The high school science program offers three laboratory science courses. Biology is a required course for all 10th grade students. Two levels of biology are taught. One level is geared to meet the needs of less academically talented students; the other is designed primarily for students planning post high school education. Chemistry is recommended to students who plan to continue their formal education. There are two separate offerings of physical science. Physical Science II is a continuation of junior high physical science, and is offered to those students who wish to take project physics. Project physics requires a strong background in mathematics and is elected by students who are considering a career in a science related area.

Social Studies
Two required courses and three electives make up the social science program. A semester course in civics is required in the sophomore year. A year long course in current world events is required for all seniors. The social studies electives include world history, sociology, and mini-courses. Six week mini-courses are offered in geography, economics, psychology, and personal relationships.

Accomplishments of Man: This very popular social studies course is restricted to students with at least a B average. The course is taught through the English, social studies, and art departments. The literary, artistic, political, and social accomplishments of mankind are traced from Ancient Greece to the present.

Special Education
Nine students are currently enrolled in the special education program which is staffed by one full time teacher. Each student attends his/her special education class for two hours each day, and is scheduled for a two hour period of individualized instruction each week. All special education students are encouraged to take regular classes. Each student is assigned a work station within the school during his/her sophomore and junior years. The library, cafeteria, administrative office, school nurse, and maintenance provide work stations for these students. Most of the special education students are given some work experience in the community during their senior year.
Expenditure of high school per student in average daily attendance—$2,450.00

Budget Planning 1983-1984

<table>
<thead>
<tr>
<th>Department</th>
<th>Budget 1983-1984</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>$1,625</td>
</tr>
<tr>
<td>Art</td>
<td>875</td>
</tr>
<tr>
<td>Home Economics</td>
<td>800</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>600</td>
</tr>
<tr>
<td>General Instructional Supply</td>
<td>1,675</td>
</tr>
<tr>
<td>Library</td>
<td>6,014</td>
</tr>
<tr>
<td>Textbooks</td>
<td>4,800</td>
</tr>
<tr>
<td>Speech</td>
<td>1,130</td>
</tr>
<tr>
<td>Summer Play</td>
<td>2,800</td>
</tr>
<tr>
<td>Special Education</td>
<td>1,940</td>
</tr>
</tbody>
</table>

Department Budget

Six hundred dollars is budgeted annually for the industrial arts program. The dollar amount of budget has not changed since 1977. The budget is expended for supplies, repairs, and replacement of small tools. The instructors feel that this amount of money is adequate but does not allow for program expansion. Additional funds have been made available on an emergency basis. Two years ago, the table saw had to be replaced during the school year, and the department was able to secure extra money from the district's central office.

Industrial Arts Facilities and Equipment

Physical Plant

The high school was constructed during the 1960's and reflects the architectural style used at that time. Except for changes to improve heating efficiency, the building has not needed any major renovation.

The industrial arts, home economics, and music departments are housed in one of three wings which are joined to the central support area. The central support area contains the administrative offices, nurses office, guidance complex, library, and cafeteria.

The general unit shop concept was used in the design of the industrial arts classrooms. Each classroom-laboratory has provisions for an instructor's office, planning-library facilities, and storage for supplies. The staff, and other professionals who have visited the physical plant, agree that it provides an excellent learning environment.

Tools and Equipment

The majority of the tools and equipment used for instructional purposes were purchased at about the time that the high school was constructed. The tools and machines are kept in good working condition by the staff. The laboratories are cleaned and maintained regularly by the school custodians.

The staff has evaluated the tools and equipment in each of the laboratories and concludes that all the units contained in the program of study can be effectively taught with the tools, machines, and teaching aids on hand.

School District Policies Affecting the Industrial Arts Staff and Program

327.2 Personnel Evaluation

The Board of Directors shall employ, retain, and promote only the most qualified personnel. The administration shall submit written, annual evaluations for each professional staff member to the superintendent's office by the first of February. The principal or his/her assistant shall formally observe each teacher in the performance of his or her professional duties at least two(2) times each year.

410.1 Use of School Property

Under no circumstances is it considered acceptable for any staff member to use school facilities or property for private profit.
1206.5 Injury or Illness at School
Students who become ill or injured at school may be given first aid. In cases of serious illness or injury, the pupil will be transported to the hospital or doctor’s office by ambulance or other suitable means of transportation. When possible, the parent or guardian will be notified and instructions requested regarding further action.

1206.6 Accident Reports
Accidents shall be reported to the building principal within one (1) working day of the occurrence. Each accident shall be reported on the accident report form.

Building Policies Affecting the Industrial Arts Staff and Program
H.S. 67.1 An up-to-date course of study is to be kept on general file by the administrative office for each course currently offered.

H.S. 67.5 A copy of the final examination given in each course is to be kept on file with the office secretary.

H.S. 90.4 Written permission must be obtained from each student’s parent or guardian before he/she is permitted to operate industrial arts power equipment or driver training vehicles.

H.S. 92.1 Written permission must be obtained from the parent or guardian of each student participating in school sponsored trips during school hours.

Department Philosophy
Industrial arts is an important part of a student’s total education. The subject matter offered through the industrial arts curriculum will provide each student with an insight into the tools, machines, processes, and materials used by society to provide goods and services. These insights will be enhanced through a variety of hands-on experiences which are representative of modern industry.

Department Objectives
The industrial arts program should do the following:
1. Provide information and representative experiences from major occupational areas found in American industry.
2. Help each student develop an appreciation of good craftsmanship and pride in doing a job to the best of his/her ability.
3. Develop each student’s knowledge to a point where he/she can intelligently select, purchase, use, and maintain industrial products.
4. Develop each student’s psychomotor skills so that he/she can use machines and tools safely and effectively.
5. Develop safe working attitudes and practices.
6. Develop skills which each student can apply toward vocational and recreational activities.

Department Activities
Meetings
The members of the department meet as the need arises to discuss matters of concern to the industrial arts department.

State Awards Contest
The Industrial Arts Awards Contest is held each May under the auspices of the State-Industrial Arts Association. All industrial arts students are encouraged to enter their work in the regional contest. The winning entries from the eight regional contests compete at the statewide contest. Last year, three students from the high school won two seconds and one third place award at the regional contest. A student from Mr. A’s advanced woodworking class received a second place award for his oak dressing table. A second place and a third place award were won by two students in architectural drawing for their house plans.
Parent's Night

The parents and patrons of the high school are encouraged to attend the open house held each November. The industrial arts teachers are available in their classrooms or laboratories to explain the program and answer any questions that parents might have. The parents are asked to make future appointments with the individual teacher if they want to discuss their student's progress or problems more specifically.

Industrial Arts Staff Qualifications and Activities 1982-83

Teacher A:
Education: B.S. (Major in Industrial Arts)
Experience: 9 years (4 years at this school)
Teaching responsibilities: Architectural Drafting, Woodworking
Professional membership(s): Local Ind. Arts. Assoc., S.E. Regional Ind. Arts Assoc.*
Meetings attended: Oct. & April meetings of Local Ind. Arts. Assoc.

Teacher B:
Education: B.S. (Major- Coaching, Minor-Ind. Arts)
Experience: 3 years (3 years at this school)
Teaching responsibilities: Drafting (1/5 time), Coaching & P.E. (4/5 time)
Professional membership(s): State Athletic Assoc., Western Valley Athletic Assoc.
Meetings attended: Quarterly meetings of the Western Valley coaches

*The S.E. Regional Industrial Arts Association is one of seven regional subdivisions of the state industrial arts organization. Any industrial arts educator who teaches within the six county region is eligible for membership. The organization meets twice a year at one of the member schools. The business meetings are usually concerned with the annual I.A. Project Contest. Each business meeting is followed by a program which features speakers from industry, workshops, or a presentation by one of the members.

Industrial Arts Curriculum

The industrial arts curriculum extends from grade seven through grade twelve. The junior high school curriculum (grades 7, 8, and 9) includes required courses in drafting, hand woodworking, and crafts. Fifteen percent of the high school graduates have taken an industrial arts course credit. Most of these students take more than one industrial arts course.

Drafting

Course Description
Beginning Drafting (1 year) A mechanical drawing course designed to meet the needs of those students who will continue their education or enter the work force upon graduation. Areas of study include drafting techniques, working drawings, assembly drawings, and pictorial drawings.

Enrollment
Grades: 10, 11, 12
Male: 52 Female: 5
Sections: 5

Class size: 17-22

Text
Drafting for Industry, Walter C. Brown;
Goodheart-Willcox

Course Planning
1. List of general course objectives
2. List of instructional units and lessons
3. Instructional time schedule
4. List of criteria used for evaluating student drawings

Objectives
This drafting course will:
1. Develop the student's ability to communicate ideas through drawings.
2. Develop the student's ability to read and interpret drawings.
3. Develop a degree of skill with the use of drafting tools and materials.
4. Develop the student's understanding of how drawings are used to communicate ideas.
5. Utilize tables, handbooks, and manuals to solve graphic problems.
6. Develop the ability to cooperate with others.
7. Apply problem solving processes to drafting problems.
Course Content

Job opportunities in drafting
Freehand sketching
Lettering
Orthographic projection
Single view drawings
Multi-view drawings
Equipment and methods
Dimensioning practice
Section views
Graphic geometry

Production drawings
Assembly drawings
Bill of materials
Fasteners
Methods of reproducing drawings
Pictorial drawings
Oblique drawings
Isometric drawings
Pictorial drawings
Sheetmetal drawing

Activities

Project

Three to five drawings are assigned for each unit of instruction. The instructor reviews each drawing with the student and makes suggestions for improvement. The last 8 weeks of the course are devoted to making and rendering a pictorial drawing. The students seem to enjoy the activity and look forward to it.

Architectural Drawing

Course Description

Architectural Drafting (1 year) A course in designing and drawing a complete set of house plans, including floor, foundation, elevations, detail, and perspective drawing.
Prerequisite: Machine Drafting. (Source: Guidance brochure)

Enrollment

Grades: 10, 11, 12
Male: 40 Female: 0
Class size: 16-20
Periods/week: 5
Minutes/week: 250

Text

Architectural Drawing, Function Planning, and Creative Design
Geo. K. Stegman and Harry J. Stegman; American Technical Publishers

Course Planning

Course of Study (1979)
1. General objectives
2. Classroom policies and procedures
3. List of instructional units
4. List of materials and equipment used to teach the course.
5. Sample test questions

Objectives

1. Develop an appreciation of planning requirements that must precede the construction of a family dwelling.
2. Develop knowledge, skill, and judgment to the extent of his/her interest and ability.
3. Recognize the elements of good architectural design.
4. Develop a knowledge of home construction.

Course Content

Site selection
Floor plan
Foundation plan
Wall section
Fireplace details
Stair details
Major elevations
Window and door details
Kitchen and bath elevations
Framing plan
Electrical plan
Plot and plat drawings
Perspective drawings

Activities

Project

Each student designs a single family dwelling which meets the parameters set by the instructor. After the design is approved, the student draws a set of plans which could be used to construct the home.
Woodworking I

Course description
Woodworking I (1 year) The course includes the study and use of woodworking hand tools, portable electric power tools, woodworking machines, and wood finishing techniques.
(Source: Guidance brochure)

Enrollment
Grades: 10, 11, 12
Male: 58 Female: 0
Sections: 3
Class size: 14-22
Periods/week: 5
Minutes/week: 250

Text
American Technical Publishers

Course planning
Course of Study (1980)
1. General course objectives
2. Units of instruction
3. Classroom policies and procedures
4. Student evaluation policies
5. Names and addresses of suppliers
6. List of project ideas
7. Bibliography of references

Objectives
1. Students will develop safe work habits when using woodworking tools and machines.
2. Students will develop understanding and skills in the proper use of woodworking tools and machines.
3. Students will develop an understanding of the materials and methods used in working with wood.
4. Students will explore the occupational choices that are available in the woodworking and related trades.
5. Students will develop an appreciation of orderly procedures when working with wood.
6. Students will develop consumer knowledge about the purchase and use of wood products.

Course Content
Shop orientation and safety
Project planning
Design
Working drawings
Material selection
Dimension lumber
Firwood
Other wood products
Review of hand tool methods
Portable power tools
Table saw operations
Band saw operations
Jointer operations
Wood lathe operations
Drill press operations
Adhesives
Clamping and Glueing
Wood finishing
Abrasives
Stains and bleaches
Fillers
Finishes

Activities
Project
Each student selects, designs, and builds one or more cabinet making projects during the course. Several of these projects have received widespread recognition for their complexity and craftsmanship.
Woodworking II

Course Description
Woodworking II (1 year) An advanced course designed for those students who are interested in additional woodworking experience. Students are expected to demonstrate their wood skills by constructing more difficult and complex projects.

Enrollment
Grades: 11, 12
Male: 8 Female: 0
Sections: 1
Class size: 8
Periods/week: 5
Minutes/week: 250

Text
None. (Several references are used as needed.)

Course planning
The instructor works with each student to plan and schedule activities for the year.

Activities
Project
Each student constructs a project which displays a high degree of craftsmanship. The class has produced grand prize winners at the Industrial Arts Awards Contest during the past five years.
APPENDIX B: LETTERS TO HIGH SCHOOL TEACHERS,
PRINCIPALS, INDUSTRIAL ARTS SUPERVISORS
AND TEACHER EDUCATORS
March 14, 1984  
Northwest Missouri State University  
Maryville, Missouri 64468

Dear Industrial Arts Teacher Educator,

As a Ph. D. candidate in Industrial Education at Iowa State University, I am conducting a study to investigate the degree to which selected Industrial Arts Standards can be used to detect differences in the quality of industrial arts programs. The purpose of this study is to provide additional information about industrial arts evaluation and to discover if the Standards can be used to obtain uniform ratings when they are used to evaluate industrial arts programs.

As a professional educator, you are involved in the on-going process of evaluating and modifying educational programs. Therefore, I am requesting your participation in this research.

If you are willing to participate in this study, you will receive the following material by return mail:

1. A nine item questionnaire requesting information about your educational and work background, position, teaching load, and size of school where you are currently employed.

2. A written description of a high school industrial arts program of less than 20 pages in length.

3. A list of 30 Industrial Arts Standards to use for evaluating the written program.

Every effort has been made to minimize the time needed for response. Approximately 1 hour of your time will be needed to read and evaluate the material. An abstract of the study results will be mailed to participants who request them.

The information collected will be for research purposes only. Neither individual participants nor their responses will be identified in the report.

Please indicate your willingness to participate by completing the enclosed form and returning it in the stamped self-addressed envelope.

Thank you.

Sincerely,

Tony McEvoy  
Doctoral Candidate  
Industrial Education and Technology

Dr. William D. Wolansky  
Professor of Industrial Education and Coordinator of International Education Programs, College of Education  
Iowa State University, Ames, Iowa
April 5, 1984
Northwest Missouri State University
Maryville, Missouri 64468

Dear Industrial Arts Teacher,

As a Ph. D. candidate in Industrial Education at Iowa State University, I am conducting a study to investigate the degree to which selected Industrial Arts Standards can be used to detect differences in the quality of industrial arts programs. The purpose of this study is to provide additional information about industrial arts evaluation and to discover if the Standards can be used to obtain uniform ratings when they are used to evaluate industrial arts programs.

As a professional educator you are involved in the on-going process of evaluating and modifying educational programs. Therefore, I am requesting your participation in this research.

If you are willing to participate in this study, you will receive the following material by return mail:

1. A nine item questionnaire requesting information about your educational and work background, position, teaching load, and size of school where you are currently employed.

2. A written description of a high school industrial arts program of less than 20 pages in length.

3. A list of 30 Industrial Arts Standards to use for evaluating the written program.

Every effort has been made to minimize the time needed for response. Approximately 1 hour of your time will be needed to read and evaluate the material. An abstract of the study results will be mailed to participants who request them.

The information collected will be for research purposes only. Neither individual participants nor their responses will be identified in the report.

Please indicate your willingness to participate by completing the enclosed form and returning it in the stamped self-addressed envelope.

Thank you.

Sincerely,

Tony McEvoy
Doctoral Candidate
Industrial Education and Technology

Dr. William D. Wolansky
Professor of Industrial Education and Coordinator of International Education Programs, College of Education
Iowa State University, Ames, Iowa
March 14, 1984
Northwest Missouri State University
Maryville, Missouri 64468

Dear Principal,

As a Ph. D. candidate in Industrial Education at Iowa State University, I am conducting a study to investigate the degree to which selected Industrial Arts Standards can be used to detect differences in the quality of industrial arts programs. The purpose of this study is to provide additional information about industrial arts evaluation and to discover if the Standards can be used to obtain uniform ratings when they are used to evaluate industrial arts programs.

As a professional educator, you are involved in the on-going process of evaluating and modifying educational programs. Therefore, I am requesting your participation in this research.

If you are willing to participate in this study, you will receive the following material by return mail:

1. A nine item questionnaire requesting information about your educational and work background, position, teaching load, and size of school where you are currently employed.

2. A written description of a high school industrial arts program of less than 20 pages in length.

3. A list of 30 Industrial Arts Standards to use for evaluating the written program.

Every effort has been made to minimize the time needed for response. Approximately 1 hour of your time will be needed to read and evaluate the material. An abstract of the study results will be mailed to participants who request them.

The information collected will be for research purposes only. Neither individual participants nor their responses will be identified in the report.

Please indicate your willingness to participate by completing the enclosed form and returning it in the stamped self-addressed envelope.

Thank you.

Sincerely,

Tony McEvoy
Doctoral Candidate
Industrial Education and Technology

Dr. William D. Wolansky
Professor of Industrial Education and Coordinator of International Education Programs, College of Education
Iowa State University, Ames, Iowa
March 14, 1984
Northwest Missouri State University
Maryville, Missouri 64468

Dear Industrial Arts Supervisor,

As a Ph. D. candidate in Industrial Education at Iowa State University, I am conducting a study to investigate the degree to which selected Industrial Arts Standards can be used to detect differences in the quality of industrial arts programs. The purpose of this study is to provide additional information about industrial arts evaluation and to discover if the Standards can be used to obtain uniform ratings when they are used to evaluate industrial arts programs.

As a professional educator, you are involved in the on-going process of evaluating and modifying educational programs. Therefore, I am requesting your participation in this research.

If you are willing to participate in this study, you will receive the following material by return mail:

1. A nine item questionnaire requesting information about your educational and work background, position, teaching load, and size of school where you are currently employed.

2. A written description of a high school industrial arts program of less than 20 pages in length.

3. A list of 30 Industrial Arts Standards to use for evaluating the written program.

Every effort has been made to minimize the time needed for response. Approximately 1 hour of your time will be needed to read and evaluate the material. An abstract of the study results will be mailed to participants who request them.

The information collected will be for research purposes only. Neither individual participants nor their responses will be identified in the report.

Please indicate your willingness to participate by completing the enclosed form and returning it in the stamped self-addressed envelope.

Thank you.

Sincerely,

Tony McEvoy
Doctoral Candidate
Industrial Education and Technology

Dr. William D. Wolansky
Professor of Industrial Education and Coordinator of International Education Programs, College of Education
Iowa State University, Ames, Iowa
APPENDIX C: RETURN FORM
_____ I will be able to participate in the research.

_____ I would like to have an abstract of the results.

Please indicate any corrections needed on the mailing label.

_____ I will not be able to participate.
APPENDIX D: QUESTIONNAIRE AND STANDARDS
RATING INSTRUMENT
INDUSTRIAL ARTS STANDARDS RESEARCH QUESTIONNAIRE

Thank you for agreeing to participate in this research.

The purpose of this research is to determine whether selected Industrial Arts Standards can detect differences in program quality. You are asked to evaluate the written program description using the enclosed Standards as the criteria for making the evaluation.

The information collected with this instrument is for research purposes only. Neither individual participants nor their responses will be identified in the report.

The study will benefit the profession by providing information about the usefulness of the Standards for assessing the quality of industrial arts programs.

If you have any questions concerning this research project, please contact me:

Mr. Tony McEvoy
Industrial Arts Dept.
Northwest Missouri State Univ.
Maryville, Missouri 64468

Phone (816) 562-1191

I would appreciate receiving your data within the next three weeks.

Thanks again!

Please respond to the 9 items listed below and return this instrument to the researcher.

1. Sex: Male___ Female___

2. Degree status
   ___less than B.S. (A.A.)
   ___B.S. Major: ____________
   ___M.S.
   ___Specialists
   ___Ph. D.

3. Please indicate your present position
   ___High school teacher
   ___High school administrator
   ___Industrial arts supervisor
   ___Industrial arts teacher educator

4. What is the total time that you have served as a teacher, administrator, and/or supervisor? ___year(s)
5. How long have you been employed in your present teaching, administrative, or supervisory position. ___year(s)

6. How many industrial arts courses are you teaching during the current semester?
   0 1 2 3 4 5 6 7 more than 7

7. Please indicate the industrial arts courses that you are presently teaching.

<table>
<thead>
<tr>
<th>Graphic Communications</th>
<th>Industrial Materials and Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Drafting</td>
<td>General Shop</td>
</tr>
<tr>
<td>Architectural Drafting</td>
<td>Woodworking</td>
</tr>
<tr>
<td>Graphic Arts</td>
<td>General Metals</td>
</tr>
<tr>
<td>Photography</td>
<td>Machine Tools</td>
</tr>
<tr>
<td>Other</td>
<td>Welding</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
</tr>
<tr>
<td>Energy and Power</td>
<td>Crafts</td>
</tr>
<tr>
<td>Electricity</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>Electronics</td>
<td>Plastics</td>
</tr>
<tr>
<td>Power</td>
<td>Other</td>
</tr>
<tr>
<td>Auto Mechanics</td>
<td></td>
</tr>
<tr>
<td>Fluid Power</td>
<td></td>
</tr>
<tr>
<td>Pneumatics</td>
<td></td>
</tr>
<tr>
<td>Computer Tech.</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

8. What is the enrollment of the:
   High school in which you teach. ____ students
   What grades: 7 8 9 10 11 12
   College or university in which you teach.
   ____ students
   High school(s) under your supervision. ____ students

9. Have you ever been employed in business or industry?
   ____ yes   How long? ____ years. ____ months.
   ____ no
STANDARDS STATEMENTS*

Directions: Please assess the enclosed program description by indicating whether it falls below, meets, or exceeds the Standard by marking the appropriate symbol to the left of each Standard. In some instances, the program description may not provide enough information for forming an accurate evaluation. Please use your best judgment and mark each of the Standards, if possible. If you feel that you cannot reach a decision based on the information provided, leave the symbols for that Standard blank.

Example:

Below Standard

Meet Standard

Exceeds Standard

Written program description does not provide enough information for forming a judgment.

Standard Topic 1

Philosophy

The statements contained within this standard topic concern the philosophy of an industrial arts program. A philosophy is a statement of fundamental beliefs which reflect a value system. It serves as a foundation and framework for all elements of a program.

Standard Statement

A current, comprehensive, and written philosophy statement is available and influences thought and action for industrial arts.

1.1 Development

A philosophical statement for including industrial arts as an integral part of the total school curriculum is developed.

1. The philosophical statement is developed as a joint effort of a number of contributors.

Parents, business and industry representatives, and other consultants are involved in the development of the philosophical statement.

The philosophical statement is consistent with local, state, and national philosophies of education and of industrial arts.

The philosophy describes the industrial and technological nature of society in the past, present, and future.

The philosophy identifies the needs, abilities, and interests of all learners, regardless of race, sex, creed, national origin, or handicapping conditions.

*Standards for Industrial Arts Programs Project at Virginia Polytechnic Institute and State University Industrial Arts Programs. Project No. 49SAH80061. Contract No. 300-78-1565 with the U.S. Dept. of Educ.
The philosophy addresses the value of industrial arts including industrial and technological literacy; career orientation, exploration, and preparation; avocational activities; economic concepts; consumer skills; creative talents; personal and social growth; and problem solving skills.

The philosophy focuses upon the broad categories of communication, construction, manufacturing, and transportation at all educational levels.

Standard Topic 2

The statements contained within this standard topic concern the instructional program. This program, which reflects the stated philosophy, provides a wide variety of organized experiences for all students. These experiences assist learners in reaching predetermined goals.

Standard Statement
The instructional program reflects the stated industrial arts philosophy through experiences designed to meet the needs of all students.

2.1 Goals
Program goals are established from the stated philosophy to provide direction for program development, implementation, and evaluation.

1. The program goals encompass the major purposes of industrial arts.

   Emphasis is placed upon preparing students for entry into advanced trade and industrial, technical, or other advanced education programs.

   Emphasis is placed upon developing student problem-solving and decision-making abilities involving industrial materials, processes, and products.

   Emphasis is placed upon reinforcing the basic skills and interrelating the content of industrial arts with other school subjects.

2.3 Content
Course content reflects the intent of the course objectives.

   Course content is selected to provide for all students.

   Courses in the industrial arts program are sequential, beginning with broad orientation and exploration of subject matter areas, followed by specialized experiences.

   Course content represents the state of the art in industry and technology.
Standard Topic 3

Student Populations Served
The statements contained within this standard topic concern the student populations served. The industrial arts program may serve all persons, pre-school through adult. Accommodations in the program are made for students with special needs.

Standard Statement
All students, regardless of their race, sex, creed, national origin, or special needs are admitted to and served by the industrial arts program.

3.1 Individual Differences

\[ \n\begin{align*}
\checkmark & \quad \Delta & \text{All students, regardless of their abilities and needs, are served by the industrial arts program.} \\
\checkmark & \quad \Delta & \text{All students are provided a variety of effective and meaningful learning experiences commensurate with industrial arts program goals and course objectives.} \\
\checkmark & \quad \Delta & \text{Students identified as handicapped and requiring additional or modified educational services or materials are enrolled only after the Individualized Education Program (IEP) has been prepared.} \\
\checkmark & \quad \Delta & \text{Students identified as gifted and/or talented are provided learning activities consistent with their abilities.}
\end{align*} \\
\]

3.2 Sex Equity
Industrial arts is provided equitably for females as well as males.

\[ \n\begin{align*}
\checkmark & \quad \Delta & \text{Females, as well as males, are encouraged to enroll in industrial arts courses.} \\
\checkmark & \quad \Delta & \text{Industrial arts activities are provided for all students on a sex-fair basis.}
\end{align*} \\
\]

Standard Topic 4

Instructional Staff
The statements contained within this standard topic concern the instructional staff of an industrial arts program. The instructional staff responsible for teaching industrial arts provides the essential component for a quality program. Staff members should meet the highest standards of professional and technical competence.

Standard Statement
The instructional staff is both professionally and technically competent to provide students with a quality, comprehensive industrial arts program.
The industrial arts teacher is competent in planning, organizing, directing, and evaluating activities in the industrial arts program.

The industrial arts teacher is technically competent in the assigned teaching area(s).

The industrial arts teacher is prepared, through preservice/inservice education, to provide experiences for students with special needs.

The industrial arts teacher is prepared, through preservice/inservice education, to organize and operate a local AIASA chapter.

4.2 Professional Responsibilities
The industrial arts teacher fulfills the roles and responsibilities of a professional educator.

The industrial arts teacher is a member of and actively participates in professional and technical organizations related to industrial arts.

The industrial arts teacher serves as an active member of the school instructional staff, sharing in decision-making processes and participating in program promotion and staff development.

Standard Topic 5

Administration and Supervision
The statements contained within this standard topic concern the administration and supervision of an industrial arts program. Administrators and supervisors provide management of and direction for the program. These personnel perform leadership functions that ensure attainment of all program goals.

Standard Statement
Administration and supervision are provided at all levels to ensure a well managed and comprehensive industrial arts program.

5.2 Planning and Organizing
A system is provided which ensures program direction, short and long range planning, organization, and administration for program operation and improvement.

Provisions are made for teachers to review, develop, and adapt curriculum and instructional materials which are compatible with local and state industrial arts guidelines.

Supervisors and teachers cooperatively develop specifications for industrial arts equipment and resource materials.
5.3 Budgeting
A budgeting system is utilized to ensure the identification and procurement of all resources essential for the accomplishment of program goals and course objectives, consistent with student enrollment and unique student needs.

V O A Funds are budgeted for purchase of equipment to accomplish course objectives.

5.6 Communicating
Communications is maintained among faculty, administrative personnel, students, and the community.

V O A Effective, open communication pertaining to all elements in the instructional program is established and utilized consistently among industrial arts faculty and school staff.

V O A Effective, open communication pertaining to all elements in the instructional program is established and utilized consistently among administrators, school board members, supervisors, advisory committees, and faculty.

V O A Effective, open communication pertaining to all elements in the instructional program is established and utilized consistently among students, parents, and faculty.

THANK YOU FOR TAKING TIME TO PARTICIPATE IN THIS RESEARCH. PLEASE RETURN THE QUESTIONNAIRE AND THE STANDARDS (BLUE PAGES) IN THE STAMPED ENVELOPE AS SOON AS POSSIBLE.
APPENDIX E: LISTING OF INTERCORRELATIONS
Table E.1. Listing of intercorrelations

<table>
<thead>
<tr>
<th></th>
<th>Prog 1</th>
<th>Prog 2</th>
<th>Role 1</th>
<th>Role 2</th>
<th>Role 3</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prog 1</td>
<td>1.000</td>
<td>-0.511</td>
<td>-0.033</td>
<td>0.007</td>
<td>0.161</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.66</td>
<td>0.91</td>
<td>0.31</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Prog 2</td>
<td>-0.511</td>
<td>1.000</td>
<td>-0.017</td>
<td>0.015</td>
<td>-0.048</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.82</td>
<td>0.83</td>
<td>0.52</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Role 1</td>
<td>-0.033</td>
<td>-0.017</td>
<td>1.000</td>
<td>-0.300</td>
<td>-0.319</td>
<td>-0.483</td>
</tr>
<tr>
<td></td>
<td>0.66</td>
<td>0.82</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Role 2</td>
<td>0.007</td>
<td>0.015</td>
<td>-0.300</td>
<td>1.000</td>
<td>-0.191</td>
<td>0.072</td>
</tr>
<tr>
<td></td>
<td>0.91</td>
<td>0.83</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Role 3</td>
<td>0.161</td>
<td>-0.048</td>
<td>-0.319</td>
<td>-0.191</td>
<td>1.000</td>
<td>-0.087</td>
</tr>
<tr>
<td></td>
<td>0.03</td>
<td>0.52</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Degree</td>
<td>0.001</td>
<td>0.001</td>
<td>0.483</td>
<td>0.072</td>
<td>-0.087</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>0.98</td>
<td>0.98</td>
<td>0.00</td>
<td>0.33</td>
<td>0.24</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.118</td>
<td>-0.064</td>
<td>-0.239</td>
<td>0.124</td>
<td>0.101</td>
<td>0.214</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>0.39</td>
<td>0.00</td>
<td>0.09</td>
<td>0.17</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Yrs P</td>
<td>-0.111</td>
<td>-0.002</td>
<td>0.061</td>
<td>-0.194</td>
<td>-0.015</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.97</td>
<td>0.41</td>
<td>0.00</td>
<td>0.83</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Enrol</td>
<td>-0.114</td>
<td>0.086</td>
<td>0.352</td>
<td>-0.220</td>
<td>0.047</td>
<td>0.437</td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>0.27</td>
<td>0.00</td>
<td>0.00</td>
<td>0.55</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>-0.109</td>
<td>0.148</td>
<td>0.042</td>
<td>-0.126</td>
<td>-0.003</td>
<td>-0.042</td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>0.04</td>
<td>0.57</td>
<td>0.09</td>
<td>0.96</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Area 1</td>
<td>-0.103</td>
<td>0.011</td>
<td>-0.180</td>
<td>-0.077</td>
<td>-0.057</td>
<td>0.146</td>
</tr>
<tr>
<td></td>
<td>0.23</td>
<td>0.89</td>
<td>0.03</td>
<td>0.37</td>
<td>0.51</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>Yrs T</td>
<td>Yrs P</td>
<td>Enrol</td>
<td>Ind Exp</td>
<td>Area 1</td>
<td>Area 2</td>
<td>Area 3</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>-0.118</td>
<td>-0.111</td>
<td>-0.114</td>
<td>-0.109</td>
<td>-0.103</td>
<td>-0.010</td>
<td>-0.023</td>
</tr>
<tr>
<td>0.11</td>
<td>0.13</td>
<td>0.14</td>
<td>0.14</td>
<td>0.23</td>
<td>0.90</td>
<td>0.79</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
</tbody>
</table>

| -0.064 | -0.002 | 0.086 | 0.148 | 0.011 | 0.072 | 0.065 |
| 0.39 | 0.97 | 0.27 | 0.04 | 0.89 | 0.41 | 0.45 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 0.239 | 0.061 | -0.352 | 0.042 | -0.180 | -0.059 | -0.027 |
| 0.00 | 0.41 | 0.00 | 0.57 | 0.03 | 0.49 | 0.75 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 0.124 | -0.194 | -0.220 | -0.126 | -0.077 | -0.048 | -0.015 |
| 0.09 | 0.00 | 0.00 | 0.09 | 0.37 | 0.58 | 0.85 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 0.101 | -0.015 | 0.047 | -0.003 | -0.057 | 0.026 | 0.049 |
| 0.17 | 0.83 | 0.55 | 0.96 | 0.51 | 0.76 | 0.57 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 0.214 | 0.011 | 0.437 | -0.042 | 0.146 | 0.090 | -0.035 |
| 0.00 | 0.87 | 0.00 | 0.57 | 0.09 | 0.30 | 0.68 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 1.000 | 0.681 | 0.112 | -0.045 | 0.039 | 0.013 | -0.048 |
| 0.00 | 0.00 | 0.15 | 0.54 | 0.65 | 0.87 | 0.58 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 0.681 | 1.000 | 0.017 | 0.039 | 0.084 | -0.019 | 0.023 |
| 0.00 | 0.00 | 0.82 | 0.99 | 0.33 | 0.82 | 0.78 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 0.112 | 0.017 | 1.000 | 0.178 | 0.199 | 0.038 | 0.071 |
| 0.15 | 0.82 | 0.00 | 0.02 | 0.02 | 0.66 | 0.42 |
| 160 | 160 | 160 | 160 | 128 | 128 | 128 |

| -0.045 | -0.039 | 0.178 | 1.000 | 0.075 | 0.063 | 0.016 |
| 0.54 | 0.59 | 0.02 | 0.00 | 0.38 | 0.47 | 0.84 |
| 177 | 177 | 160 | 177 | 131 | 131 | 131 |

| 0.039 | 0.084 | 0.199 | 0.075 | 1.000 | -0.118 | -0.279 |
| 0.65 | 0.33 | 0.02 | 0.38 | 0.00 | 0.17 | 0.00 |
| 131 | 131 | 128 | 131 | 131 | 131 | 131 |
Table E.1. Continued

<table>
<thead>
<tr>
<th></th>
<th>Prog 1</th>
<th>Prog 2</th>
<th>Role 1</th>
<th>Role 2</th>
<th>Role 3</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area 2</td>
<td>-0.010</td>
<td>0.072</td>
<td>-0.059</td>
<td>-0.048</td>
<td>0.026</td>
<td>0.090</td>
</tr>
<tr>
<td></td>
<td>0.90</td>
<td>0.41</td>
<td>0.49</td>
<td>0.85</td>
<td>0.76</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>Area 3</td>
<td>0.023</td>
<td>0.065</td>
<td>-0.027</td>
<td>-0.015</td>
<td>0.049</td>
<td>-0.035</td>
</tr>
<tr>
<td></td>
<td>0.79</td>
<td>0.45</td>
<td>0.75</td>
<td>0.85</td>
<td>0.57</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P1 R1</td>
<td>0.474</td>
<td>-0.242</td>
<td>0.504</td>
<td>-0.151</td>
<td>-0.161</td>
<td>-0.241</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.04</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P1 R2</td>
<td>0.325</td>
<td>-0.166</td>
<td>-0.173</td>
<td>0.576</td>
<td>-0.110</td>
<td>0.097</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.02</td>
<td>0.02</td>
<td>0.00</td>
<td>0.14</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P1 R3</td>
<td>0.418</td>
<td>-0.214</td>
<td>-0.222</td>
<td>-0.133</td>
<td>0.697</td>
<td>-0.054</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.07</td>
<td>0.00</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P2 R1</td>
<td>-0.253</td>
<td>0.494</td>
<td>0.475</td>
<td>-0.142</td>
<td>-0.152</td>
<td>-0.222</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.05</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P2 R2</td>
<td>-0.174</td>
<td>0.340</td>
<td>-0.163</td>
<td>0.545</td>
<td>-0.104</td>
<td>-0.056</td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>0.00</td>
<td>0.02</td>
<td>0.00</td>
<td>0.16</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P2 R3</td>
<td>-0.163</td>
<td>0.319</td>
<td>-0.153</td>
<td>-0.092</td>
<td>0.481</td>
<td>-0.025</td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>0.00</td>
<td>0.04</td>
<td>0.22</td>
<td>0.00</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P1 A1</td>
<td>0.270</td>
<td>-0.136</td>
<td>-0.017</td>
<td>-0.035</td>
<td>0.083</td>
<td>-0.126</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.11</td>
<td>0.84</td>
<td>0.68</td>
<td>0.34</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P1 A2</td>
<td>0.208</td>
<td>-0.105</td>
<td>-0.033</td>
<td>-0.027</td>
<td>-0.046</td>
<td>0.143</td>
</tr>
<tr>
<td></td>
<td>0.01</td>
<td>0.23</td>
<td>0.70</td>
<td>0.75</td>
<td>0.59</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P1 A3</td>
<td>0.470</td>
<td>-0.237</td>
<td>0.039</td>
<td>0.061</td>
<td>0.073</td>
<td>-0.048</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.65</td>
<td>0.48</td>
<td>0.40</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>Yrs T</td>
<td>Yrs P</td>
<td>Enrol</td>
<td>Ind Exp</td>
<td>Area 1</td>
<td>Area 2</td>
<td>Area 3</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>0.013</td>
<td>-0.019</td>
<td>0.038</td>
<td>0.063</td>
<td>-0.118</td>
<td>1.000</td>
<td>-0.173</td>
</tr>
<tr>
<td>0.87</td>
<td>0.82</td>
<td>0.66</td>
<td>0.47</td>
<td>0.17</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.048</td>
<td>0.023</td>
<td>0.071</td>
<td>0.016</td>
<td>-0.279</td>
<td>-0.173</td>
<td>1.000</td>
</tr>
<tr>
<td>0.58</td>
<td>0.78</td>
<td>0.42</td>
<td>0.84</td>
<td>0.00</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.253</td>
<td>-0.073</td>
<td>-0.170</td>
<td>0.047</td>
<td>-0.069</td>
<td>-0.031</td>
<td>-0.056</td>
</tr>
<tr>
<td>0.00</td>
<td>0.33</td>
<td>0.03</td>
<td>0.52</td>
<td>0.42</td>
<td>0.72</td>
<td>0.52</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.046</td>
<td>-0.096</td>
<td>-0.131</td>
<td>-0.057</td>
<td>-0.054</td>
<td>-0.033</td>
<td>-0.079</td>
</tr>
<tr>
<td>0.53</td>
<td>0.20</td>
<td>0.09</td>
<td>0.44</td>
<td>0.53</td>
<td>0.70</td>
<td>0.36</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.020</td>
<td>-0.073</td>
<td>-0.008</td>
<td>-0.047</td>
<td>0.003</td>
<td>-0.059</td>
<td>0.020</td>
</tr>
<tr>
<td>0.78</td>
<td>0.33</td>
<td>0.91</td>
<td>0.53</td>
<td>0.96</td>
<td>0.49</td>
<td>0.81</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.098</td>
<td>0.037</td>
<td>-0.170</td>
<td>-0.003</td>
<td>-0.044</td>
<td>0.074</td>
<td>-0.046</td>
</tr>
<tr>
<td>0.19</td>
<td>0.61</td>
<td>0.03</td>
<td>0.95</td>
<td>0.61</td>
<td>0.39</td>
<td>0.59</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.007</td>
<td>-0.097</td>
<td>-0.129</td>
<td>0.094</td>
<td>-0.038</td>
<td>-0.023</td>
<td>0.137</td>
</tr>
<tr>
<td>0.92</td>
<td>0.19</td>
<td>0.10</td>
<td>0.20</td>
<td>0.66</td>
<td>0.78</td>
<td>0.11</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.074</td>
<td>0.059</td>
<td>0.106</td>
<td>0.067</td>
<td>-0.077</td>
<td>-0.048</td>
<td>0.082</td>
</tr>
<tr>
<td>0.32</td>
<td>0.42</td>
<td>0.18</td>
<td>0.37</td>
<td>0.37</td>
<td>0.58</td>
<td>0.35</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.016</td>
<td>0.018</td>
<td>-0.061</td>
<td>0.014</td>
<td>0.455</td>
<td>0.054</td>
<td>-0.127</td>
</tr>
<tr>
<td>0.84</td>
<td>0.83</td>
<td>0.49</td>
<td>0.87</td>
<td>0.00</td>
<td>0.53</td>
<td>0.14</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.052</td>
<td>0.030</td>
<td>0.039</td>
<td>0.058</td>
<td>-0.066</td>
<td>0.563</td>
<td>-0.097</td>
</tr>
<tr>
<td>0.55</td>
<td>0.72</td>
<td>0.65</td>
<td>0.50</td>
<td>0.44</td>
<td>0.00</td>
<td>0.26</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.186</td>
<td>-0.107</td>
<td>-0.014</td>
<td>-0.123</td>
<td>-0.151</td>
<td>0.093</td>
<td>0.541</td>
</tr>
<tr>
<td>0.03</td>
<td>0.22</td>
<td>0.87</td>
<td>0.16</td>
<td>0.08</td>
<td>0.28</td>
<td>0.00</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
</tbody>
</table>
Table E.1. Continued

<table>
<thead>
<tr>
<th></th>
<th>Prog 1</th>
<th>Prog 2</th>
<th>Role 1</th>
<th>Role 2</th>
<th>Role 3</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2 A1</td>
<td>-0.174</td>
<td>0.345</td>
<td>-0.075</td>
<td>-0.042</td>
<td>-0.071</td>
<td>0.182</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
<td>0.00</td>
<td>0.39</td>
<td>0.63</td>
<td>0.41</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P2 A2</td>
<td>-0.130</td>
<td>0.258</td>
<td>0.020</td>
<td>-0.031</td>
<td>-0.053</td>
<td>0.032</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.00</td>
<td>0.81</td>
<td>0.72</td>
<td>0.54</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P2 A3</td>
<td>-0.254</td>
<td>0.530</td>
<td>-0.109</td>
<td>0.082</td>
<td>0.073</td>
<td>-0.026</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.21</td>
<td>0.35</td>
<td>0.40</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P1 D</td>
<td>0.933</td>
<td>-0.477</td>
<td>-0.131</td>
<td>0.045</td>
<td>0.124</td>
<td>0.211</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.08</td>
<td>0.54</td>
<td>0.09</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P2 D</td>
<td>-0.479</td>
<td>0.936</td>
<td>-0.107</td>
<td>-0.007</td>
<td>-0.054</td>
<td>0.194</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.15</td>
<td>0.92</td>
<td>0.47</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
</tbody>
</table>

Pearson Correlation Coefficients
Prob IRI under HO:RHO = 0
Number of observations

Definition of terms:
P Program level
R Evaluator's professional role
D Evaluator's degree status
Yrs T Evaluator's years of professional experience
Yrs P Length of evaluator's tenure in present position
Enrol Enrollment of the school(s) where evaluator was teaching and/or supervising
Ind Exp Years of industrial experience
A Area of teaching or administrative expertise
<table>
<thead>
<tr>
<th>Yrs T</th>
<th>Yrs P</th>
<th>Enrol</th>
<th>Ind Exp</th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.024</td>
<td>-0.007</td>
<td>0.157</td>
<td>0.103</td>
<td>0.543</td>
<td>-0.064</td>
<td>-0.151</td>
</tr>
<tr>
<td>0.77</td>
<td>0.93</td>
<td>0.07</td>
<td>0.24</td>
<td>0.00</td>
<td>0.46</td>
<td>0.08</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.088</td>
<td>-0.093</td>
<td>0.028</td>
<td>0.008</td>
<td>-0.077</td>
<td>0.653</td>
<td>-0.113</td>
</tr>
<tr>
<td>0.31</td>
<td>0.28</td>
<td>0.75</td>
<td>0.92</td>
<td>0.37</td>
<td>0.00</td>
<td>0.19</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.113</td>
<td>0.101</td>
<td>0.110</td>
<td>0.185</td>
<td>-0.151</td>
<td>-0.093</td>
<td>0.541</td>
</tr>
<tr>
<td>0.19</td>
<td>0.24</td>
<td>0.21</td>
<td>0.03</td>
<td>0.08</td>
<td>0.28</td>
<td>0.00</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>128</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.033</td>
<td>-0.083</td>
<td>-0.046</td>
<td>-0.118</td>
<td>-0.138</td>
<td>0.045</td>
<td>-0.000</td>
</tr>
<tr>
<td>0.65</td>
<td>0.27</td>
<td>0.55</td>
<td>0.11</td>
<td>0.11</td>
<td>0.60</td>
<td>0.99</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.042</td>
<td>-0.007</td>
<td>0.173</td>
<td>0.174</td>
<td>0.079</td>
<td>0.077</td>
<td>0.041</td>
</tr>
<tr>
<td>0.57</td>
<td>0.92</td>
<td>0.02</td>
<td>0.02</td>
<td>0.36</td>
<td>0.37</td>
<td>0.64</td>
</tr>
<tr>
<td>177</td>
<td>177</td>
<td>160</td>
<td>177</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
</tbody>
</table>
Table E.1. Continued

<table>
<thead>
<tr>
<th></th>
<th>P1 R1</th>
<th>P1 R2</th>
<th>P1 R3</th>
<th>P2 R1</th>
<th>P2 R2</th>
<th>P2 R3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prog 1</td>
<td>0.474</td>
<td>0.325</td>
<td>0.418</td>
<td>-0.253</td>
<td>-0.174</td>
<td>-0.163</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Prog 2</td>
<td>-0.242</td>
<td>-0.166</td>
<td>-0.214</td>
<td>0.494</td>
<td>0.340</td>
<td>0.319</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Role 1</td>
<td>0.504</td>
<td>-0.173</td>
<td>-0.222</td>
<td>0.475</td>
<td>-0.163</td>
<td>-0.153</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Role 2</td>
<td>-0.151</td>
<td>0.576</td>
<td>0.133</td>
<td>-0.142</td>
<td>0.545</td>
<td>-0.092</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
<td>0.00</td>
<td>0.07</td>
<td>0.05</td>
<td>0.00</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Role 3</td>
<td>-0.161</td>
<td>-0.110</td>
<td>0.697</td>
<td>-0.152</td>
<td>-0.104</td>
<td>0.481</td>
</tr>
<tr>
<td></td>
<td>0.03</td>
<td>0.14</td>
<td>0.00</td>
<td>0.04</td>
<td>0.16</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Degree</td>
<td>-0.241</td>
<td>0.097</td>
<td>-0.054</td>
<td>-0.222</td>
<td>-0.056</td>
<td>-0.025</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.19</td>
<td>0.46</td>
<td>0.00</td>
<td>0.045</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.253</td>
<td>0.046</td>
<td>0.020</td>
<td>-0.098</td>
<td>0.007</td>
<td>0.074</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.53</td>
<td>0.78</td>
<td>0.19</td>
<td>0.92</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Yrs P</td>
<td>-0.073</td>
<td>-0.096</td>
<td>-0.073</td>
<td>0.037</td>
<td>-0.097</td>
<td>0.059</td>
</tr>
<tr>
<td></td>
<td>0.33</td>
<td>0.20</td>
<td>0.33</td>
<td>0.61</td>
<td>0.19</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Enrol</td>
<td>-0.170</td>
<td>-0.131</td>
<td>-0.008</td>
<td>-0.170</td>
<td>-0.129</td>
<td>0.106</td>
</tr>
<tr>
<td></td>
<td>0.03</td>
<td>0.09</td>
<td>0.91</td>
<td>0.03</td>
<td>0.10</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>0.047</td>
<td>-0.057</td>
<td>-0.047</td>
<td>-0.003</td>
<td>-0.094</td>
<td>0.067</td>
</tr>
<tr>
<td></td>
<td>0.52</td>
<td>0.44</td>
<td>0.53</td>
<td>0.95</td>
<td>0.20</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Area 1</td>
<td>-0.069</td>
<td>-0.054</td>
<td>0.003</td>
<td>-0.044</td>
<td>-0.038</td>
<td>-0.077</td>
</tr>
<tr>
<td></td>
<td>0.42</td>
<td>0.53</td>
<td>0.906</td>
<td>0.61</td>
<td>0.66</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>P1 A1</td>
<td>P1 A2</td>
<td>P1 A3</td>
<td>P2 A1</td>
<td>P2 A2</td>
<td>P2 A3</td>
</tr>
<tr>
<td>---</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>0.270</td>
<td>0.208</td>
<td>0.470</td>
<td>-0.174</td>
<td>-0.130</td>
<td>-0.254</td>
<td>0.933</td>
</tr>
<tr>
<td>0.131</td>
<td>0.23</td>
<td>0.00</td>
<td>0.04</td>
<td>0.13</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>-0.136</td>
<td>-0.105</td>
<td>-0.237</td>
<td>0.345</td>
<td>0.258</td>
<td>0.503</td>
<td>-0.477</td>
</tr>
<tr>
<td>0.00</td>
<td>0.23</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>-0.017</td>
<td>-0.033</td>
<td>0.039</td>
<td>-0.075</td>
<td>0.020</td>
<td>-0.109</td>
<td>-0.131</td>
</tr>
<tr>
<td>0.84</td>
<td>0.70</td>
<td>0.65</td>
<td>0.39</td>
<td>0.81</td>
<td>0.21</td>
<td>0.08</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.035</td>
<td>-0.027</td>
<td>-0.061</td>
<td>-0.042</td>
<td>-0.031</td>
<td>0.082</td>
<td>0.045</td>
</tr>
<tr>
<td>0.68</td>
<td>0.75</td>
<td>0.48</td>
<td>0.63</td>
<td>0.72</td>
<td>0.35</td>
<td>0.54</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.083</td>
<td>-0.046</td>
<td>0.073</td>
<td>-0.071</td>
<td>-0.053</td>
<td>0.073</td>
<td>0.124</td>
</tr>
<tr>
<td>0.34</td>
<td>0.59</td>
<td>0.40</td>
<td>0.41</td>
<td>0.54</td>
<td>0.40</td>
<td>0.09</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.126</td>
<td>0.143</td>
<td>-0.048</td>
<td>0.182</td>
<td>0.032</td>
<td>-0.026</td>
<td>0.211</td>
</tr>
<tr>
<td>0.15</td>
<td>0.10</td>
<td>0.58</td>
<td>0.03</td>
<td>0.71</td>
<td>0.76</td>
<td>0.00</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.016</td>
<td>0.052</td>
<td>-0.186</td>
<td>-0.024</td>
<td>-0.088</td>
<td>-0.113</td>
<td>-0.033</td>
</tr>
<tr>
<td>0.84</td>
<td>0.55</td>
<td>0.03</td>
<td>0.77</td>
<td>0.31</td>
<td>0.19</td>
<td>0.65</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.018</td>
<td>0.030</td>
<td>-0.107</td>
<td>0.007</td>
<td>-0.093</td>
<td>0.101</td>
<td>-0.083</td>
</tr>
<tr>
<td>0.83</td>
<td>0.72</td>
<td>0.22</td>
<td>0.93</td>
<td>0.28</td>
<td>0.24</td>
<td>0.27</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.061</td>
<td>0.039</td>
<td>-0.014</td>
<td>0.157</td>
<td>0.028</td>
<td>0.110</td>
<td>-0.046</td>
</tr>
<tr>
<td>0.49</td>
<td>0.65</td>
<td>0.87</td>
<td>0.07</td>
<td>0.75</td>
<td>0.21</td>
<td>0.55</td>
</tr>
<tr>
<td>128</td>
<td>128</td>
<td>128</td>
<td>128</td>
<td>128</td>
<td>128</td>
<td>160</td>
</tr>
<tr>
<td>0.014</td>
<td>0.058</td>
<td>-0.123</td>
<td>0.103</td>
<td>0.008</td>
<td>0.185</td>
<td>-0.118</td>
</tr>
<tr>
<td>0.87</td>
<td>0.50</td>
<td>0.16</td>
<td>0.24</td>
<td>0.92</td>
<td>0.03</td>
<td>0.11</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.455</td>
<td>-0.066</td>
<td>-0.151</td>
<td>0.543</td>
<td>-0.077</td>
<td>-0.151</td>
<td>-0.138</td>
</tr>
<tr>
<td>0.00</td>
<td>0.44</td>
<td>0.08</td>
<td>0.00</td>
<td>0.37</td>
<td>0.08</td>
<td>0.11</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>P1 R1</td>
<td>P1 R2</td>
<td>P1 R3</td>
<td>P2 R1</td>
<td>P2 R2</td>
<td>P2 R3</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Area 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.031</td>
<td>-0.033</td>
<td>-0.059</td>
<td>0.074</td>
<td>-0.023</td>
<td>-0.048</td>
</tr>
<tr>
<td></td>
<td>0.72</td>
<td>0.70</td>
<td>0.49</td>
<td>0.39</td>
<td>0.78</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>0.056</td>
<td>-0.079</td>
<td>0.020</td>
<td>-0.046</td>
<td>0.137</td>
<td>0.082</td>
</tr>
<tr>
<td></td>
<td>0.52</td>
<td>0.36</td>
<td>0.81</td>
<td>0.59</td>
<td>0.12</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td><strong>P1 R1</strong></td>
<td>1.000</td>
<td>-0.087</td>
<td>-0.112</td>
<td>-0.120</td>
<td>-0.082</td>
<td>-0.077</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.24</td>
<td>0.13</td>
<td>0.11</td>
<td>0.27</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td><strong>P1 R2</strong></td>
<td>-0.087</td>
<td>1.000</td>
<td>-0.077</td>
<td>-0.082</td>
<td>-0.056</td>
<td>-0.053</td>
</tr>
<tr>
<td></td>
<td>0.24</td>
<td>0.00</td>
<td>0.30</td>
<td>0.27</td>
<td>0.45</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td><strong>P1 R3</strong></td>
<td>-0.112</td>
<td>-0.077</td>
<td>1.000</td>
<td>-0.106</td>
<td>-0.072</td>
<td>-0.068</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.30</td>
<td>0.00</td>
<td>0.16</td>
<td>0.33</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td><strong>P2 R1</strong></td>
<td>-0.120</td>
<td>-0.082</td>
<td>-0.106</td>
<td>1.000</td>
<td>-0.077</td>
<td>-0.073</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>0.27</td>
<td>0.16</td>
<td>0.00</td>
<td>0.30</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td><strong>P2 R2</strong></td>
<td>-0.082</td>
<td>-0.056</td>
<td>-0.072</td>
<td>-0.077</td>
<td>1.000</td>
<td>-0.050</td>
</tr>
<tr>
<td></td>
<td>0.27</td>
<td>0.45</td>
<td>0.33</td>
<td>0.30</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td><strong>P2 R3</strong></td>
<td>-0.077</td>
<td>-0.053</td>
<td>-0.068</td>
<td>-0.073</td>
<td>-0.050</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>0.30</td>
<td>0.48</td>
<td>0.36</td>
<td>0.33</td>
<td>0.50</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td><strong>P1 A1</strong></td>
<td>0.136</td>
<td>-0.024</td>
<td>0.146</td>
<td>-0.076</td>
<td>-0.017</td>
<td>-0.035</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>0.77</td>
<td>0.09</td>
<td>0.38</td>
<td>0.84</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td><strong>P1 A2</strong></td>
<td>0.076</td>
<td>-0.019</td>
<td>-0.033</td>
<td>-0.059</td>
<td>-0.013</td>
<td>-0.027</td>
</tr>
<tr>
<td></td>
<td>0.38</td>
<td>0.82</td>
<td>0.70</td>
<td>0.50</td>
<td>0.87</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td><strong>P1 A3</strong></td>
<td>0.334</td>
<td>-0.043</td>
<td>0.160</td>
<td>-0.133</td>
<td>-0.030</td>
<td>-0.061</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.62</td>
<td>0.06</td>
<td>0.12</td>
<td>0.73</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>P1 A1</td>
<td>P1 A2</td>
<td>P1 A3</td>
<td>P2 A1</td>
<td>P2 A2</td>
<td>P2 A3</td>
</tr>
<tr>
<td>-----</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>-0.054</td>
<td>0.563</td>
<td>-0.093</td>
<td>-0.064</td>
<td>0.653</td>
<td>-0.093</td>
<td>0.045</td>
</tr>
<tr>
<td>0.53</td>
<td>0.00</td>
<td>0.28</td>
<td>0.46</td>
<td>0.00</td>
<td>0.28</td>
<td>0.60</td>
</tr>
<tr>
<td>0.127</td>
<td>-0.097</td>
<td>0.541</td>
<td>-0.151</td>
<td>-0.113</td>
<td>-0.541</td>
<td>-0.001</td>
</tr>
<tr>
<td>0.11</td>
<td>0.26</td>
<td>0.00</td>
<td>0.08</td>
<td>0.19</td>
<td>0.00</td>
<td>0.99</td>
</tr>
<tr>
<td>0.136</td>
<td>0.076</td>
<td>0.334</td>
<td>-0.100</td>
<td>-0.075</td>
<td>-0.146</td>
<td>0.293</td>
</tr>
<tr>
<td>0.11</td>
<td>0.38</td>
<td>0.00</td>
<td>0.25</td>
<td>0.39</td>
<td>0.09</td>
<td>0.00</td>
</tr>
<tr>
<td>0.146</td>
<td>-0.033</td>
<td>0.160</td>
<td>-0.052</td>
<td>-0.038</td>
<td>-0.075</td>
<td>0.356</td>
</tr>
<tr>
<td>0.09</td>
<td>0.70</td>
<td>0.06</td>
<td>0.55</td>
<td>0.65</td>
<td>0.38</td>
<td>0.00</td>
</tr>
<tr>
<td>0.076</td>
<td>-0.059</td>
<td>-0.133</td>
<td>0.110</td>
<td>0.195</td>
<td>0.160</td>
<td>-0.236</td>
</tr>
<tr>
<td>0.38</td>
<td>0.50</td>
<td>0.12</td>
<td>0.21</td>
<td>0.02</td>
<td>0.06</td>
<td>0.00</td>
</tr>
<tr>
<td>0.017</td>
<td>-0.013</td>
<td>-0.030</td>
<td>-0.020</td>
<td>-0.015</td>
<td>0.253</td>
<td>-0.162</td>
</tr>
<tr>
<td>0.84</td>
<td>0.87</td>
<td>0.73</td>
<td>0.81</td>
<td>0.85</td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td>0.035</td>
<td>-0.027</td>
<td>-0.061</td>
<td>-0.042</td>
<td>-0.031</td>
<td>0.225</td>
<td>-0.152</td>
</tr>
<tr>
<td>0.68</td>
<td>0.75</td>
<td>0.48</td>
<td>0.63</td>
<td>0.72</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>1.000</td>
<td>-0.030</td>
<td>-0.068</td>
<td>-0.047</td>
<td>-0.035</td>
<td>-0.068</td>
<td>-0.168</td>
</tr>
<tr>
<td>0.00</td>
<td>0.72</td>
<td>0.43</td>
<td>0.59</td>
<td>0.68</td>
<td>0.43</td>
<td>0.05</td>
</tr>
<tr>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>0.030</td>
<td>1.000</td>
<td>-0.052</td>
<td>-0.036</td>
<td>-0.027</td>
<td>-0.052</td>
<td>0.284</td>
</tr>
<tr>
<td>0.72</td>
<td>0.00</td>
<td>0.54</td>
<td>0.68</td>
<td>0.75</td>
<td>0.54</td>
<td>0.00</td>
</tr>
<tr>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>-0.068</td>
<td>-0.052</td>
<td>1.000</td>
<td>-0.082</td>
<td>-0.061</td>
<td>-0.119</td>
<td>0.401</td>
</tr>
<tr>
<td>0.43</td>
<td>0.54</td>
<td>0.00</td>
<td>0.35</td>
<td>0.48</td>
<td>0.17</td>
<td>0.00</td>
</tr>
<tr>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td></td>
<td>P1 R1</td>
<td>P1 R2</td>
<td>P1 R3</td>
<td>P2 R1</td>
<td>P2 R2</td>
<td>P2 R3</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>P2 A1</td>
<td>-0.100</td>
<td>-0.029</td>
<td>-0.052</td>
<td>-0.110</td>
<td>-0.020</td>
<td>-0.042</td>
</tr>
<tr>
<td></td>
<td>0.25</td>
<td>0.73</td>
<td>0.55</td>
<td>0.21</td>
<td>0.81</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P2 A1</td>
<td>-0.075</td>
<td>-0.022</td>
<td>-0.038</td>
<td>0.195</td>
<td>-0.015</td>
<td>-0.031</td>
</tr>
<tr>
<td></td>
<td>0.39</td>
<td>0.80</td>
<td>0.65</td>
<td>0.02</td>
<td>0.85</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P2 A3</td>
<td>-0.146</td>
<td>-0.043</td>
<td>-0.075</td>
<td>0.160</td>
<td>-0.253</td>
<td>0.225</td>
</tr>
<tr>
<td></td>
<td>0.09</td>
<td>0.62</td>
<td>0.38</td>
<td>0.06</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>P1 D</td>
<td>0.293</td>
<td>0.363</td>
<td>0.356</td>
<td>-0.236</td>
<td>-0.162</td>
<td>-0.152</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P2 D</td>
<td>-0.227</td>
<td>-0.155</td>
<td>-0.200</td>
<td>0.320</td>
<td>-0.282</td>
<td>-0.283</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>P1 A1</td>
<td>P1 A2</td>
<td>P1 A3</td>
<td>P2 A1</td>
<td>P2 A2</td>
<td>P2 A3</td>
<td>P1 D</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>-0.047</td>
<td>-0.036</td>
<td>-0.082</td>
<td>1.000</td>
<td>-0.042</td>
<td>-0.082</td>
<td>-0.161</td>
</tr>
<tr>
<td>0.59</td>
<td>0.68</td>
<td>0.35</td>
<td>0.00</td>
<td>0.63</td>
<td>0.35</td>
<td>0.06</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.035</td>
<td>-0.027</td>
<td>-0.061</td>
<td>-0.042</td>
<td>1.000</td>
<td>-0.061</td>
<td>-0.120</td>
</tr>
<tr>
<td>0.68</td>
<td>0.75</td>
<td>0.48</td>
<td>0.63</td>
<td>0.00</td>
<td>0.48</td>
<td>0.16</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>-0.068</td>
<td>-0.052</td>
<td>-0.119</td>
<td>-0.082</td>
<td>-0.061</td>
<td>1.000</td>
<td>-0.235</td>
</tr>
<tr>
<td>0.43</td>
<td>0.54</td>
<td>0.17</td>
<td>0.35</td>
<td>0.48</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.168</td>
<td>0.284</td>
<td>0.401</td>
<td>-0.161</td>
<td>-0.120</td>
<td>-0.235</td>
<td>1.000</td>
</tr>
<tr>
<td>0.05</td>
<td>0.00</td>
<td>0.00</td>
<td>0.06</td>
<td>0.16</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>177</td>
</tr>
<tr>
<td>-0.127</td>
<td>-0.098</td>
<td>-0.221</td>
<td>0.433</td>
<td>0.256</td>
<td>0.440</td>
<td>-0.447</td>
</tr>
<tr>
<td>0.14</td>
<td>0.26</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
<td>177</td>
</tr>
</tbody>
</table>
APPENDIX F: SUMMARY REGRESSION ANALYSIS FOR STUDY VARIABLES
Table F.1. Summary of regression analysis of degree on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>1</td>
<td>725.948</td>
<td>725.948</td>
<td>14.81</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>125</td>
<td>6126.682</td>
<td>49.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Square = 0.10594  
Adj. R-Square = 0.09878

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>26.819</td>
<td>1.951</td>
<td>13.741</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-2.147</td>
<td>0.558</td>
<td>-3.849</td>
<td>0.000</td>
</tr>
</tbody>
</table>
Table F.2. Summary of regression analysis of degree and years in present position on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>2</td>
<td>726.404</td>
<td>363.202</td>
<td>7.35</td>
<td>0.0011</td>
</tr>
<tr>
<td>Error</td>
<td>124</td>
<td>6126.226</td>
<td>49.405</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-Square</td>
<td></td>
<td>0.10600</td>
<td>Adj. R-Square</td>
<td>0.09158</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>26.898</td>
<td>2.121</td>
<td>12.682</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-2.134</td>
<td>0.577</td>
<td>-3.695</td>
<td>0.000</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.007</td>
<td>0.074</td>
<td>-0.096</td>
<td>0.924</td>
</tr>
</tbody>
</table>
Table F.3. Summary of regression analysis of degree, years in present position, and years total experience on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>1103.962</td>
<td>347.988</td>
<td>7.871</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>123</td>
<td>5748.665</td>
<td>46.737</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Square = 0.16110  
Adj. R-Square = 0.14064

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>26.010</td>
<td>2.086</td>
<td>12.467</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-1.697</td>
<td>0.582</td>
<td>-2.914</td>
<td>0.004</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.287</td>
<td>0.122</td>
<td>-2.355</td>
<td>0.020</td>
</tr>
<tr>
<td>Yrs P</td>
<td>0.354</td>
<td>0.124</td>
<td>2.842</td>
<td>0.005</td>
</tr>
</tbody>
</table>
Table F.4. Summary of regression analysis of degree, years in present position, years total experience, and years of industrial experience on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>1103.966</td>
<td>275.992</td>
<td>5.85</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>124</td>
<td>5748.664</td>
<td>47.120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>6852.630</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Square = 0.16110  Adj. R-Square = 0.13360

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>26.008</td>
<td>2.178</td>
<td>11.942</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-1.696</td>
<td>0.586</td>
<td>-2.895</td>
<td>0.005</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.287</td>
<td>0.123</td>
<td>2.313</td>
<td>0.006</td>
</tr>
<tr>
<td>Yrs P</td>
<td>0.355</td>
<td>0.126</td>
<td>2.813</td>
<td>0.006</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>0.470-03</td>
<td>0.095</td>
<td>0.005</td>
<td>0.996</td>
</tr>
</tbody>
</table>
Table F.5. Summary of regression analysis of degree, years in present position, years total experience, and enrollment on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>5</td>
<td>1148.178</td>
<td>229.636</td>
<td>4.87</td>
<td>0.0002</td>
</tr>
<tr>
<td>Error</td>
<td>121</td>
<td>5704.452</td>
<td>47.144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Square = 0.16755
Adj. R-Square = 0.13315

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>25.104</td>
<td>2.369</td>
<td>10.595</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-1.299</td>
<td>0.715</td>
<td>-1.815</td>
<td>0.072</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.279</td>
<td>0.124</td>
<td>-2.260</td>
<td>0.026</td>
</tr>
<tr>
<td>Yrs P</td>
<td>0.335</td>
<td>0.128</td>
<td>2.617</td>
<td>0.101</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>0.035</td>
<td>0.101</td>
<td>0.342</td>
<td>0.733</td>
</tr>
<tr>
<td>Enrol</td>
<td>-0.110-03</td>
<td>0.110-03</td>
<td>-0.968</td>
<td>0.335</td>
</tr>
</tbody>
</table>
Table F.6. Summary of regression analysis of degree, years in present position, years total experience, years of industrial experience, enrollment, and area of expertise on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>8</td>
<td>1281.113</td>
<td>160.139</td>
<td>3.39</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>118</td>
<td>5571.517</td>
<td>47.216</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-Square</td>
<td></td>
<td>0.18695</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. R-Square</td>
<td></td>
<td>0.13183</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>25.770</td>
<td>2.458</td>
<td>10.486</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-1.428</td>
<td>0.723</td>
<td>-1.974</td>
<td>0.051</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.302</td>
<td>0.126</td>
<td>-2.408</td>
<td>0.018</td>
</tr>
<tr>
<td>Yrs P</td>
<td>0.367</td>
<td>0.131</td>
<td>2.793</td>
<td>0.006</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>0.06</td>
<td>0.102</td>
<td>0.250</td>
<td>0.803</td>
</tr>
<tr>
<td>Enrol</td>
<td>-0.73D-04</td>
<td>0.12D-03</td>
<td>-0.610</td>
<td>0.543</td>
</tr>
<tr>
<td>Area 1</td>
<td>-1.164</td>
<td>1.880</td>
<td>-0.619</td>
<td>0.537</td>
</tr>
<tr>
<td>Area 2</td>
<td>2.808</td>
<td>2.484</td>
<td>1.130</td>
<td>0.261</td>
</tr>
<tr>
<td>Area 3</td>
<td>-1.237</td>
<td>1.468</td>
<td>-0.843</td>
<td>0.401</td>
</tr>
</tbody>
</table>
Table F.7. Summary of regression analysis of degree, years in present position, and years total experience on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>21</td>
<td>2618.450</td>
<td>124.688</td>
<td>3.09</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>105</td>
<td>4234.180</td>
<td>40.326</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Square = 0.38210  Adj. R-Square = 0.25853

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>27.506</td>
<td>2.643</td>
<td>10.407</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-1.650</td>
<td>0.752</td>
<td>-2.195</td>
<td>0.030</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.323</td>
<td>0.121</td>
<td>-2.673</td>
<td>0.009</td>
</tr>
<tr>
<td>Yrs P</td>
<td>0.355</td>
<td>0.124</td>
<td>2.871</td>
<td>0.005</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>-0.092</td>
<td>0.102</td>
<td>-0.279</td>
<td>0.781</td>
</tr>
<tr>
<td>Enrol</td>
<td>-0.110-03</td>
<td>0.110-03</td>
<td>-1.215</td>
<td>0.227</td>
</tr>
<tr>
<td>Area 1</td>
<td>4.316</td>
<td>2.615</td>
<td>1.668</td>
<td>0.098</td>
</tr>
<tr>
<td>Area 2</td>
<td>5.381</td>
<td>4.671</td>
<td>1.152</td>
<td>0.252</td>
</tr>
<tr>
<td>Area 3</td>
<td>2.460</td>
<td>2.311</td>
<td>1.064</td>
<td>0.290</td>
</tr>
<tr>
<td>P1 R3</td>
<td>1.991</td>
<td>2.918</td>
<td>0.682</td>
<td>0.497</td>
</tr>
<tr>
<td>P1 R2</td>
<td>-5.895</td>
<td>4.654</td>
<td>-1.267</td>
<td>0.208</td>
</tr>
<tr>
<td>P2 R3</td>
<td>-5.684</td>
<td>4.038</td>
<td>-1.408</td>
<td>0.162</td>
</tr>
<tr>
<td>P2 R2</td>
<td>-12.065</td>
<td>6.834</td>
<td>-1.765</td>
<td>0.080</td>
</tr>
<tr>
<td>P2 R1</td>
<td>-2.088</td>
<td>2.093</td>
<td>-0.997</td>
<td>0.321</td>
</tr>
<tr>
<td>P1 R1</td>
<td>0.475</td>
<td>1.952</td>
<td>0.243</td>
<td>0.808</td>
</tr>
<tr>
<td>P1 A1</td>
<td>-11.028</td>
<td>3.846</td>
<td>-2.868</td>
<td>0.005</td>
</tr>
<tr>
<td>P1 A2</td>
<td>-11.058</td>
<td>5.927</td>
<td>-1.866</td>
<td>0.065</td>
</tr>
<tr>
<td>P2 D</td>
<td>0.359</td>
<td>0.583</td>
<td>0.616</td>
<td>0.539</td>
</tr>
<tr>
<td>P1 A3</td>
<td>-8.050</td>
<td>2.887</td>
<td>-2.788</td>
<td>0.006</td>
</tr>
<tr>
<td>P2 A1</td>
<td>-7.593</td>
<td>3.969</td>
<td>-1.913</td>
<td>0.058</td>
</tr>
<tr>
<td>P2 A2</td>
<td>2.309</td>
<td>5.376</td>
<td>0.393</td>
<td>0.695</td>
</tr>
<tr>
<td>P2 A3</td>
<td>-1.000</td>
<td>3.373</td>
<td>-0.297</td>
<td>0.767</td>
</tr>
</tbody>
</table>
Table F.8. Summary of regression analysis of degree, years in present position, years total experience, and years of industrial experience on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>24</td>
<td>2885.211</td>
<td>120.217</td>
<td>3.09</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>102</td>
<td>3967.419</td>
<td>38.896</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-Square</td>
<td></td>
<td></td>
<td></td>
<td>0.42104</td>
<td></td>
</tr>
<tr>
<td>Adj. R-Square</td>
<td></td>
<td></td>
<td></td>
<td>0.28481</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>23.416</td>
<td>3.068</td>
<td>7.632</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-0.990</td>
<td>0.784</td>
<td>-1.263</td>
<td>0.210</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.357</td>
<td>0.125</td>
<td>-2.867</td>
<td>0.005</td>
</tr>
<tr>
<td>Yrs P</td>
<td>0.376</td>
<td>0.127</td>
<td>2.974</td>
<td>0.004</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>-0.029</td>
<td>0.101</td>
<td>-0.282</td>
<td>0.779</td>
</tr>
<tr>
<td>Enrol</td>
<td>-0.970-04</td>
<td>0.110-03</td>
<td>0.840</td>
<td>0.403</td>
</tr>
<tr>
<td>Area 2</td>
<td>5.251</td>
<td>6.429</td>
<td>0.817</td>
<td>0.416</td>
</tr>
<tr>
<td>Area 3</td>
<td>2.002</td>
<td>2.283</td>
<td>0.877</td>
<td>0.383</td>
</tr>
<tr>
<td>P1 R3</td>
<td>-1.428</td>
<td>9.339</td>
<td>-0.153</td>
<td>0.879</td>
</tr>
<tr>
<td>P1 R2</td>
<td>-13.441</td>
<td>7.941</td>
<td>-1.693</td>
<td>0.094</td>
</tr>
<tr>
<td>P2 R3</td>
<td>-9.267</td>
<td>9.717</td>
<td>-0.954</td>
<td>0.343</td>
</tr>
<tr>
<td>P2 R2</td>
<td>-19.565</td>
<td>9.361</td>
<td>-2.090</td>
<td>0.039</td>
</tr>
<tr>
<td>P2 R1</td>
<td>-5.081</td>
<td>2.479</td>
<td>-2.050</td>
<td>0.043</td>
</tr>
<tr>
<td>P1 R1</td>
<td>-2.258</td>
<td>2.275</td>
<td>-0.993</td>
<td>0.323</td>
</tr>
<tr>
<td>P1 A1</td>
<td>-10.459</td>
<td>3.784</td>
<td>-2.764</td>
<td>0.007</td>
</tr>
<tr>
<td>P1 A2</td>
<td>-10.269</td>
<td>7.333</td>
<td>-1.400</td>
<td>0.164</td>
</tr>
<tr>
<td>P2 D</td>
<td>-0.169</td>
<td>0.584</td>
<td>1.060</td>
<td>0.292</td>
</tr>
<tr>
<td>P1 A3</td>
<td>-6.844</td>
<td>2.887</td>
<td>-2.370</td>
<td>0.020</td>
</tr>
<tr>
<td>P2 A1</td>
<td>-8.714</td>
<td>3.923</td>
<td>-2.221</td>
<td>0.029</td>
</tr>
<tr>
<td>P2 A2</td>
<td>2.885</td>
<td>7.289</td>
<td>0.396</td>
<td>0.693</td>
</tr>
<tr>
<td>P2 A3</td>
<td>-0.254</td>
<td>3.330</td>
<td>-0.067</td>
<td>0.939</td>
</tr>
<tr>
<td>Role 1</td>
<td>4.799</td>
<td>2.083</td>
<td>2.305</td>
<td>0.023</td>
</tr>
<tr>
<td>Role 2</td>
<td>5.333</td>
<td>8.854</td>
<td>0.602</td>
<td>0.548</td>
</tr>
</tbody>
</table>
Table F.9. Summary of regression analysis of degree, years in present position, years total experience, years of industrial experience, enrollment, area of expertise, interactions, professional role, and program on rating

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>26</td>
<td>3217.224</td>
<td>123.739</td>
<td>3.40</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>100</td>
<td>3635.406</td>
<td>36.354</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Square = 0.42104

Adj. R-Square = 0.28481

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO:</th>
<th>Prob &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>29.710</td>
<td>3.812</td>
<td>7.794</td>
<td>0.000</td>
</tr>
<tr>
<td>Degree</td>
<td>-1.148</td>
<td>0.872</td>
<td>-1.316</td>
<td>0.191</td>
</tr>
<tr>
<td>Yrs T</td>
<td>-0.426</td>
<td>0.123</td>
<td>-3.474</td>
<td>0.001</td>
</tr>
<tr>
<td>Yrs P</td>
<td>0.436</td>
<td>0.124</td>
<td>3.515</td>
<td>0.001</td>
</tr>
<tr>
<td>Ind Exp</td>
<td>-0.002</td>
<td>0.099</td>
<td>-0.025</td>
<td>0.980</td>
</tr>
<tr>
<td>Enrol1</td>
<td>-0.130-03</td>
<td>0.110-03</td>
<td>-1.204</td>
<td>0.231</td>
</tr>
<tr>
<td>Area 2</td>
<td>-0.188</td>
<td>6.474</td>
<td>-0.029</td>
<td>0.977</td>
</tr>
<tr>
<td>Area 3</td>
<td>-0.993</td>
<td>2.440</td>
<td>-2.407</td>
<td>0.685</td>
</tr>
<tr>
<td>Area 1</td>
<td>0.873</td>
<td>2.910</td>
<td>0.300</td>
<td>0.765</td>
</tr>
<tr>
<td>P1 R3</td>
<td>-0.501</td>
<td>9.077</td>
<td>-0.055</td>
<td>0.956</td>
</tr>
<tr>
<td>P1 R2</td>
<td>-6.767</td>
<td>8.018</td>
<td>-0.844</td>
<td>0.401</td>
</tr>
<tr>
<td>P2 R3</td>
<td>-7.604</td>
<td>9.493</td>
<td>-0.805</td>
<td>0.423</td>
</tr>
<tr>
<td>P2 R2</td>
<td>-12.623</td>
<td>9.530</td>
<td>-1.325</td>
<td>0.188</td>
</tr>
<tr>
<td>P2 R1</td>
<td>1.566</td>
<td>3.579</td>
<td>0.437</td>
<td>0.663</td>
</tr>
<tr>
<td>P1 R1</td>
<td>3.246</td>
<td>2.997</td>
<td>1.083</td>
<td>0.282</td>
</tr>
<tr>
<td>P1 A1</td>
<td>-5.050</td>
<td>4.246</td>
<td>-1.189</td>
<td>0.237</td>
</tr>
<tr>
<td>P1 A2</td>
<td>-2.787</td>
<td>7.525</td>
<td>-0.370</td>
<td>0.712</td>
</tr>
<tr>
<td>P2 D</td>
<td>2.271</td>
<td>1.444</td>
<td>1.573</td>
<td>0.119</td>
</tr>
<tr>
<td>P1 A3</td>
<td>-2.563</td>
<td>3.245</td>
<td>-0.790</td>
<td>0.432</td>
</tr>
<tr>
<td>P2 A1</td>
<td>-4.691</td>
<td>4.069</td>
<td>-1.153</td>
<td>0.252</td>
</tr>
<tr>
<td>P2 A2</td>
<td>9.083</td>
<td>7.342</td>
<td>1.237</td>
<td>0.219</td>
</tr>
<tr>
<td>P2 A3</td>
<td>3.458</td>
<td>3.446</td>
<td>1.004</td>
<td>0.318</td>
</tr>
<tr>
<td>Role 1</td>
<td>0.234</td>
<td>2.518</td>
<td>0.093</td>
<td>0.926</td>
</tr>
<tr>
<td>Role 2</td>
<td>5.293</td>
<td>6.724</td>
<td>0.787</td>
<td>0.433</td>
</tr>
<tr>
<td>Role 3</td>
<td>5.624</td>
<td>8.561</td>
<td>0.657</td>
<td>0.513</td>
</tr>
<tr>
<td>Prog 1</td>
<td>-7.327</td>
<td>2.751</td>
<td>-2.663</td>
<td>0.009</td>
</tr>
<tr>
<td>Prog 2</td>
<td>-12.292</td>
<td>6.206</td>
<td>-1.981</td>
<td>0.050</td>
</tr>
</tbody>
</table>