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Thomas F. Ferguson

Date

May 22, 1970

CREATIVE DESIGN IN INDUSTRIAL ARTS: OPINIONS
OF MONTANA HIGH SCHOOL TEACHERS

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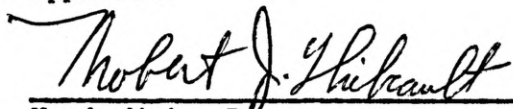
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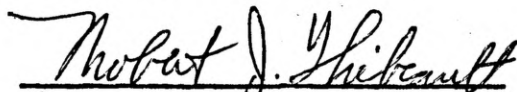
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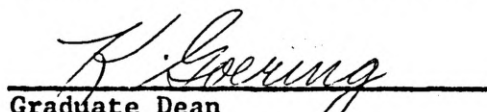
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Approved:


Head, Major Department


Chairman, Examining Committee


Graduate Dean

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ABSTRACT

The purpose of this study was to determine the opinions of Montana high school industrial arts teachers in Class AA, A, and B schools about creative design in industrial arts education.

Data were collected from a questionnaire mailed to 123 teachers in Montana who were listed by the Office of the Superintendent of Public Instruction as being part time or full time industrial arts teachers during the 1969-1970 school year.

The eighty-eight respondents were categorized by age and class of school for purposes of data evaluation.

Teachers between the ages of 25 and 36 years of age tended to agree with one another when answering the questions, and teachers within each class of school tended to agree with their teaching partners.

Seven teachers indicated they had teaching minors in art, and because it was believed their responses might differ from those teachers without art backgrounds, their responses to the questionnaire were tabulated separately from the majority.

On all items in the questionnaire which related to the economics of a creative industrial arts program, the art minors disagreed with the other respondents. The art minors also disagreed with the majority on one of the four items which sampled opinions about the value or worth of a creative industrial arts education program.

A difference in teaching approach or teaching philosophy in regard to industrial arts was noted, in that the art minors disagreed with the majority about students designing their own projects and about the success of students who have design backgrounds versus those who do not have a background in design.

The consensus of opinion among all teachers was that creative industrial arts can be incorporated into existing industrial arts programs; that students can benefit from instruction in design and principles of color; and that students' interest and motivation in industrial arts can benefit from the introduction of design elements into the curricula.

Chapter 1

INTRODUCTION, STATEMENT OF THE PROBLEM AND DESIGN OF THE STUDY

By nature, man is a creative and resourceful individual. From prehistoric times to our present age of technological achievement, man has relied upon his ability to design and construct tools and other conveniences with which to meet his needs and improve his standard of living.

In the public school system, industrial arts and art are two of the many courses designed to assist students in meeting the challenges of the modern world. But in reality, how well prepared are our students? Are they creative and resourceful, or has their creativity been stifled by modern educational theory?

The place of industrial arts in the curricula has presented a problem to educators for years. This neither-fish-nor-fowl area has caused educators to ponder where, if at all, does industrial arts belong?

There has been talk of "new curricula" for industrial arts over the past 25 years or so, but efforts to produce them have suffered from lack of a clear consensus on the place of IA in the public schools' educational plan. Should IA be part of vocational education? Of general education? A vehicle for teaching mathematics and science...or even social studies? The pendulum has swung in various arcs from one trend to another, and its movement is still undetermined. . . .¹

Art education, on the other hand, appears to have made a

¹"Curriculum Letter for Administrators Concerned With Secondary Schools," 8:5, January, 1969, p. 2.

decisive shift in emphasis. According to Dale, "in the past fifty years the emphasis in art education has shifted from technique to creative expression."² This new trend resulted from a recognition of the importance of giving "tangible expression to the emotional forces within" and of satisfying the students' "urge for communication."³

Separate schools of thought appear to exist in regard to art and industrial arts. Art is regarded as "education" while industrial arts is regarded as "training." A distinction needs to be made between education and training, as the two terms are frequently used interchangeably. Training is but a small part of a whole job and may be learned very quickly. The trained person, said Dale:

has no chance to exercise judgment, to bring to bear upon his work something learned from a previous experience, to develop new ideas --to grow. . . . A man who is merely trained can quickly attain the top level of his skill--and there he remains frozen unless some new opportunity arises for new learnings.⁴

Consequently, interest is soon lost and the job becomes relatively meaningless.

Education provides the opportunity to develop and grow, to enlarge one's understanding of a subject as new facts and skills are learned together with their significant inter-relationships. "Skill or training can be rendered useless by the advent of a new invention or

²Dale, Edgar, Audio-Visual Methods in Teaching, New York: Holt, Rinehart and Winston, 1954, revised 1961, p. 484.

³Ibid., p. 484.

⁴Ibid., p. 10.

skill, but a liberal education can never be taken away. . . ."⁵

Dale asked, "Are we depriving a learner when we teach him a fact without showing its relationship to the whole to which it belongs?"⁶

It was the opinion of the investigator that this is happening in art and industrial arts. In many art classes creativity and design are taught as major elements, with construction receiving less emphasis. Many industrial arts classes deal with sound construction and manufacturing techniques, but project design and appeal seem to be secondary.

THE PROBLEM

Innovation in industrial arts education is beginning to make its appearance, although further work in this area is needed. Innovations in which industrial arts is used as a vehicle to create interest in another field does not permit the field of industrial arts to move toward the "education" end of the scale, and does not provide as great a synthesis of knowledge as would a program involving art and industrial arts in which each field could benefit equally. Industrial arts should be taught for its own sake and not as a vehicle by which to create interest in another field.

It was the writer's belief that industrial arts students should be given the opportunity for instruction in elements and principles of

⁵Ibid., p. 10.

⁶Ibid., p. 10.

design and creativity, as well as construction techniques and practices.

This study was an attempt to elicit opinions of Montana high school industrial arts teachers about creative design in industrial arts education.

PURPOSES

Four purposes were identified: (1) to identify the opinions of Montana high school industrial arts teachers in Class AA, A, and B schools in regard to creative design; (2) to determine if the opinions of the teachers differed among the three classes of schools; (3) to determine if age and/or years of teaching experience affected the opinions of teachers about creative design in industrial arts; and (4) to determine if the level of education attained and/or the areas of teaching major or minor affected the responses.

It was not the purpose of this study to determine opinions about creative design from teachers other than industrial arts teachers. Further, the scope of the study was limited to industrial arts education only, with full realization given the fact that a similar study could be accomplished in other fields.

DESIGN OF THE STUDY

Construction of a Questionnaire

In order to elicit opinions from Montana high school industrial

arts teachers, the questionnaire was selected as the tool of choice.

Seventeen items reflecting commonly held opinions about creative design and industrial arts were developed. Three categories of opinion were sampled: (1) economics, which included the extra time and staff involved in developing a creative industrial arts program; (2) the value or worth of the creative design program itself; and (3) individual opinions of the teachers about student learning and motivation in the industrial arts area.

Questions 1, 5, 11, and 12 were designed to gain opinions about the value or worth of the creative design program. Questions 2, 3, 4, 7, 8, 9, 10, 13, 16, and 17 were intended to yield information about the flexibility and philosophies of the teachers in regard to student learning and motivation. The economic aspect of the creative design program was measured by questions 6, 14, and 15.

Five choices were possible responses for each item: (1) agree completely; (2) agree; (3) neutral or no opinion; (4) disagree; or (5) completely disagree.

Respondents were instructed to check the number between one (1) and five (5) which most closely corresponded to their opinion about each item.

Following the seventeen items was a space for comments and a request for personal information. The personal information sought included: (1) age; (2) years of teaching experience; (3) highest degree

held to date; (4) teaching major; and (5) teaching minor.

Selection of the Sample

Questionnaires were sent to one hundred twenty-three teachers in Class AA, A, and B schools in Montana who were listed as being industrial arts teachers, 1969-1970, by the Office of the Superintendent of Public Instruction.⁷ A cover letter outlined the purpose of the study and gave general instructions to the teachers. (See Appendixes A and B, pages 46 and 47 for the cover letter and questionnaire.)

The one hundred twenty-three teachers taught in 75 Montana high schools. Thirty-four were teachers in 14 Class AA schools, twenty-nine taught in 12 Class A schools, and the remaining sixty teachers taught in the 49 Class B schools which offered industrial arts in their curricula.

The distribution of the teachers by the class of school in which they taught can be summarized as follows:

<u>Class of School</u>	<u>Number of Schools</u>	<u>Number of Teachers</u>
AA	14	34
A	12	29
B	<u>49</u>	<u>60</u>
Total	75	123

⁷"Montana Industrial Arts Teachers, 1969-1970," Preliminary List Compiled from Fall Reports by Ralph W. Mikkelsen, Industrial Education Supervisor, State of Montana, Office of the Superintendent of Public Instruction, F2013-411.161-2/70.

Limitations to the Study

It was recognized that the nature of the study and the method used to obtain data placed certain limitations on the study. Interpretation of the questionnaire items by individual teachers may have resulted in answers other than those expected most frequently.

The request for personal information from each teacher was intended to further reduce limitations that might be imposed upon the study.

DEFINITIONS OF TERMS USED

In order to establish a common basis of understanding, the following definitions of terms were used:

Industrial Arts. The course of study employed for teaching manual and technical skills used in industry. Also abbreviated I. A.

Industrial Design. The aesthetic and practical design of industrial products.

Creative Design. The individual's conceptualization of a new solution to a problem. The concept may not be original, but would not have been previously used by the individual.

Industrial Arts Teacher. A teacher who, on a full time or part time basis, is employed to teach woodworking, welding, machine processes, auto mechanics, forging, or any other subject that requires the designing and building of a project as partial fulfillment of the course re-

quirements.

ORGANIZATION OF THE REMAINDER OF THE STUDY

The remainder of the study was organized into three chapters. Chapter 2 presents the review of pertinent literature. Chapter 3 presents the findings and interpretations of the data and Chapter 4 summarizes the study and presents the conclusions and recommendations.

Chapter 2

REVIEW OF THE LITERATURE

Much has been written about creative behavior, learning, and innovation in education. Due to the quantity of information available in these areas, only those works related to creative design and innovation in industrial arts education were utilized.

Design, like most things, is relative. It is related to the goals and concepts one sets for himself. The qualities of design cannot be measured by mechanical means but must be evaluated by a discriminating and open mind. "One aspect of a design (balance, proportion, color) may have more importance than another, yet removing even a small element may destroy the entire design."¹

Hawkins elaborated upon this point when he indicated that "the knowledge of basic principles of design--line, color, shape and texture --are essential. In addition, the craftsman must have an awareness of the necessity for the article to be practical as well as attractive."²

The beginning of any project rests in the conception of an idea. The ability to visualize an idea and eventually work it into a functional design is essential to the creation of any object. Seitz said that

¹Micheels, William J. (ed.), Creative Design for the Industrial Arts Teacher, Dearborn, Michigan: Ford Motor Company, Educational Affairs Department, 1958, p. 12.

²Hawkins, Leslie V., "Art Metal in Industrial Arts," IAVE, 54:10 December, 1965, p. 23.

the creative person is interested in doing different things, but he may not be the most intelligent of the group. Quite often he comes up with ideas which, to a less creative person, seem "wild" or unworkable. If this person is confined to repetitive tasks he will soon lose interest and become bored with the work at hand.³

Von Fange believed that "to create is to combine existing elements in new ways, even if new [only] as far as the creator himself is concerned."⁴

A person who creates takes what he knows, what he can do, and what he feels, and puts these factors together to come up with a worthwhile solution to a given problem. A creative problem has various possible solutions. "In the field of industrial arts, the designer puts together his skills, his understanding, and his ideas to develop original concepts."⁵ This is the beauty, the reward of creation. Although two individuals have been educated in the same manner, their creations may be so different as to have no resemblance, yet each designer has provided a fresh and valid solution to the problem.

Good workmanship is an inherent part of good design. Many industrial arts teachers tend to rate workmanship as the most important

³Seitz, James E., "Creativity in Industrial Arts," The Journal of Industrial Arts Education, 25:3, January-February, 1966, p. 51.

⁴Von Fange, Eugene K., Professional Creativity, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1959, p. 36.

⁵Micheels, op. cit., p. 32.

part of their course. But it is a mistake to think of craftsmanship as standing alone. Good craftsmanship endures only when it enhances good design.⁶

Vaughn added other elements to the process of creation. He said that in order for a project to be of the greatest usefulness, it should involve research into materials, design, purpose and construction as all are vital features of the project being constructed.

The historical importance of creativity was aptly summarized by Micheels when he said:

One hundred fifty years ago the average citizen in our culture made or prepared most of the things he used. Homes were built of native lumber, fieldstone and mortar. It was in the home that the clothes and furniture were made. In such an environment invention and craftsmanship were practiced by all members of the family. Learning to use tools was a natural part of growing up.⁸

Resourcefulness and invention are essential aspects of the creative process. The industrial arts teacher should make a concentrated effort to cultivate these qualities in his students from the first day of class. Riggin pointed out that "beginning pupils in junior high school often have little, if any, idea how to develop or design suitable

⁶ Micheels, op. cit., p. 13.

⁷ Vaughn, Maurice S., "A Case for Compatibility," The Journal of Industrial Arts Education, 28:1, September-October, 1968, p. 17.

⁸ Micheels, op. cit., p. 9.

projects."⁹

The ability to design is not an innate quality, but must be learned. Hawkins believed that "the ability to design can be learned through study, application, and by observation analysis and good judgment."¹⁰ One must learn the good qualities in design to find meaningful values and design concepts. These principles can be learned in the same way as any other learning is acquired, through activity, learning by doing, working to find the meaning of design and applying the results to everyday living. "By creating an article from an idea to a tangible object the student learns and appreciates the industrial techniques as well as the scientific knowledge necessary for these processes."¹¹

With the advancement of technology and the advent of mass production, less emphasis has been placed upon individual creation of an object, and more attention paid to assembly line production.

Vaughn identified the impact of technological advancement upon the "new" industrial arts when he stated that "today the student in industrial arts is more likely to be encouraged to identify a need in the problem solving approach--one that can be met by using tools, materials, and processes common to industry."¹²

⁹Riggin, Lee W., "Wood Carving in Industrial Arts," IAVE, 54:10, December, 1965, p. 22.

¹⁰Hawkins, loc. cit.

¹¹Ibid.

¹²Vaughn, loc. cit.

Micheels elaborated upon the problem solving approach to industrial arts in his statement:

Industrial arts is problem-solving with tools and materials-- problems related to the products of industry; problems concerning industrial science and invention; problems involving the social and economic contributions of industry. And it is in the context of problem-solving that design becomes an integral part of industrial arts.¹³

Seitz offered a challenge to industrial arts education when he said, "The industrial arts program rests in a unique position today. It is virtually unrivaled with its possibilities for putting meaningful theory to the practical test."¹⁴

Micheels offered a partial answer: ". . . tools, materials, ideas. . . are the ingredients of industrial arts. Mix them with the proper amount of creativeness and craftsmanship and they provide a learning environment that has purpose and value for every person."¹⁵

Creativity in industrial arts education is becoming apparent, although Hawkins pointed out that "in teaching the industrial process, there is a tendency to overlook such objectives as incentive, creativity, inspiration and the desire for learning."¹⁶

Weir believed that the technique of copying is a very inefficient method of learning. He said that "learning cannot be thought of as the mere duplication of an act performed by someone else nor the copying of

¹³Micheels, op. cit., p. 8. ¹⁴Seitz, loc. cit.

¹⁵Micheels, loc. cit. ¹⁶Hawkins, loc. cit.

an idea developed by someone else."¹⁷ In order to be effective, Weir further believed that "learning is a process of personal choice making; it is activity in which the learner through his own experiences and out of his own motivation decides for himself what he is to believe and what he will do with his life."¹⁸

Harnack proposed that "good" education means the education of the individual in terms of his interests, needs, wants and desires. In general, teachers realize that it has become necessary to relate and correlate various subjects together.¹⁹ Foster observed, "For several years there has been a growing tendency to relate studies which are abstract in nature to studies that deal with concrete materials. In teaching science this has led to the introduction of courses such as consumer science, home economics science, and science related to industrial arts."²⁰

Industrial arts also has a close relationship to English, mathematics, social science and even to art, according to Feirer. But,

¹⁷Weir, Edward C., "Choice and Creativity in Teaching and Learning," in Change and Secondary School Administration, A Book of Readings, ed. Glen Ovard, New York: The Macmillan Company, 1968, p.311.

¹⁸Ibid.

¹⁹Harnack, Robert S., The Teacher: Decision Maker and Curriculum Planner, Scranton, Pa.: International Textbook Company, 1968, p. 27.

²⁰Foster, E. Arthur, "Science and Industrial Arts," Science Education, 50:4, October, 1966, p. 379.

as Feirer pointed out, the justification for industrial arts is not solely to improve the other subjects, but ". . . to represent in the school's curriculum the areas of industry and technology. We are not teaching applied math, science, or language, but we use them. . . ." ²¹

Status for industrial arts education should not be achieved in an unorthodox way, for Feirer pointed out:

Sometimes we attempt to gain status by identifying with other areas that at the moment seem to have greater parental approval. We should spend more of our time making sure that our contributions are so important and so distinct that they will be recognized by everyone as an essential part of the learning experiences of our youth. ²²

"Ours is an industrial society," said Micheels, "and Yankee ingenuity helped to make it that. Every child needs first-hand experience with the creative heritages that have brought our kind of life into being, for when Americans lose the urge to build, the America we know will vanish." ²³

SUMMARY

The basic elements of design can be effectively taught in the industrial arts setting and, according to the authors cited, should be taught there. Following the mastery of the basic principles of good

²¹Feirer, John L., "Industrial Arts and the Other School Subjects," IAVE, 54:6, June, 1965, p. 51.

²²Ibid.

²³Micheels, op. cit., p. 8.

design--balance, harmony, rhythm, and color--the student can improve his ability to design.

As instruction in design progresses, the ability to visualize and organize material in a pleasing and functional manner will increase. Design and good workmanship are inherent in the meaningful completion of any worthwhile project. Mix the proper amount of creativeness, craftsmanship, and correct tool usage together and student interest, motivation and feeling of self worth should expand.

With the proper incorporation of these principles, industrial arts teachers have a unique opportunity to encourage student interest and eager participation in shop problems he designs and executes himself.

Chapter 3

FINDINGS AND INTERPRETATIONS OF THE DATA

Classification of Respondents

The personal data requested at the end of the questionnaire and coding of the return envelope as to whether the respondent taught in a Class AA, A, or B school provided means by which to categorize the teachers participating in the study.

Questionnaires were sent to one hundred twenty-three teachers in Montana high schools classified as AA, A, or B schools. The teachers' names were secured from the preliminary list of "Montana Industrial Arts Teachers, 1969-1970," as compiled by the Office of the Superintendent of Public Instruction.

Eighty-eight of the one hundred twenty-three questionnaires were completed, a return percentage of 71.5.

Of the thirty-four Class AA teachers contacted, twenty-four returned the questionnaires, a return of 70.6 percent. Within the Class A schools, twenty out of twenty-nine teachers, or 69 percent, returned the questionnaires. Forty-three of the sixty Class B school teachers returned their questionnaires, for a return of 73.3 percent. No questionnaire was disqualified due to lack of information, although some teachers did not respond to all items. Table 1 on page 18 summarizes the percentage return of the questionnaires.

Table 1

Number and Percentage of Montana Industrial Arts Teachers
in Class AA, A, and B High Schools Who Returned
Questionnaires

Class of School	Teachers		
	Number in School	Number Returning Questionnaires	% Returning Questionnaires
AA	34	24	70.6
A	29	20	69.0
B	<u>60</u>	<u>44</u>	<u>73.3</u>
Total	123	88	71.5

Age of Respondents

The teachers completing the questionnaire were asked to indicate their age by checking one of six categories: (1) under 25 years; (2) 25 - 35 years; (3) 36 - 45 years; (4) 46 - 55 years; (5) 56 - 65 years; or (6) over 65 years.

The majority of the teachers responding to the questionnaire were between 25 and 45 years of age, with the mode being 25 - 35 years. No teacher was over 65 years of age.

Years of Teaching Experience

Teachers to whom the questionnaires were sent were asked to check one of six categories which indicated their years of teaching experience. The six choices were: (1) 0 - 3 years; (2) 4 - 7 years; (3) 8 - 10 years; (4) 11 - 15 years; (5) 16 - 25 years; and (6) over

25 years.

The majority of the teachers had less than ten years of teaching experience, with the mode being 0 - 3 years.

Responses to Questions

Comparison of means from the three classes of high schools was used to present the data. The data were further compared by class of high school and age group of the teacher. This technique yielded a visual picture of the variation which existed among school classes and ages in response to a specific question. (See Appendixes C and D, pages 50 and 53 for presentation of raw data and mean responses to all questions.)

Respondents who indicated that their major or minor teaching area was art were separated from the remainder of the group, regardless of their ages or the classes of schools represented. Since it was believed that those teachers with an art major or minor might respond differently to the questions than the rest of the teachers, the seven teachers who fell into this category were labeled "art minors" and their responses were tabulated separately.

For each of the seventeen questionnaire items the data were recorded and the mean computed. A summary of responses to each question was prepared. Teachers responding with means of 1.0 to 2.5 were said to be in agreement with the item; those teachers whose mean responses were between 2.5 and 3.5 were said to be neutral or to have expressed no opinion; and the teachers whose mean responses were between 3.5 and 5

were interpreted as disagreeing with the questionnaire item.

Question 1. An industrial arts student's understanding of the elements and principles of good design and color has little to do with his project solving ability.

The mean responses to Question 1 were as follows:

<u>Age Group</u>	<u>Mean Response by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		3.0	3.5
25 - 35	3.8	4.0	4.0
36 - 45	4.8	4.6	4.0
46 - 55	3.0	4.0	3.0
56 - 65	4.0	4.0	3.8

The group mean was 3.77 and the art minors' mean was 3.12.

The findings indicated that all the teachers tended to disagree or to be of no opinion or neutral about the item, with the consensus being that color and design are important elements for students to understand in order to solve projects.

Teachers under 25 years of age were neutral about the item. Those teachers ranging in age from 25 to 45 tended to disagree with the item, with a range in means of 3.8 to 4.8. Teachers who were between 46 and 55 years of age tended to have no opinion about the item if they taught in Class AA and B schools, yet teachers in the same age group who taught in Class A schools disagreed with the item. Teachers over

the age of 56 disagreed with the item, agreeing with teachers whose ages were between 25 and 35. The group mean of 3.77 indicated disagreement, while the art minors' mean of 3.12 was within the neutral or no opinion area.

Teachers from Class A schools appeared to be a homogenous group, agreeing with each other more frequently than did either Class AA or B teachers.

Question 2. Creations by craftsmen are basically works of art.

The mean responses to Question 2 were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		2.0	3.2
25 - 35	2.1	2.2	1.9
36 - 45	3.2	3.3	2.0
46 - 55	3.0	2.5	1.4
56 - 65	2.0	2.0	2.6

The group mean was 2.18 and the art minors' mean was 2.12, indicating that all teachers responding to the questionnaire agreed that creations by craftsmen are basically works of art.

Teachers under 25 years of age from Class A schools agreed with the statement, while teachers in the same age group from Class B schools were neutral or had no opinion about the item.

Those teachers whose ages ranged between 25 and 35 agreed closely

among themselves about the item, with a mean response range of 1.9 to 2.2. Teachers within the age group of 46 to 55 years showed the most pronounced disagreement among themselves, with a mean response range of 1.4 to 3.0. The Class B teachers in this age group agreed more closely with the other teachers participating in the study than did the teachers from the Class AA and A schools.

Teachers who were 56 years of age and over agreed with the item and also agreed closely with teachers between 25 and 35 years of age.

As with Question 1, teachers from the Class A schools agreed as a group more consistently than did teachers from either of the other classes of schools.

Question 3. An industrial arts student's projects should reflect something of himself.

The mean responses to Question 3 were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		2.5	2.0
25 - 35	1.4	1.8	1.9
36 - 45	1.4	2.2	1.5
46 - 55	1.8	2.0	1.2
56 - 65	2.0	3.0	2.0

The group mean was 1.78 and the art minors' mean was computed at 1.57, both indicating agreement with the idea that an industrial arts

student's projects should reflect something of himself. The notable exceptions to the majority were those teachers under the age of 25 and between the ages of 56 and 65 who taught in Class A schools. These two groups tended toward an expression of no opinion or neutrality regarding the item.

Teachers between the ages of 25 and 35 were in closest agreement about the item, with a mean response range of 1.4 to 1.9.

Question 4. The industrial arts student should be able to apply elements and principles of good design and color.

The mean responses to this question were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		2.0	1.7
25 - 35	1.6	1.4	1.6
36 - 45	1.0	2.7	1.5
46 - 55	2.5	1.3	1.6
56 - 65	2.0	2.0	1.8

The group mean of 1.59 and the art minors' mean of 1.43 indicated agreement with the idea that an industrial arts student should be able to apply elements and principles of good design and color.

Teachers between the ages of 36 and 45 who taught in Class A schools, along with teachers in the 46 to 55 years age group, expressed no opinion or neutrality regarding the item.

Teachers in the age groups of 25 to 35 years and 56 to 65 years were in closest agreement, with each group having a mean response difference of .2. (The mean response difference was computed by subtracting the lowest mean from the highest mean, e.g., the means for the 25 to 35 years age group were 1.6, 1.4, and 1.6. Subtracting 1.4 from 1.6 yields a mean response difference of .2.)

The Class B teachers were the most homogenous group responding to this question, having a mean response range of 1.5 to 1.8. The greatest diversity of opinion occurred among the teachers from all schools who were between 36 and 45 years of age. Their mean response range was 1.0 to 2.7.

Question 5. Design and principles of color are skills in which industrial arts students should have instruction.

The mean responses to this question were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		2.0	1.8
25 - 35	1.6	1.4	1.6
36 - 45	1.2	2.0	1.5
46 - 55	1.8	2.0	2.0
56 - 65	2.0	1.0	1.6

The group mean was 1.68 and the art minors' mean was computed at 1.43, both of which indicated agreement with the statement that design

and principles of color are skills in which industrial arts students should have instruction.

Teachers under 25 years of age, from 25 to 35 years of age, and from 46 to 55 years of age were in closest agreement, having mean response differences of .2.

Teachers from Class B schools were the most homogenous group, having a mean response range of 1.5 to 2.0.

Question 6. In order to be practical, design problems should be left to the art teacher and construction techniques to the industrial arts teacher.

The mean responses to this question were:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		4.5	3.5
25 - 35	4.3	4.6	4.0
36 - 45	4.6	4.2	4.5
46 - 55	4.0	4.5	4.2
56 - 65	4.0	4.0	3.6

The group mean was 4.15, and the art minors' mean was 3.58.

All teachers tended to disagree with the item, indicating that art and industrial arts could be interrelated.

Class B teachers under 25 years of age and over 56 years of age, along with the art minors responded close to and within the no opinion

or neutral area. Class AA and A teachers tended to agree among themselves, with each group of teachers having mean response differences of .6. Teachers whose ages were between 36 and 45 and over 56 years showed the most agreement, with each group having a mean response difference of .4.

Question 7. The industrial arts student should consider the physical properties of materials, i.e., "material honesty" in researching and planning to solve the problems of texture and color.

The mean responses of the teachers by age and class of school were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		2.0	1.7
25 - 35	1.8	2.0	1.9
36 - 45	1.6	2.2	1.9
46 - 55	1.7	2.0	1.8
56 - 65	3.0	2.0	1.8

The mean response of the group was 1.86 and the art minors' mean was 1.57.

With the exception of the Class AA teachers over the age of 56, all teachers agreed that knowledge of the physical properties of materials was important in industrial arts project solving.

Class A and Class B teachers were in close agreement among them-

selves, with each group having a mean response difference of .2. Class AA teachers, on the other hand, had a mean response difference of 1.4, with a range of 1.6 to 3.0.

Teachers whose ages were between 25 and 35 years agreed most closely among themselves, having a mean response range of 1.8 to 2.0.

Question 8. As the industrial arts student continues in the curriculum he should rely more upon his own creativity rather than upon copying from a catalog or from another's design.

The mean responses to Question 8 were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		2.0	1.5
25 - 35	1.7	1.4	1.6
36 - 45	1.6	1.8	1.6
46 - 55	1.7	2.7	2.6
56 - 65	2.0	1.0	1.8

The group mean of 1.68 and the art minors' mean of 1.57 were in the area of agreement, indicating that the teachers, as a whole, believed students should rely increasingly upon their own creativity.

Teachers from the Class AA schools were in closest agreement among themselves regarding this item, with a mean response difference of .3.

By age groups, teachers between the ages of 25 and 45 were in

close agreement, with a .3 mean response difference among the 25 to 35 year old teachers and a .2 mean response difference among the 36 to 45 year old teachers.

Regarding this item, one teacher commented, "Amen! Tell me how!"

Question 9. In actual practice it is impossible to follow the philosophy of permitting the student's creativity to supply designs for project solving.

Teachers responding to this item had the following mean responses:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		3.0	3.7
25 - 35	3.0	3.6	3.7
36 - 45	4.0	3.2	2.2
46 - 55	3.5	4.0	4.2
56 - 65	3.0	3.0	3.0

The group mean was 3.36 and the art minors' mean was 3.58, with the group being in the neutral or no opinion area and the art minors trending toward disagreement with the statement.

Teachers who were between the ages of 56 and 65 years agreed most consistently among themselves, with all of the schools earning mean responses of 3.0, an expression of neutrality or no opinion.

No other age group or class of school had close agreement about the item.

Question 10. The industrial arts student who has taken design courses will ultimately be more successful in industrial arts than the student without the design background.

The mean responses to this question were:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		1.5	2.7
25 - 35	2.0	2.4	2.4
36 - 45	3.0	2.6	2.7
46 - 55	2.3	2.0	2.2
56 - 65	2.0	2.0	1.8

The group mean was 2.25 and the art minors' mean was 2.57, which indicated that the teachers, as a whole, agreed that courses in design would aid in the success of an industrial arts student. The art minors expressed no opinion or neutrality regarding the item, although their mean was just slightly within the neutral area of response.

Teachers between the ages of 56 and 65 agreed most closely among themselves, having a mean response difference of .2. The greatest diversity of opinion was expressed by teachers under 25 years of age, who had a mean response range of 1.5 to 2.7.

All classes of schools were similar in their responses, in that the mean response differences were 1.0, 1.1, and .9, respectively.

One teacher, who was not an art minor, commented that he taught a unit in design.

Question 11. To become an effective craftsman, one should have at least elementary training in design.

The mean responses of the teachers to this item were:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		2.0	1.7
25 - 35	2.1	2.4	2.0
36 - 45	1.4	1.2	2.3
46 - 55	2.8	1.8	2.0
56 - 65	2.0	2.0	1.6

The group mean was 1.99 and the art minors' mean was 1.71, both of which fell within the agreement area of response. All of the teachers, as a whole, agreed that elementary training in design was basic to becoming an effective craftsman.

Class AA teachers between the ages of 46 and 55 responded within the no opinion or neutrality area of the scale. Teachers under 25 years and between the ages of 25 and 35 evidenced the highest agreement, having mean response differences of .3 and .4, respectively.

The three classes of schools were similar in the responses their teachers made, having mean response differences of .7, .8, and .7 respectively.

Question 12. The formation of a good design and the solution of the problem offer a variety of avenues to the understanding of industrial problems.

The mean responses to this item were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of School</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		1.5	2.2
25 - 35	1.7	1.8	1.8
36 - 45	1.4	1.8	1.8
46 - 55	2.3	2.8	1.8
56 - 65	2.0	2.0	1.8

The mean response of the group was 1.87, while the art minors' mean response was 1.71. The mean responses would indicate that the teachers, as a whole, agreed that the understanding of industrial problems is aided by the formation of a good design and the solution of the problem.

Class A teachers in the 46 to 55 year age group responded within the neutrality or no opinion area.

Teachers agreeing most closely among themselves were those between the ages of 25 and 35. Their mean response difference was .1. The greatest diversity of opinion occurred among teachers under the age of 25, with a mean response difference of .7.

The teachers from the Class B schools were the most homogenous group, having a .4 mean response difference among the various age groups.

Question 13. The incorporation of design principles into industrial arts teaching units should help accelerate learning and increase interest.

The mean responses to this item were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		1.5	2.0
25 - 35	2.0	2.2	1.9
36 - 45	1.4	2.2	1.8
46 - 55	2.5	2.2	2.0
56 - 65	2.0	2.0	1.6

The group mean was 1.94, while the art minors' mean was 1.71.

All teachers in the group agreed that the incorporation of design principles into industrial arts teaching units should accelerate learning and increase interest.

The teachers in the 25 to 35 year age group agreed most closely among themselves, having a mean response difference of .3. The greatest diversity of opinion was found among teachers in the 36 to 45 years age group, where the mean response difference was .8.

Teachers under the age of 25 and over the age of 56 agreed more closely with each other than did any other two age groups.

The most homogenous group of teachers taught in the Class B schools, where their mean response range was 1.6 to 2.0.

Question 14. A program which includes instruction in the elements of design and color is too time consuming to justify its incorporation into the industrial arts program.

The mean responses to Question 14 were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		4.0	3.3
25 - 35	3.6	4.0	2.6
36 - 45	4.6	4.0	3.9
46 - 55	4.0	3.7	4.2
56 - 65	4.0	4.0	3.6

The group mean was computed at 3.75, while the art minors' mean was 4.30. As a whole, the teachers disagreed with the premise that instruction in color and design was too time consuming to warrant its inclusion in the industrial arts program. Some teachers tended toward an expression of no opinion or neutrality.

Teachers from Class B schools who were under the age of 36 tended to express no opinion regarding Question 14 more frequently than did any other age group or school classification.

Teachers who were over 56 years of age tended to agree within the age group more frequently than did the other age groups, having a mean response difference of .4.

Class A teachers showed the highest agreement with one another, having a mean response range of 3.7 to 4.0.

The art minors disagreed strongly with the item, having a mean response of 4.30. Class AA teachers between the ages of 36 and 45 agreed closely with the art minors, as did Class B teachers in the 46 to 55 years age group.

Question 15. If instruction in design were to be incorporated into the industrial arts curriculum it would require an additional teacher.

The mean responses of teachers in Class AA, A, and B schools to this item were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		4.0	2.5
25 - 35	3.5	3.4	3.4
36 - 45	3.6	3.8	3.7
46 - 55	4.0	3.7	3.4
56 - 65	3.0	3.0	3.9

The group mean was 3.13, with the art minors' mean being 3.58. As a group the teachers expressed neutrality or no opinion regarding the item. This could be interpreted to mean that the teachers could not definitely state whether an additional teacher would be needed in order to incorporate design instruction into the industrial arts curriculum. One teacher made the comment, "Someone teaching in the curriculum should be qualified."

Teachers between the ages of 25 and 35 agreed very closely with one another, having a mean response difference of .1. The most diverse answers came from the teachers under 25 years of age. Their mean response difference was 1.5.

Mean response differences of 1.0 were computed for all teachers in the Class AA and Class A schools.

Although the group mean was within the no opinion area of the scale, the art minors trended toward the disagreement end of the scale, apparently reflecting their belief that incorporation of design principles could be accomplished without the addition of another teacher.

Question 16. The incorporation of design elements into the industrial arts program should be limited to furniture and related design problems.

The mean responses computed for Question 16 were as follows:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		4.0	3.7
25 - 35	4.5	3.8	4.0
36 - 45	4.0	3.6	3.3
46 - 55	4.3	4.2	4.2
56 - 65	4.0	4.0	3.0

The group mean was 3.62, and the art minors' mean was 4.30. The teachers, as a group, disagreed with the statement regarding limiting design incorporation to furniture and related design problems. Some expression of no opinion or neutrality was noted, primarily from Class B teachers between the ages of 36 and 45 and over 56 years of age.

Teachers between the ages of 46 and 55 were in closest agreement about the item, with a mean response difference of .1.

Teachers in the Class AA schools agreed most closely as a group, with a mean response range of 4.0 to 4.5 and a resultant mean response difference of .5.

The art minors tended to respond similarly to the teachers between the ages of 46 and 55, strongly disagreeing with the item.

Question 17. Awareness and basic understanding of design principles has very little bearing upon an industrial arts student's projects.

The mean responses for Question 17 were:

<u>Age Group</u>	<u>Mean Responses by Class of Schools</u>		
	<u>AA</u>	<u>A</u>	<u>B</u>
Under 25		4.5	4.3
25 - 35	4.8	4.4	3.8
36 - 45	5.0	4.0	3.8
46 - 55	4.0	4.2	4.2
56 - 65	4.0	4.0	4.4

The group mean was 4.05 and the art minors' mean was 4.45. All teachers disagreed with the item, indicating their belief that awareness and basic understanding of design principles is influential in the projects of industrial arts students.

Teachers under 25 years of age and in the age group 46 to 55 were in closest agreement about the statement, having mean response differences of .2.

The teachers from the Class A and Class B schools tended to agree more within their groups than did the Class AA teachers. Mean response differences of .5 and .6 were computed for the Class A and Class B teachers, respectively.

The art minors answered similarly to the under-25 teachers, and strongly disagreed with the question.

Chapter 4

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The problem undertaken in this study was to determine the opinions of Montana high school industrial arts teachers in Class AA, A, and B schools about creative design in industrial arts education.

Three purposes, in addition to the major one stated above, were identified for the study: (1) to determine if the opinions of teachers differed among the three classes of schools; (2) to determine if age and/or years of teaching experience affected the opinions of teachers; and (3) to determine if the level of education attained and/or the areas of teaching major or minor affected the responses.

The sample included all industrial arts teachers listed by the Office of the Superintendent of Public Instruction as teaching industrial arts on a full time or part time basis during the 1969-1970 school year. One hundred twenty-three teachers met this criterion, and were mailed a seventeen-item questionnaire.

Of the one hundred twenty-three questionnaires distributed, 88 were returned, for a return percentage of 71.5.

In addition to responding to the seventeen items by either agreeing, disagreeing, or expressing no opinion or neutrality, the teachers were requested to give some personal information about themselves. The areas in which the teachers were asked to give personal information in-

cluded age, years of teaching experience, highest degree earned to date, teaching major and teaching minor. No decisive differences in opinion were measured when the questionnaires were grouped by age, years of teaching experience, highest degree earned to date, and class of school. Therefore, it was decided to utilize the age group of the teacher and the class of school in which he taught as the basic framework for the interpretation of data. It was believed that teachers having a teaching major or minor in art might respond differently from the remainder of the sample, so the responses of the seven teachers in this category were tabulated separately from the other teachers and entered as "art minors'" responses.

Using the factors of age and class of school, the mean response to each question was computed.

Conclusions

In general, teachers whose ages were between 25 and 36 years tended to agree among themselves when responding to the questions. On eleven of the 17 questions, teachers in this age group agreed among themselves.

A definite expression of agreement or disagreement was given to all questions except items 9 and 15. Teachers responded with a no opinion or neutral opinion to those items.

Teachers from all classes of schools agreed among themselves, by class of school, to some questions. Class AA teachers agreed least

often among themselves, agreeing when answering items 6, 8, 10, 11, 15, and 16. Class A teachers agreed among themselves most frequently, being in agreement about items 1, 2, 6, 7, 10, 11, 14, 15, and 17. Class B teachers were in agreement with each other when responding to items 4, 5, 7, 10, 11, 12, 13, and 17.

The art minors agreed with the remainder of the sample on eleven of the items, disagreeing on six.

The questionnaire items were designed to sample three categories of opinion: (1) economics, which included the extra time and staff involved in developing a creative industrial arts program; (2) the value or worth of the creative design program itself; and (3) individual opinions of teachers about student learning and motivation in the industrial arts area.

The art minors disagreed with the remainder of the sample on all of the items (6, 14, and 15) which were designed to elicit opinions about the economic aspects of creative industrial arts. This would tend to indicate that the art minors believed that creative industrial arts could be accomplished with less economic strain than did the remainder of the teachers.

The art minors and the other industrial arts teachers were in agreement about three of the items (5, 11, and 12) which sampled opinions about the value or worth of the creative industrial arts program. In responding to item 1, the art minors expressed no opinion or a neu-

tral opinion while the remainder of the teachers disagreed with the question. Question 1 was stated: "An industrial arts student' understanding of the elements and principles of good design has little to do with his project solving ability."

The remaining two items about which there was disagreement between the art minors and the rest of the sample were questions 9 and 10. The art minors expressed disagreement and the remaining teachers expressed neutrality or no opinion to Question 9. "In actual practice it is impossible to follow the philosophy of permitting the student's creativity to supply designs for project solving." The difference in opinion might be interpreted as meaning that the industrial arts teachers who did not have art minors had not used this approach, while the art minors had.

Question 10 was stated: "The industrial arts student who has taken design courses ultimately will be more successful in industrial arts than the student without the design background." The art minors tended toward no opinion or neutrality regarding this item, while the industrial arts teachers agreed with the item. The diversity of opinion might be due to the fact that industrial arts teachers who have minors in art routinely include instruction in design in their I.A. teaching units, and that industrial arts teachers who do not have the background in art themselves have observed that students who do take design courses consistently achieve higher than students who do not have the design instruction.

At the completion of tabulating the responses to the questionnaire and computing the mean response to each question, the following items received a consensus of agreement from the participants:

1. Creations by craftsmen are basically works of art (Mean = 2.18).
2. An industrial arts student's projects should reflect something of himself (Mean = 1.78).
3. An industrial arts student should be able to apply elements and principles of good design and color (Mean = 1.59).
4. Design and principles of color are skills in which industrial arts students should have instruction (Mean = 1.68).
5. The industrial arts student should consider the physical properties of materials, i.e., "material honesty", in researching and planning to solve the problems of texture and color (Mean = 1.86).
6. As the industrial arts student continues in the curriculum he should rely more upon his own creativity rather than upon copying from a catalog or from another's design (Mean = 1.68).
7. The industrial arts student who has taken design courses ultimately will be more successful in industrial arts than the student without the design background (Mean = 2.25).
8. To become an effective craftsman, one should have at least elementary training in design (Mean = 1.99).
9. The formation of a good design and the solution of the problem

offer a variety of avenues to the understanding of industrial problems (Mean = 1.87).

10. The incorporation of design principles into industrial arts teaching units should help to accelerate learning and increase interest (Mean = 1.94).

As a group the teachers disagreed with the following items:

1. An industrial arts student's understanding of the elements and principles of good design and color has little to do with his project solving ability (Mean = 3.77).

2. In order to be practical, design problems should be left to the art teacher and construction techniques to the industrial arts teacher (Mean = 4.15).

3. A program which includes instruction in the elements of design and color is too time consuming to justify its incorporation into the industrial arts program (Mean = 3.75).

4. The incorporation of design elements into the industrial arts program should be limited to furniture and related design problems (Mean = 3.62).

5. Awareness and basic understanding of design principles has very little bearing upon an industrial arts student's projects (Mean = 4.05).

Recommendations

In order for the industrial arts program to fulfill the needs of

the students and make the courses more useful and interesting to the students, design principles should be incorporated into the program at an early level. As the student progresses in the program he should be given more responsibility for the design as well as the construction of a project.

Further study of the area of creative industrial arts would aid in the delineation of the principles of design which would be appropriate for various levels of students.

Additional comments made by teachers participating in this study have been included in Appendix E, page 55, in order that their suggestions might be available to those interested in further study of this area.

APPENDIXES

APPENDIX A. Cover Letter

Box 925
Bozeman, Mt. 59715
April 11, 1970

Dear

I am a graduate student in the College of Education at Montana State University. As partial fulfillment of the requirements for the degree of Master of Education, I am undertaking a study of one aspect of industrial arts education.

The enclosed questionnaire attempts to measure the opinions of industrial arts teachers in relation to the teaching of color and design as a part of industrial arts instruction.

Since you are a teacher of industrial arts, I am interested in your opinions and comments about design and color in industrial arts education. I would appreciate your completing the enclosed questionnaire and returning it in the envelope provided no later than April 20, 1970.

Your name is not required. Please be assured that all responses will remain confidential and will be used only for the purposes of this study.

Thank you for your assistance.

Sincerely,

/s/ Thomas F. Ferguson

Thomas F. Ferguson
Graduate Student
Montana State University

TFF:mf
Enclosures

APPENDIX B. Questionnaire

Please respond to the following statements as spontaneously and honestly as possible by checking the number between one (1) and five (5) which most closely corresponds to your opinion about each statement. One (1) represents complete agreement with the statement, while five (5) represents complete disagreement with the statement.

Example:

- a. The best teacher is one who tells students exactly what is to be done and how to do it. (1) (2) (3) (4) (5)

Answer Possibilities

- (1) agree completely
- (2) agree
- (3) neutral or no opinion
- (4) disagree
- (5) completely disagree

1. An industrial arts student's understanding of the elements and principles of good design and color has little to do with his project solving ability. (1) (2) (3) (4) (5)
2. Creations by craftsmen are basically works of art. (1) (2) (3) (4) (5)
3. An industrial arts student's projects should reflect something of himself. (1) (2) (3) (4) (5)
4. An industrial arts student should be able to apply elements and principles of good design and color. (1) (2) (3) (4) (5)
5. Design and principles of color are skills in which industrial arts students should have instruction. (1) (2) (3) (4) (5)
6. In order to be practical, design problems should be left to the art teacher and construction techniques to the industrial arts teacher. (1) (2) (3) (4) (5)

Answer Possibilities

- (1) agree completely
- (2) agree
- (3) neutral or no opinion
- (4) disagree
- (5) completely disagree

- 7. The industrial arts student should consider the physical properties of materials, i.e., "material honesty", in researching and planning to solve the problems of texture and color. (1) (2) (3) (4) (5)
- 8. As the industrial arts student continues in the curriculum he should rely more upon his own creativity rather than upon copying from a catalog or from another's design. (1) (2) (3) (4) (5)
- 9. In actual practice it is impossible to follow the philosophy of permitting the student's creativity to supply designs for project solving. (1) (2) (3) (4) (5)
- 10. The industrial arts student who has taken design courses ultimately will be more successful in industrial arts than the student without the design background. (1) (2) (3) (4) (5)
- 11. To become an effective craftsman, one should have at least elementary training in design. (1) (2) (3) (4) (5)
- 12. The formation of a good design and the solution of the problem offers a variety of avenues to the understanding of industrial problems. (1) (2) (3) (4) (5)
- 13. The incorporation of design principles into industrial arts teaching units should help to accelerate learning and increase interest. (1) (2) (3) (4) (5)
- 14. A program which includes instruction in the elements of design and color is too time consuming to justify its incorporation into the industrial arts program. (1) (2) (3) (4) (5)

Answer Possibilities

- (1) agree completely
- (2) agree
- (3) neutral or no opinion
- (4) disagree
- (5) completely disagree

15. If instruction in design were to be incorporated into the industrial arts curriculum it would require an additional teacher. (1) (2) (3) (4) (5)
16. The incorporation of design elements into the industrial arts program should be limited to furniture and related design problems. (1) (2) (3) (4) (5)
17. Awareness and basic understanding of design principles has very little bearing upon an industrial arts student's projects. (1) (2) (3) (4) (5)

ADDITIONAL COMMENTS:

PERSONAL DATA: Please supply the following information about yourself.

Age:

Years of Teaching Experience:

_____ under 25
 _____ 25 - 35
 _____ 36 - 45
 _____ 46 - 55
 _____ 56 - 65
 _____ over 65

_____ 0 - 3
 _____ 4 - 7
 _____ 8 - 10
 _____ 11 - 15
 _____ 16 - 25
 _____ over 25

Highest Degree Earned to Date:

_____ BS/BA _____ MS/MA _____ Ph.D./Ed.D. _____ Other, specify

Teaching Major: _____ Industrial Arts _____ Other, specify

Teaching Minor: _____ Industrial Arts _____ Other, specify

APPENDIX C. Responses of Eighty-eight Montana High School Industrial Arts Teachers
to Questions Regarding Creative Design in Industrial Arts*

	Agree 1	2	3	4	Disagree 5
1. An industrial arts student's understanding of the elements and principles of good design and color has little to do with his project solving ability.	5	8	10	37	25
2. Creations by craftsman are basically works of art.	21	34	11	14	4
3. An industrial arts student's projects should reflect something of himself.	32	42	9	3	
4. An industrial arts student should be able to apply elements and principles of good design and color.	43	40	5		
5. Design and principles of color are skills in which industrial arts students should have instruction.	33	49	5		
6. In order to be practical, design problems should be left to the art teacher and construction techniques to the industrial arts teacher.	1	4	8	44	31
7. The industrial arts student should consider the physical properties of materials, i.e., "material honesty", in researching and planning to solve the problems of texture and design.	22	47	15		

	Agree					Disagree				
	1	2	3	4	5	1	2	3	4	5
8. As the industrial arts student continues in the curriculum he should rely more upon his own creativity rather than upon copying from a catalog or from another's design.	37	38	9	3						
9. In actual practice it is impossible to follow the philosophy of permitting the student's creativity to supply designs for project solving.	4	17	14	45	6					
10. The industrial arts student who has taken design courses will ultimately be more successful in industrial arts than the student without the design background.	11	44	17	9	4					51
11. To become an effective craftsman, one should have at least elementary training in design.	25	46	7	6	3					
12. The formation of a good design and the solution of the problem offers a variety of avenues to the understanding of industrial problems.	22	56	9	1						
13. The incorporation of design principles into industrial arts teaching units should help to accelerate learning and increase interest.	20	51	12	3						

	Agree 1	2	3	4	Disagree 5
14. A program which includes instruction in the elements of design and color is too time consuming to justify its incorporation into the industrial arts program.	2	3	16	54	11
15. If instruction in design were to be incorporated into the industrial arts curriculum it would require an additional teacher.	3	12	18	39	9
16. The incorporation of design elements into the industrial arts program should be limited to furniture and related design problems.	3	6	11	47	19
17. Awareness and basic understanding of design has very little bearing upon an industrial arts student's projects.			9	42	36
					52

* When the total responses for any one item do not equal 88, the remaining teachers did not respond to that item.

APPENDIX D. Mean Responses to Questionnaire of Eighty-eight Montana High School Industrial Arts Teachers by Age and Class of School

Item	Age and Class of School														Group Mean
	Under 25			25 - 35			36 - 45			46 - 55			56 - 65		
	A	B	AA	A	B	AA	A	B	AA	A	B	AA	A	B	
1	3.0	3.5	3.8	4.0	4.0	4.8	4.6	4.0	3.0	4.0	3.0	4.0	4.0	3.8	3.77
2	2.0	3.2	2.1	2.2	1.9	3.2	3.3	2.0	3.0	2.5	1.4	2.0	2.0	2.6	2.18
3	2.5	2.0	1.4	1.8	1.9	1.4	2.2	1.5	1.8	2.0	1.2	2.0	3.0	2.0	1.78
4	2.0	1.7	1.6	1.4	1.6	1.0	2.7	1.5	2.5	1.3	1.6	2.0	2.0	1.8	1.59
5	2.0	1.8	1.6	1.4	1.6	1.2	2.0	1.5	1.8	2.0	2.0	2.0	1.0	1.6	1.68
6	4.5	3.5	4.3	4.6	4.0	4.6	4.2	4.5	4.0	4.5	4.2	4.0	4.0	3.6	4.15
7	2.0	1.7	1.8	2.0	1.9	1.6	2.2	1.9	1.7	2.0	1.8	3.0	2.0	1.8	1.86
8	2.0	1.5	1.7	1.4	1.6	1.6	1.8	1.6	1.7	2.7	2.6	2.0	1.0	1.8	1.68
9	3.0	3.7	3.0	3.6	3.7	4.0	3.2	2.2	3.5	4.0	4.2	3.0	3.0	3.0	3.36
10	1.5	2.7	2.0	2.4	2.4	3.0	2.6	2.7	2.3	2.0	2.2	2.0	2.0	1.8	2.25
11	2.0	1.7	2.1	2.4	2.0	1.4	1.2	2.3	2.8	1.8	2.0	2.0	2.0	1.6	1.99
12	1.5	2.2	1.7	1.8	1.8	1.4	1.8	1.9	2.3	2.8	1.8	2.0	2.0	1.8	1.87
13	1.5	2.0	2.0	2.2	1.9	1.4	2.2	1.8	2.5	2.2	2.0	2.0	2.0	1.6	1.94

Item	Age and Class of School														Group Mean			
	Under 25*				25 - 35				36 - 45				46 - 55				56 - 65	
	A	B	AA	A	B	AA	A	AA	B	AA	A	B	AA	A	B			
14	4.0	3.3	3.6	4.0	2.6	4.6	4.0	3.9	4.0	3.7	4.2	4.0	4.0	3.6	3.75			
15	4.0	2.5	3.5	3.4	3.4	3.6	3.8	3.7	4.0	3.7	3.4	3.0	3.0	3.9	3.13			
16	4.0	3.7	4.5	3.8	4.0	4.0	3.6	3.3	4.3	4.2	4.2	4.0	4.0	3.0	3.62			
17	4.5	4.3	4.8	4.4	3.8	5.0	4.0	3.8	4.0	4.2	4.2	4.0	4.0	4.5	4.05			

* No teachers under the age of 25 taught in Class AA schools.

APPENDIX E. Comments From Montana Industrial Arts Teachers

From Class AA Teachers

"I have never taken a course in color and design but definitely feel I need one."

"Design should most probably be taught by the art department because it appears that few I.A. have the ability to teach it -- but it is doubtful this much efficiency could be achieved in curriculum coordination because of the interdepartmental bickering. Design should therefore be handled in the shops as much as possible. The ability and interest level of the students wouldn't allow institution of a comprehensive design program anyhow. Its (sic) a drag just to get to school for most of these guys."

"It would be interesting to review the definitions and philosophies pertaining to industrial arts of the participants of this questionnaire. . . ."

"I agree with your efforts - I would suggest that such a course be a prerequisite for regular I.A. Unit Shops or included in the first of a series in I.A. class. This could be taught in a (sic) American industries course. . . . We at present here only have a general shop - which means general approach to all areas with not much time in any area. This makes teaching design very limited but just as important. I have found student creativity to be one of my biggest problems in teaching. . . ."

From Class A Teachers

"I believe some students have a (sic) inborn feeling of good design and color principles while other students do not have this. Of course this can be improved with instruction in design."

"The talents and individual abilities should never be overlooked. Given the opportunity some students, and perhaps this could be many students will excel in artistic avenues with proper facilities and stimulation."

From Class B Teachers

"I consider woodworking a very small part of Industrial Arts."

Things of major importance are welding, engine tuneup, metal working, electronics."

"On a high school level too much time should not be spent on color and design."

"Time does not allow extensive instruction in design. I do spend time on design but no on color."

"I teach Art and Industrial Arts. I.A. can help Art nearly as much as the other helps I.A."

"In the areas of color and design, I spend very little time with color but I do elaborate some on design. It is difficult, do (sic) to the time the students have to work, to have them express themselves with individual designs of projects. Most of our projects are copied from others."

"Design and color should be entered into all courses. A student who copies designs will soon become bored and lose interest, every student has his own ideas on how projects should look."

"I believe why more design is not stressed is because few I.A. instructors qualify as acceptable design instructors. This is essential -- to know the subject -- in order to 'get design across,' otherwise, design will be boring, losing the students' interest. Much more stress should be placed on design, not only from the industrial aspect, but in everyday living."

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