AN INDUSTRIAL ARTS TEACHER EDUCATION PROGRAM
FOR ELEMENTARY SCHOOLS.

DISSERTATION
Presented in Partial Fulfillment of the Requirements
for the Degree Doctor of Philosophy in the
Graduate School of the Ohio State
University

By
HAROLD G. GILBERT, B. S., M. A.

The Ohio State University
1955

Approved by:

[Signature]
Advisor
AN INDUSTRIAL ARTS TEACHER EDUCATION PROGRAM

FOR ELEMENTARY SCHOOLS
For a long time teachers and leaders have talked about the desirability of industrial arts in the elementary schools, and it is expected that this movement will go forward rapidly in the next few decades. School administrators and architects are beginning to see the need for craft and industrial activities at the lower levels, and the new buildings consistently contain provisions, either for a separate room for such activities, or for facilities within or adjacent to the classrooms themselves. Present indications are that the elementary child of tomorrow will not be excluded from participation in industrial arts activities as are thousands of children today.
Classroom teachers in elementary schools are beginning to utilize more life experiences that involve the use of a variety of equipment, materials and tools. An industrial arts consultant can provide teachers with the assistance they need to enrich their classroom activities in such a manner.

A specialist who can serve in the above capacity needs teacher education experiences in industrial arts education to prepare him for the situations he will meet in the elementary schools. This study attempts to describe the situations and then to recommend significant content to be included in industrial arts and elementary education programs.

The guidance of Professor William E. Warner was the source of inspiration that led the author through a program of professional development leading to this dissertation study. The other members of the graduate committee, Professor Earl W. Anderson and Professor Lowry W. Harding, provided invaluable assistance in clarifying problems and giving positive direction.

Many other people have assisted. Outstanding among them were: the members of the administration and faculty of the Teachers College at Oswego, administrators who returned the questionnaire, and consultants who conducted tours of their schools. Mrs. Gilbert served most capably as proofreader and typist.

November 22, 1955

HAROLD G. GILBERT
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. PLAN OF THE STUDY</td>
<td>1</td>
</tr>
<tr>
<td>II. DERIVATION OF INDUSTRIAL ARTS EDUCATION</td>
<td>9</td>
</tr>
<tr>
<td>III. DEVELOPMENT OF CURRICULUM ELEMENTS</td>
<td>53</td>
</tr>
<tr>
<td>IV. SURVEY OF NEW YORK STATE NEEDS FOR SPECIALISTS</td>
<td>105</td>
</tr>
<tr>
<td>V. ANALYSIS OF THE WORK OF THE SPECIALIST</td>
<td>131</td>
</tr>
<tr>
<td>VI. RECOMMENDED EXPERIENCES FOR PREPARING SPECIALISTS</td>
<td>152</td>
</tr>
<tr>
<td>VII. CONCLUSIONS AND RECOMMENDATIONS</td>
<td>195</td>
</tr>
<tr>
<td>VIII. SUMMARY</td>
<td>202</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>205</td>
</tr>
<tr>
<td>1. Elementary Industrial Arts at Oswego</td>
<td>206</td>
</tr>
<tr>
<td>2. Comprehensive Examination</td>
<td>208</td>
</tr>
<tr>
<td>3. Workers in the Five Units of the Curriculum</td>
<td>219</td>
</tr>
<tr>
<td>4. Directory of Consultants</td>
<td>222</td>
</tr>
<tr>
<td>5. Check List for Schools with Consultants</td>
<td>224</td>
</tr>
<tr>
<td>SELECTED BIBLIOGRAPHY</td>
<td>226</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Estimated Supply of Energy</td>
<td>45</td>
</tr>
<tr>
<td>II. Manipulative Activities Engaged in by Elementary Students</td>
<td>57</td>
</tr>
<tr>
<td>III. Industrial Arts Areas of Experiences</td>
<td>71</td>
</tr>
<tr>
<td>IV. Number of Principals Returning Questionnaires</td>
<td>112</td>
</tr>
<tr>
<td>V. Replies to Question Number One</td>
<td>114</td>
</tr>
<tr>
<td>VI. Replies to Question Number Two</td>
<td>115</td>
</tr>
<tr>
<td>VII. Replies to Question Number Three</td>
<td>117</td>
</tr>
<tr>
<td>VIII. Replies to Question Number Four</td>
<td>119</td>
</tr>
<tr>
<td>IX. Replies to Question Number Five</td>
<td>120</td>
</tr>
<tr>
<td>X. Comparison of Replies to Questions Number One to Five</td>
<td>122</td>
</tr>
<tr>
<td>XI. Factors that Impede Growth of Industrial Arts</td>
<td>124</td>
</tr>
<tr>
<td>XII. Industrial Arts Consultants Visited</td>
<td>132</td>
</tr>
<tr>
<td>XIII. Outline Used in Visiting Sixteen Schools</td>
<td>133</td>
</tr>
<tr>
<td>XIV. Industrial Arts Curriculum at Oswego</td>
<td>156</td>
</tr>
<tr>
<td>XV. Elementary Education Curriculum at Oswego</td>
<td>157</td>
</tr>
</tbody>
</table>
**LIST OF ILLUSTRATIONS**

<table>
<thead>
<tr>
<th>Illustration</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Curriculum Essentials for Industrial Arts</td>
<td>68</td>
</tr>
<tr>
<td>II. Plan for an Elementary Classroom</td>
<td>88</td>
</tr>
<tr>
<td>III. Elementary Classroom Workbench</td>
<td>92</td>
</tr>
<tr>
<td>IV. Elementary School Workroom</td>
<td>95</td>
</tr>
<tr>
<td>V. Questionnaire to Elementary School Principals</td>
<td>109</td>
</tr>
<tr>
<td>VI. Industrial Arts Activities</td>
<td>137</td>
</tr>
<tr>
<td>VII. Portable Classroom Units</td>
<td>139</td>
</tr>
<tr>
<td>VIII. Physical Settings for Industrial Arts</td>
<td>142</td>
</tr>
<tr>
<td>IX. Industrial Arts Classroom Activities</td>
<td>144</td>
</tr>
<tr>
<td>X. Elementary Industrial Arts Laboratory at Oswego</td>
<td>176</td>
</tr>
<tr>
<td>XI. Proposed Elementary Industrial Arts Laboratory</td>
<td>178</td>
</tr>
</tbody>
</table>
Chapter I

PLAN OF THE STUDY

A current trend in education seems to be toward life experiences which involve the manipulation of tools and materials. In the latter work the industrial arts teacher is especially effective because of his technical studies and industrial experiences. Although this trend is also evident in secondary education, elementary education seems to have progressed much further in actual implementation of the theories.

BACKGROUND OF THE STUDY

The significance of this trend for industrial arts education first appeared to this student in graduate study at the Ohio State University under Laura Zirbes, Professor of Elementary Education. In class discussions, group meetings with elementary teachers, and extensive reading, the trend toward activity work was definitely evident at the elementary school level.

The leadership of Professor William E. Warner in the field of industrial arts curriculum development provided an opportunity to explore the possibilities of using industrial arts to make a significant contribution toward this activity movement. Intensive curriculum research was carried out by a number of graduate students working together in this area.

A faculty committee at the State University of New York, Teachers College, Oswego outlined an Industrial Arts Teacher Education Program
for Elementary Schools. From this proposal, curriculums for industrial arts education and elementary education majors were adopted as outlined in Appendix 1. These were the only suggestions provided and this dissertation deals with the development of the program from that situation.

STATEMENT OF THE PROBLEM

A preliminary survey and brief recommendations of a faculty committee for an Industrial Arts Teacher Education Program for Elementary Schools raised the need for answers to the following problems:

1. The bases, program and curriculum elements for industrial arts in elementary grades, kindergarten through six.
2. The need for industrial arts consultants in the schools.
3. The need for elementary classroom teachers with special industrial arts training in the schools.
4. The responsibilities of an industrial arts consultant.
5. The responsibilities of an elementary teacher with special training in industrial arts.
6. The teacher education experiences, in addition to the requirements for all industrial arts teachers, that might best qualify industrial arts specialists for elementary school teaching.
7. The teacher education experiences, in addition to the requirements for all elementary teachers, that might best qualify elementary teachers to use industrial arts experiences.

The study of these problems is made as they relate to the public elementary schools in New York State, outside of New York City. Two colleges in this area, the State University of New York teachers
colleges at Buffalo and Oswego, provide most of the industrial arts teachers for the schools, and eight other state colleges provide elementary teachers as well as private colleges. The search for knowledge to solve the problems stated will continue beyond the time of this report.

Although this study is concerned directly with the elementary schools and state teachers colleges in New York State, the problem is national as Gallan (10, p. 155)* said in his survey of industrial arts teacher education institutions:

Particular attention should be given to the fact that elementary industrial arts occurs in but four programs, while thirty-three, or 90 percent of the programs, make no provisions for work on this level. Frequent mention is made of elementary industrial arts in the catalogs, but this work is not made available to industrial arts majors. Only eleven percent of the colleges require some preparation in this area as part of the major. It is not even listed as an elective in any other program.

This statement indicates that the information gathered in regard to the problem stated above might be considered in the development of programs in teacher education elsewhere.

METHODS OF RESEARCH USED

The solution of the problems stated above may be derived from research according to Whitney's (104, p. 341) definition of curriculum revision which said:

Curriculum revision is research if it isolates problems of course content and organization and methods of teaching, accepts hypotheses for their solution, and gets all the evidence

* Figures in parenthesis are numbers of references in the Selected Bibliography. This form of notation is used throughout the study.
obtainable on these tentative conclusions. Then good generalizations for the conduct of educational effort will appear, and experimental tests of their permanency can be made for prediction values.

The problems of course content and organization, and methods of teaching are discussed in Chapters II and III which contain bibliographical studies for the derivation of industrial arts education and the development of curriculum elements. The Selected Bibliography was prepared from an inspection of the following resources:

1. Bibliographies in graduate studies.
2. Card catalog at Ohio State University and Oswego State Teachers College.
5. Reading lists from graduate courses.

This inspection produced over 150 possible sources for materials. Study of these revealed that the 110 listed in the Selected Bibliography were applicable to this study. Of this list 96 have been quoted directly or referred to at least once and some as many as six times.

The hypothesis for the solution of the problems in curriculum revision mentioned by Whitney was established by the tentative curriculum at Oswego. Evidence on these tentative conclusions was gathered by means of a survey of New York State needs for specialists in Chapter IV which used teacher placement records and a questionnaire surveying
administrator opinions and an analysis of the work of the specialists which used a check list in the observation of sixteen school situations in addition to correspondence with schools.

The generalizations for the conduct of educational effort appear in the sixth chapter of recommended experiences for preparing specialists. The experimental tests of their permanency have been deferred beyond the time when this study is reported due to the fact that the program at Oswego was disrupted because of lack of staff time to teach the necessary courses.

A measuring instrument has been prepared to conduct experimental tests with second-half senior college students. It appears in Appendix 2. The questions were tried with college students and a revision made based upon the results. This test may be given to industrial arts seniors who have elected the sequence for specializing at the elementary level, to regular industrial arts students, to elementary education students who have elected the minor in industrial arts, and to regular elementary education students. A comparison of the results might be one indication of the comparative effectiveness of the sequence for specialization. A follow-up study of graduates after they have taught may provide another form of experimental test.

**TERMINOLOGY USED**

The following definitions are made to clarify the terminology used in this study:

**Industrial Arts.** Briefly, this is a study of production, consumption and recreation in a democratic, technological society with emphasis
upon experimentation with tools and materials. This definition in its
full extent is derived and documented in the second chapter. There are
a number of terms used to describe this work as Barich (4, p. 255)
explained:

We find the lack of common use of terminology, industrial
arts, handcraft, and construction are just some of the terms
picked at random which very often identify the same curriculum
area in an elementary school.

These additional terms, handcraft, craftwork, and construction,
might be supplemented by activity work, arts and crafts, household arts
and practical arts. Part of the confusion is due to the attempt to use
a different term when industrial arts activities are integrated with work
in other subject areas such as Newkirk (62, p. 4) explained in regard to
the Chicago schools:

Handwork is the planned modification of the construction
materials with the hands or hand tools, to express ideas in all
subjects adapted to a handwork approach and to provide a whole­
some means of creative leisure-time expression.

Thus handwork has a broader application than industrial
arts, because industrial arts is a curriculum subject in itself,
whereas handwork provides a part of the approach to learning in
many subjects.

This writer does not agree with this view of changing the name to
handwork when the activities are integrated with the work in other sub­
jects and maintains that industrial arts is the better term to describe
the work. This broader view is supported by a bulletin from the United
States Office of Education, The Place of Subjects in the Curriculum (5).
In that reference industrial arts was identified as a separate subject
in the curriculum because that is the curriculum plan of most elementary
schools and teachers colleges. However, the bulletin quotes Bess
Soodykoontz, then Director, Division of Elementary Education, United States Office of Education who said (5, Foreword):

Education should consist of meaningful, purposeful experiences if it is to be of practical use in everyday life, and if it is to have permanence. Such experiences that have real meaning for children and for which they can see an immediate use, rather than subjects as such, form the basis for teaching and learning in the modern elementary school. Through continuous planning, the curriculum of any group of children in any year becomes rich, broad and practical.

Industrial arts can be defined as a separate subject but still act as an experience that has real meaning when used with those other subjects to enrich the curriculum. Therefore, for this study the term "industrial arts" is used to include the other terms mentioned.

**Elementary School.** The writer considers an elementary school to include grades kindergarten through six, which is the general plan used for New York State. Although some elementary schools still include grades seven and eight they are in the process of placing the latter in a junior high school with the ninth grade. The eight grade elementary schools are usually found in the larger cities that have not found it feasible to revise their building programs.

**Laboratory.** This term is used to describe the resource center for industrial arts activities in the elementary school. It is used in preference to the term shop. The latter is defined as a place where things are produced according to plans given to a worker, while a laboratory is a place where experimentation and learning take place. For this reason the term laboratory is considered to be more appropriate than the term shop.
Industrial Arts Specialist. The term specialist describes a person in terms of his background in teacher education which has included more than the usual amount of industrial arts work to make a person's qualifications different from a regular classroom teacher or an industrial arts specialist.

Industrial Arts Consultant. This term describes a person in terms of his position in the elementary school where the classroom teachers and children seek his advice on matters relating to the teaching of industrial arts.

Atypical Industrial Arts. Industrial arts activities in the elementary school can be designed to serve the special needs of mentally retarded, physically handicapped or gifted children. These may be specified as atypical industrial arts experiences and are considered too large a field to include in this study of conventional and professional programs.

The background of the study, statement of the problem, methods of research used, and terminology used have attempted to establish the framework for this study of an industrial arts teacher education program for elementary schools. The following chapter contains the part of the bibliographical study concerning the derivation of industrial arts education.
Chapter II

DERIVATION OF INDUSTRIAL ARTS EDUCATION

As education develops to meet the needs of the present democratic technological society, industrial arts education plays an essential role in achieving the goals of that education. This theme was indicated in the Report of the Harvard Committee, General Education in a Free Society (32, p. 175) which stated that:

... we spoke of the importance of shop training for students who intend to go into scientific or technological work. Such experience is important for the general education for all. ... The bookish student needs to know how to do things as much as do students who do not plan to take further intellectual training. The direct contact with materials, the manipulation of simple tools, the capacity to create by hand from a concept in the mind - all these are indispensable aspects of the general education of everyone.

Industrial arts, then, is identified as a part of the general education of everyone. If this role is to be followed, Hornbake (36, p. 216) gave a point of departure:

Industrial arts should not set up ultimate objectives or aims. Thinking and practice in industrial arts should be kept within the scope and direction of the total school program. Industrial arts is not a special subject having unique attitudes and interests to develop.

The total school program needs to be analysed in relation to the nature of the individual, the characteristics of society, and the type of economy; these furnish postulated bases for the program and a definition of industrial arts education within the total program of the school.
POSTULATED BASES

The bases for industrial arts education may be postulated from an analysis of the social organization of society, a scientific study of individual nature and an examination of the economic structure. This division was used in a statement from Policies for Education in American Democracy (60, p. 186):

The general end of education in America at the present time is fullest possible development of the individual within the framework of our present industrialized democratic society.

This study of a part of education in America is based upon a scientific analysis to determine the fullest possible development of the individual. The framework of the present democratic society is provided by an analysis of the nature of society, and industrialized society implies the type of economic structure. Beginning with the individual each of these three is analysed to postulate the bases for industrial arts education.

Individual Basis. The first base to postulate for industrial arts education in the elementary school is a scientific study of individual nature, which has been the object of specialists in the areas of anthropology, biology, physiology and psychology. These men have made careful studies of the way in which growth, development and learning occur, resulting in principles of action which appear to rest upon observed facts. A summary of these principles is contained in the introduction to the book, Education for All American Children (59, p. 5), published by the Educational Policies Commission. As the basic statement of each of these seven principles is quoted below it is indicated how industrial arts activities in the elementary school conform to them.
1. Development and Growth Are Continuous. Industrial arts activities as well as other learning activities do not cease at the close of school. Culpepper (14, p. 89) wrote that one of the objectives of their program in Suffolk, Virginia was:

To foster in the student a desire for worth-while leisure time activity of a constructive nature.

This practice of carrying on hobbies at home will be discussed at length under the heading of Recreation under the societal basis later in this chapter. These recreation activities are valuable forms of development and growth that extend industrial arts activities into the home and community. Moore (56, p. 22) suggested a means of recognizing and encouraging this type of work saying that:

The school should give credit for work done at home. Teachers should recognize the imagination, the planning, the effort and the thought the child has put into the work. Schools might well exhibit home craftwork. These things the school can do to encourage children to work at crafts at home.

So the schools might try exhibits and other forms of recognition to give added incentive to children who spend their time outside of school profitably.

Development and growth in industrial arts activities can be encouraged in adults who have completed formal schooling. It is common practice for industrial arts teachers to hold evening work sessions for adults who enjoy developing hobbies, such as ceramics, furniture making, leathercraft or weaving. The adults not only spend their time profitably but also tend to encourage the development of their hobbies with other adults or children. The adults who have contact with the
schools increase their appreciation of the work the school is trying to accomplish. Elementary schools are usually spread throughout the neighborhoods where the children live, making it convenient for them to reach the schools.

The above statements indicate development and growth in industrial arts continues beyond the school day for school-age children and beyond the years of formal schooling to stimulate learning through hobbies.

2. Behavior Is Learned. Children react to industrial arts activities in such a way that they acquire a pattern of intelligent action which they review and apply to life situations. Bonser (7, p. 132) believed that work with tools and materials that are new to children stimulated learning because of an "investigative impulse". He thought that all children have an impulse to inquire, to explore, and to raise questions of "what" and "what for". Therefore as new tools, materials, and processes are introduced, children learn to control their behavior so they can satisfy the impulse to learn more about the new activity. This creates a natural readiness for learning which makes the experience very intensive and easy to recall for application to future situations.

Wiecking (105, p. 248) felt that industrial arts activities are essential for some children to learn the proper behavior. She wrote:

It is often very hard for the adult to realize the haziness, confusion, or meagerness of children's mental images. In using handwork as a means of clearing up such confusion, care must be taken that further confusion or inaccuracy does not result. It is the teacher's responsibility to weigh the values in any project planned.

Although some children can learn better through activities, care must be taken that they are not beyond their level of accomplishment. The
teacher may provide children with a very effective way of learning behavior through using industrial arts activities, but caution must be used to keep them within the ability of the individual child.

3. Learning and Growth Are Stimulated by both Security and Adventure. These can be provided in elementary grades through industrial arts. The importance of security was explained in the Report of the Sixth Annual Conference on Elementary Education (97, p. 15) sponsored by the United States Office of Education. It stated:

It must be recognized that the early years are very important in the lives of children. We must help children compensate for, and live with, some of the factors in their environment that we cannot change. The area of emotional and social needs is very important. Each child must succeed in some areas in school; this will compensate for some of the unsatisfactory home conditions.

This need for each child to succeed is related to the security that industrial arts can supply. This was indicated by Hornbake (37, p. 126) who made the following statement with regard to a possible area for that success:

Children who have little apparent success in dealing with symbols and abstractions can sometimes have relatively greater success in manipulating construction materials. If the school does not provide a variety of opportunities so that all children can succeed in some type of work, then the children who cannot perform well in the types of work available become a failure group, failures in school or failures to themselves.

Industrial arts activities are essential parts of the curriculum to prevent students falling into failure groups, because they offer the security that some children need for emotional balance. To some children, industrial arts is the only area that can provide this security, while many children attain a measure of security.
Adventure is offered in many contacts with new materials and processes, as well as with local industry. Children may work with wipe-on finishes, vacuum form plastic boats, or sit in the cockpit of a jet fighter. These are adventures which are learning experiences in areas of industrial arts. Learning and growth can be stimulated by both security and adventure in industrial arts activities.

4. Each Individual Is Unique. Industrial arts activities are organized in such a fashion that the teacher can meet the varying needs of individual children. Wilber (106, p. 24) explained this by writing:

Because of the somewhat less formal nature of the organization of an industrial arts class and a resulting closer personal relationship between the teacher and the student, the industrial arts teacher has a better opportunity to know his pupils intimately and to learn about their problems. This is a prime requisite in the meeting of needs. Secondly, because of the more informal nature of class organization, more opportunities are afforded to develop those relationships which promote the meeting of needs.

The teacher can consider individual differences in the organization of industrial arts activities and adapt to them. Those who have had very little experience in working with tools and materials may select a rather simple job, while the more advanced student may select more difficult work. For example, if a class in transportation is making a diorama of an airport, the more capable students can make model planes, the control tower and the service trucks, while the slower children can make the buildings out of boxes and paint the areas for runways, roads and walks. In this way all of the students can contribute their unique talents to the development of the unit.

Hornbake (57, p. 127) pointed out that industrial arts activities may provide an inventory of individual abilities. He wrote:
Many children learn of their abilities for the first time in the activities which the school provides. Talents are not necessarily apparent to the child, parent, or teacher as are warts or measles, but must generally be discovered through participation and observation.

Industrial arts activities can be organized to help discover unique abilities as well as adapt the classroom program to unique individuals.

5. *We Learn What We Live.* The change of emphasis upon types of learning in elementary classrooms has provided the opportunity for teachers to help children learn through live experiences like industrial arts activities. This change was described by Jones (39, p. 5) as:

> Formal reciting of assignments in a formal classroom has changed to directed activity in life situations. Much of formal drill on isolated factual items has changed to practice upon a unified series of activities concerned with a more unified life activity.

This unified series of activities combines industrial arts with other subject matter areas to provide life experiences. Roush (77, p. 31) explained it by saying:

> To understand its (industrial arts) many phases and divisions children must have actual experience in doing and in seeing done as many industrial processes as possible to have them made really a part of their lives.

The more intensive and active these experiences are, the more effective they will be in influencing future reactions. Therefore, when industrial arts activities provide for work with tools, machines and materials the resulting learning is more effective and can be more easily used in similar situations. For example, when learning to read a rule, children can make measurements in order to build a book rack or a table lamp. The experience of measuring wood so the parts fit together make the measuring experience more real than merely locating the dimensions.
If a student is unable to measure correctly the parts will not fit and he will see a real need for more practice in reading a rule. In that way industrial arts activities become more effective learning because they are living experiences.

6. We Always Learn Several Different Things at Once. Contrary to belief, it has been indicated that knowledge is acquired as well as skill during industrial arts activities. Collings (13, p. XVII), who experimented in this field, stated:

The second constituent idea is that actual learning is never single. In addition to the matter immediately at hand, there are always in simultaneous operation many concomitant learnings, chiefly perhaps the building of attitudes toward various other life interests involved in what is going on, as for example some degree of self-confidence, some sense of responsibility, a liking for or against the school as encouraging such, for or against the teacher for his part in it.

The attitudes of a child towards himself and others in his school environment would seem to be more positive in activity than in repetitive work. This was positively stated by Gunther, who conducted an experiment similar to Collings. Gunther (27, p. 44) concluded:

In the study of all units the objective was the understanding of the industrial process; manipulative experiences were introduced to further the development of clearer ideas and more appreciative insight into man's work. Measured by such objectives, the study makes a contribution to the emotional and physical development as well as to the intellectual development of the child. . . . The results show that the participating group not only gained as much subject matter as the non-participating group, but also they gained whatever values might accrue through the manipulation.

The above studies, although basic, were conducted a quarter of a century ago, but a similar study just completed by the research specialist of the New York State Teachers Association indicated
similar results. In conclusion of this extensive testing, Burke (9, p. 19) reported that:

Among the practices that are used frequently in the schools ranked "Highest" on mastery of the three R's are attention to individual differences among pupils, use of community resources in teaching, activities and projects which create practical problems and practical application of knowledge and skills, the use of modern instructional aids, enrichment of curricular offerings such as art and music.

These practices were not frequently used in schools ranking lowest on mastery of the three R's. These schools generally rely on textbooks and drill in teaching. Teachers have practically no assistance from specialists in handling children's learning difficulties.

The "three R's were measured by standard achievement tests in reading, writing and number work. Other advantages of industrial arts can be obtained in activity work as well as mastering "basic" subject matter. For example, the use of numbers takes place in weaving, the use of reading takes place when reading how to manipulate a marionette, and the practice of spelling takes place when setting type. The interest aroused by the activity provides a more effective way to acquire knowledge, attitudes and skills than otherwise, therefore, learning other than mechanical skills takes place during industrial arts activities.

7. We Learn a Great Deal and Learn It Rather Permanently by Example. Industrial arts activities can be organized to place some children in positions of responsibility where they will set a good example for the others. Roush (77, p. 34) accomplished this in the following manner:

Other tools, sets of tools, or materials were put in charge of monitors. These monitors were trustworthy children who were able to handle the tools themselves and were directly responsible to the teacher. They kept the tools sharp, clean, oiled and in order.
The monitors in this way learn to accept and discharge responsibility and the others learn by the example set. Children who aspire to become a monitor will watch them and govern their behavior so they may be selected for this position of honor. In this way housekeeping chores become effective learning situations.

The informal atmosphere provided by industrial arts makes it possible for children to learn through communication with each other. One school system discovered this by trying activity work in an extra large size class. Fordell (24, p. 57) reported the situation as follows:

A teacher of 46 children has desperate need to delegate responsibilities. The children in self-contained classrooms have been accepting their responsibilities.

They found that some children may learn more easily by having help from a classmate than from the teacher. This allows children to continue their work without waiting for help from the teacher. The latter is then free to spend more time with those that need his attention. The child providing the help is usually stimulated by the service that he renders, and by the esteem of the other children. Therefore the class benefits immensely by the informal work atmosphere. This experiment also indicates industrial arts can be used in large classes, if the teacher delegates responsibilities in order to create a classroom atmosphere where children can learn a great deal and learn it rather permanently by example.

This completes the study of individual nature as a basis for industrial arts education and turns to the environment of that individual to develop the second.
Societal Basis. The environment is not limited to the child's hours in school, but considers his actions in the home and community and in his later life as a citizen contributing to the development of society. This broad view incorporates a detailed study of the actions of the individual as an educated person, as a member of a family or community group, as a producer and consumer, and as an intelligent citizen in order to provide a picture of the environment. Such a study was sponsored jointly by the Educational Policies Commission of the National Education Association and the American Association of School Administrators. This study seems to be particularly valuable for two reasons: it is prepared by a group of educators, and not a single authority; second, it is used extensively by elementary schools as their statement of principles or the basis for preparing their statement. It is quoted as a basic statement by elementary education authorities such as Lee and Lee (46, p. 9), Michaelis (55, p. 4), and Otto (72, p. 103). The entire study was reported in the book, Policies for Education in American Democracy (60, p. 189), and used four main divisions for the detailed listing of desirable actions in society:

1. The Objectives of Self-Realization  
2. The Objectives of Human Relationship  
3. The Objectives of Economic Efficiency  
4. The Objectives of Civic Responsibility  

Each of the four main sets of objectives has sub-divisions which the book discusses in detail. As the headings of these are listed below, a statement is made indicating how industrial arts at the elementary grade level contributes to the development of the individual in that particular objective.
1. **The Objectives of Self Realization.** The development of society is a sum of the influence of each individual, so the first concern is for each to develop the necessary tools for building his influence in the best possible fashion.

   a. **The Inquiring Mind.** Industrial arts activities provide an opportunity to use children's natural curiosity to explore the characteristics of new materials. The following report of a classroom teacher shows how this curiosity was used to start a unit on home construction

   In a third grade classroom, the discussion veered one day to different types of houses in Great Neck (which has undergone a tremendous post-war building boom). The teacher, quick to sense a point of departure for an important learning experience, had the children bring in samples of bricks, cinder blocks, tiles, roofing paper, cement, and shingles for a classroom museum of building materials. Interest ran so high that by the end of the second week it looked as if this third grade could go into the contracting business immediately. The librarian was called in and asked whether she could set aside some books on housing and building for the class and she worked together with the teacher to assemble quite a collection - a collection suited, incidentally, to the four levels of reading ability which prevailed in this particular class.

   That third grade teacher was alert to use the inquiring minds of the children to learn about housing through the collection and identification of building materials. The class went ahead to build a small house in the park as a culminating experience.

   b. **Speech.** Activities often encourage children to practice good speech habits such as testing a telephone circuit or an amplifier. Hornbake (37, p. 125) found that these stimulate speech in the following manner:
Young children choose to express themselves through materials and then verbalize from the things constructed. A child may construct an apparatus and then explain to his classmates how it operates, or one student may read directions orally so the other students can follow them. By centering attention on the object or task at hand, a child may overcome any block to oral reading practice.

c. Reading. The construction of puppets is one example of how industrial arts activities involve reading practice. Miss MacMurtrie (53, p. 224) used the natural interest in puppetry to stimulate language arts work in this manner:

We begin our plans for the performance in the fall by holding discussions on puppets and marionettes. English class work is devoted at this particular time to research, reporting, and discussing many interesting facts about the origin and use of puppets throughout the ages.

Reading to find material and reporting it to the class become an integral part of the activity work with puppets. The use of oral language was enlarged upon by Wiecking (105, p. 248) who said:

Opportunities for oral language in connection with hand-work are unlimited. Discussions of plans and results are an integral part of the work, and children particularly enjoy talking about what they have made or are going to make.

There are many poems and stories of industry which will have more meaning for children when they have had some of the experiences upon which such literature is based.

There are opportunities for oral reading from plans that describe activities or give recipes for making things, and reading becomes more meaningful through children's contact with materials and processes of industry. Thus, industrial arts activities contribute to reading
through incentive to do research, oral reading and reporting, and vitalization of the meanings of poems and stories.

d. **Writing.** This can be used to plan industrial arts activities as soon as the children have acquired sufficient skill in writing. It can be used in the planning about which Moore (56, p. 51) said:

> Handcraft should stimulate purposeful planning. After the project has been chosen, the child must plan his work. This planning involves the making of many decisions such as the materials required, the size and design of the object, the tools needed, the processes involved, the decoration or ornament to be applied, and the type of finish to be used.

Writing out these plans serves two purposes: first, children have an opportunity to practice writing in life situations; second, a written plan is evidence that children have thought through a process before cutting materials. This system provides a positive learning situation in which to emphasize conservation of materials. Industrial arts activities become more effective when writing practice is used.

e. **Number.** Many activities are rich in number experiences, ranging from simple counting experiences in distributing supplies, to complex figuring of proportions to mix plaster of Paris. The effectiveness of these functional activities in teaching number concepts was illustrated in an experiment reported by Harding and Bryant (50, p. 321). The experimental group used activities such as building a grocery store to buy and sell goods, while the control group used the standard text with individual drill exercises. In describing the result the reference stated:

> By making a comparison in achievement, the experimenters found that the experimental group gained in the understanding of arithmetical data and developed more desirable attitudes
and social behavior than did the control group. This study indicates that the experience method of teaching was more effective than the traditional textbook method of teaching in developing desirable learning habits and emotional and social forms of behavior.

The children not only had an opportunity to get acquainted with tools and materials, but gained in their use of number concepts as well as in social forms of behavior.

f. Sight and Hearing. Industrial arts activities offer directed guidance in using sight and hearing during field trips. The children are prepared for trips to local industry by planning what to look for during the visit and upon returning evaluate their powers of observation. Bonser and Mossman (8, p. 17) explained why these visits were used:

Relatively few industrial processes can be carried on in school as they are in industry itself, and relatively few finished products can be brought to school. To derive the economic, artistic and social values for which we are striving, the work of the schoolroom has to be extensively supplemented. Frequent excursions very materially help in securing correct ideas of processes, conditions and products. Wherever there are industries operative in a community, these should be visited when the work in school in the respective industries is under way.

Thus industrial visits give children practice in gaining knowledge through the development of their sight and hearing senses in addition to the techniques generally used in the classroom. Also, children observe a teacher demonstrating mechanical processes which they are eager to try out themselves. This natural interest intensifies their use of sight and hearing to gain the information they need to perform the operations successfully. The effectiveness of their sight and hearing is put to an immediate evaluation, with the children able to measure the degree of success or failure concretely.
Health Knowledge. Industrial arts activities in the area of food manufacture provide situations for bringing out knowledge about the body's requirements for a proper diet. Some typical situations calling for growth in ability to meet health needs are listed by Stratemeyer (89, p. 126):

Finding major nutritional contributions of common foods (Asking about the meaning of common terms such as vitamin, calorie; finding out about new foods seen in the store; selecting items on the family grocery lists; finding the major nutritional contributions of such foods as milk, common vegetables . . . ).

When the children do baking, canning, and cooking they work with the common foods using the terms stated above. As they plan menus for parties and lunches they learn the nutritive values of food and the proper preparation of food to retain the most value and thus gain basic health knowledge.

Health Habits. A basic health habit is making safe conduct in traffic a common practice and industrial arts activities can be used to provide mock-ups of traffic devices that can be used in the classroom or on the playground. Jenney (38, p. 173) reported such a program at New Rochelle, New York:

This junior traffic training program gave the timid child self-confidence, and taught the over-aggressive one respect for the rights of others. All the children increased their respect for property and awareness of the need for rules to protect rights and property. Participation in the program was limited to kindergarten through second grade until the program had to be discontinued entirely when storage space for the little cars had to be converted into classrooms to relieve overcrowding.

The children made traffic signs and laid out a system of streets on the playground to practice traffic safety using miniature cars. Before they
made the signs they realized the need to regulate traffic so traffic safety became a basic health habit in their play.

Minor accidents, such as, cuts, scratches, and slivers in fingers result when working with tools and materials. The practice of first aid provides an opportunity to develop proper health habits in situations which the children will meet in the home and on the playground.

i. Public Health. Industrial arts activities bring elementary school children in contact with public health measures when they visit local industries. Winslow (109, p. VII) explained the part this plays by saying:

Elementary instruction in the industries will create in boys and girls a sufficient interest in and knowledge of things industrial to enlarge their ability to appreciate and enjoy the works of artist, mechanic, and manufacturer. Such an ability will be brought about (1) by investigating the conditions under which products are made; (2) by making drawings to illustrate forms, facts, and operations, thus clarifying industrial concepts; (3) by manipulating the materials from which articles are made, thus creating a new product; (4) by making decorative designs to enhance the beauty of objects.

Notice the emphasis on the first item about conditions under which products are made. Each industry emphasizes a safety program to insure proper working conditions for their employees. The investigation by the children can be directed to note the public health measures taken in factories.

j. Recreation. Technological advancement has made possible a large increase in the amount of time devoted to recreation. Moore (56, p. 14) said this had also carried down to the children:

Children have more leisure time today than children ever had before. . . . . This leaves an average of about eight
hours of free time daily. And it is free time! Children today have few duties to perform in the home.

The schools have an obligation to help children make profitable use of free time by helping them to develop hobbies such as cooking, leather-craft, model building, puppets, sewing and weaving. The value of this work in the schools was stated by Moore (56, p. 21):

The schools can help! If at school the child becomes interested in handicraft activities that require the materials and tools he could secure at home, there is little doubt that the carryover is good.

Today there is a large increase in the materials and tools that children have at home available to their use. The "Do-It-Yourself" movement has brought new tools, materials and machines into the home workshop as described in a recent issue of Time magazine (91, p. 66):

In the fast growing market, the fastest-growing business of all is in the basic machines for the do-it-yourself workshop. Before the war, the power-tool industry rarely topped $25 million in sales; now it is a $200 million business, with a 25% increase predicted for 1954, and its products are America's most popular gadgets.

School children not only need help in developing hobbies, but also need instruction and practice in the use of the machine tools that the above quotation indicates will be found in the home. Insurance companies indicate an alarming increase in the number of accidents in home workshops, so that positive action is needed to adapt the school program of industrial arts so it will provide the instruction to prevent accidents.

k. Intellectual Interests. Emphasis in industrial arts is often placed on manipulative activities to the exclusion of developing the possibilities of intellectual interests. The book, How Children Develop, (71, p. 36) indicated that during the ages of nine to eleven:
Children . . . are eager to extend their horizons intellectually as well as physically. They have a great interest in facts, and are interested in what things are made of and how they work in such fields as mechanics, science, and natural phenomena. This interest is likely to reach its height before adolescence.

Recognizing that children are eager for knowledge, the teacher needs to make reference material available for them to extend their intellectual interests. After a group has worked on assembling a crystal radio, some might like to study the effect of radio waves on various types of reception equipment. Children building musical instruments such as drums, xylophones or string instruments might study composition of music. Thus, emphasis on intellectual interests as well as the manipulative experiences increases the value of industrial arts.

1. Aesthetic Interests. According to Bonser (7, p. 132) children have an "Aesthetic Impulse" which is an almost universally common drive to seek satisfaction in qualities of form and color. The teacher can use this impulse to develop aesthetic interests through activity work. This technique was mentioned by Mossman (57, p. 327) who said:

"Scarf can be made attractive by the use of batik process. To have one well made is a delight. To know the fun of seeing the design develop is open sesame to the lives of people far away. There is much of history, art and industry related to scarf making. To let such an interest begin and end with the making is to miss the big values to be derived from the activity."

As different materials are used, it is the responsibility of the teacher to point out the inherent qualities of them; such as, the rich brown color and fine grain of walnut wood, the bright colors of plastics, the clear ring of a hand wrought dish, or the intricate patterns of woven materials. Working with these helps develop an appreciation of
the materials themselves as well as of the craftsmanship involved in
fashioning artistic objects.

m. Character. The nature of industrial arts activity being
different, provides an avenue of approach to growth which may be the
only means of reaching some children. The bulletin describing the
Los Angeles program (49, p. 1) explained this by saying:

The ability to use materials well, to create with his
hands satisfactory and oftentimes outstanding results give to
the child a feeling of satisfaction that may not be possible
for him in other branches of learning. The personal satisfac­
tion of work done to the best of his ability and evaluated
carefully often leads to the improvement of the general work
habits and standards of the individual.

The fact that industrial arts activities provide the means for
developing good work habits for some children does not mean that they
are ineffective for others. Most children become well adjusted in the
school environment. Those who do not gain satisfaction from the
manipulative activities may assume responsibility for issuing supplies
and checking tools. Thus with careful organization industrial arts can
contribute personality building opportunities for all of the children.

2. The Objectives of Human Relationship. The individual in
society has daily contacts with friends, neighbors and members of his
family. These types of relationships can be developed in school
activities to prepare the children for their life in society.

a. Respect for Humanity. Industrial arts activities contribute
to a respect for humanity through developing an enlightened view of
the working conditions of different occupations. A bulletin from the
University of the State of New York (108, p. 16) which described industrial arts in elementary grades, said:

In teaching it, either as a subject or entirely in connection with other studies, we shall see that children will gradually come to acquire a knowledge of industrial facts, many of which will be made clearer to them through lessons in drawing and construction. Activities will help to make the child appreciate the value of industries and to sympathize with those engaged in them.

A combination of activity work and industrial visits brings about an appreciation of industry. Merely reading or talking about it would not otherwise develop as great a respect for the people who perform these tasks.

b. Friendships. Industrial arts activities place children in a free working environment where the exchange of ideas and assistance leads to the development of friendships. The Ohio State University School bulletin (71, p. 27) described these situations as follows:

Projects of many kinds will be found in the group activities of the seven and eight year olds. Dramatic presentations of stories, conducting roadside stands, making boats, or caring for pets are some activities on which several children work together over a considerable period of time.

Students who have an interest in some activity, like the making of boats mentioned above, naturally tend to seek each other's company to further the common interests. The teacher can draw in shy or retiring children by asking them to help someone. In this way industrial arts stimulates the development of friendships.

c. Cooperation. Working together and sharing tools during industrial arts activities provide concrete situations to demonstrate
the value of cooperation. Culpepper (14, p. 89) listed one of the purposes of setting up the use of his toolmobile:

To give the students experiences that will help develop a cooperative spirit in working with others either as leaders or as members of the group.

An opportunity to demonstrate the value of cooperation comes during the cleanup at the end of the activity period. The teacher can show how much time can be saved if the class cooperates to stop work at the same time and divide up, so that some are putting tools away, some are brushing benches, and some are sweeping floors.

d. Courtesy. It should be practiced in all classroom work, but activities bring out another type of courtesy. Welch (102, p. 35) mentioned it as one of the attainments related to attitudes, namely:

"To work in an orderly manner, and respect the rights of others." The courtesy of respecting the property or rights of others can be noted in concrete evidence of difficulties caused by discourteous acts; for example, when John painted his boat he splashed red paint on Jim's white airplane and then realized the extra work Jim had to do to cover the red splashes of paint. Although the teacher points out these courtesies in activity work, the children who err are taught to avoid such difficulties. It is difficult for children to appreciate the good feelings of others that a courteous act brings, but it is easy to see physical benefits of courtesy during the activity work.

e. Appreciation of the Home. Industrial arts activities give children a chance to make tangible contributions to the improvement of the home. This may be started by having children contribute to the
improvement of their own classrooms. Such a situation was referred to in the New York State Bulletin (63, p. 39) which said:

Home economics and shop classes make things for the elementary school. They have made bookcases, drapes and equipment, including a set of blocks, for the kindergarten.

Children who see the improvement in the classroom by the things they made, can see how the same type of thing will improve their home environment. When an opportunity is created for them to make something, they will be prepared to see the advantage of it. Once they have made a specific contribution to their own home they can appreciate the work and effort involved in creating a comfortable home environment.

g. Conservation of the Home. The use of modern appliances has reduced the need for children to help with household chores, but industrial arts activities can provide instruction in the maintenance of the appliances. Reavis (74, p. 223) described this as follows:

It is of interest to note that some activities of these areas are shared by boys and girls alike; that is, the industrial arts program may be used to teach girls how to use basic tools in making simple repairs about the home, such as replacing electric plugs, planning and constructing simple furniture, and so on; and the boys learn how to sew on buttons, how to plan simple meals, and how to be a good shopper.

Children who maintain the home by making simple repairs as mentioned by Reavis, make a worthwhile contribution to the conservation of family unity. In this way each becomes a member of the family who shares the responsibility of caring for the home and thus earns the respect of the other members of the family.

Homemaking. The home has so many modern conveniences that mothers do not need the help of children in homemaking chores. As a substitute for these chores Moore (56, p. 22) suggested:
The child should be trained from the first to keep his workshop in order, to clean up after he is through working. This training may start in the school under the supervision of the teacher. If the habit of good housekeeping is established in school it may carry over to the home and remove a possible objection of parents to children doing such work at home.

h. Democracy in the Home. Industrial arts activities in elementary school classes may be organized in such a way as to prepare children for democratic behavior at home. This is stressed by Hornbake (37, p. 40):

There are many ways in caring for tools and supplies... It would be difficult to say that one is better than another, but it is important in each case that a definite plan be developed, and that pupils be required to follow the plan without variation or exception. This is a type of formal experience which helps to develop individual responsibility as well as social cooperation.

The children can be shown how each one needs to assume responsibilities for a share of the work, and to be consistent in meeting them. With this pattern established in school it will be easier for the parents to carry out such an organization at home.

3. The Objectives of Economic Efficiency. These deal with the ability of the individual to create and use goods and services. The emphasis here is the role of the individual while the basis discussed for industrial arts education treats with the resultant nature of the economy in which the individual operates.

a. Work. When elementary school children work with tools and materials, the objectives are different from those used in later schooling. This was explained by McMurray (52, p. 17) who said:
The elementary school aims not at producing a finished proficiency in art, to say nothing of like skill in three or four such arts. For an adult apprentice to become a skilled workman in one craft requires years of continuous labor on full time. To expect immature children in the grades, spending two or three hours a week, to master three or four kinds of skilled workmanship would be preposterous. It is a crude and elementary kind of knowledge and skill that children in the grades can acquire.

Although the knowledge and skill are crude compared to adult standards, there should be an effort to maintain the highest standards possible within the ability of the children concerned. This was emphasized by Knox (44, p. 54) who said:

Again, crude work is natural and to be expected from the elementary school child. "Perfect" work is not to be desired. A child should not attempt to make his work too finished in appearance. Work of this type should be looked on with mistrust; either the work was touched up (which is dishonesty), or else the small worker is sacrificed.

On the other hand, the term crude work does not mean sloppy or ugly work - neither of these kinds should be allowed. A child must always do his best. If his work does not show improvement, something is indeed wrong. There should be a steady gain in each child's accuracy and muscular control and in the beauty of his work.

In addition to steady improvement in the quality of work, the children have the opportunity to tackle jobs that require extended effort. When one undertakes a job that seems to be within his ability, he is required to finish that job. In order to realize the value and satisfaction of a complete job he must see the need of continuous work, even though his interest lags and another job seems more fun. Thus will industrial arts activities tend to create an appreciation of work in its true sense and of the work performed in industry.
b. **Occupational Information.** There is a beginning for gathering occupational information through industrial arts activities even in the elementary grades. The early grades start with community helpers; such as, the fireman, the mailman, and the policeman, and extend to community services; such as, the auto repair man, the grocery store man, and the shoe repair man. Then transportation and manufacturing in the community are studied using topics similar to those listed by Winslow (109, p. VII):

   The study of a particular industry should be approached from the standpoint of general education, the activities involved being adjusted to the ability of the pupils. . . . what may constitute the subject matter: (1) the value of the industry to man, how we are affected by it; (2) the evolution of the industry, its story, its heroes of invention (history); (3) characteristics of the product, what constitutes excellence; (4) materials employed, where they come from (geography); (5) processes involved; (6) tools used; (7) the training of the workers; (8) the part played in the industry by arithmetic; (9) the part played by design; (10) references to the industry found in literature; (11) the industry as depicted in art.

As items four, five and six are studied, the children have an opportunity to try these things in their industrial arts activities. Industrial visits give an appreciation of size, noise, temperature, and process, but the children need to work with the materials to appreciate their characteristics. The manufacturing process should be duplicated within the extent feasible. Scobey emphasized this point by writing (83, p. 17):

   Activities in the elementary school must include the use of authentic materials and authentic processes. Though the children can produce paper easily by making pulp from Kleenex, are they understanding the total process by making paper from paper? Beyond the use of authentic materials, a wide variety of tools should be understood as the devices man has invented for use in processing materials. Children should understand that the potter's wheel, and the shuttle are tools just as are the hammer and saw.
Industrial arts activities should be presented in an authentic manner and cover a wide variety of tools in order to give correct occupational information.

c. Occupational Orientation. Activity work in the elementary grades is only background for choosing an occupation. Children may enlarge upon the occupational information mentioned above to suit their interests. This may start in school and continue outside as described by Mackintosh (51, p.44):

One of the best contributions of industrial arts occurs when a child goes home and tries to carry on the activity which he has learned in school as part of his out-of-school living. If he prepares food, sets up a home workshop, cares for his own clothing, plans for trips and excursions, he is developing interests which may lead to a vocation.

Industrial arts activities can attempt to develop an appreciation of different occupations through first-hand experiences with the tools, machines, and materials used in industry. Edgerton (21, p. 7) emphasized the importance of the child performing the operations, saying that industrial arts was one of the:

... courses which are designed for studying present day industries in an elementary way, in order that boys and girls may be more intelligent and appreciative of the conditions, materials, processes, and methods involved in manufacturing the products observed in everyday life, ...

The experiences that create this intelligence and appreciation may be organized into a mass production project such as making a pair of bookends for each classroom in the school. Through this, the various types of jobs such as those of the designer, draftsman, engineer, set-up man, operator, checker, assembler, shipper, and salesman may be tried out to discover the essential part each plays in producing an article.
If a mass production project is used the children learn to appreciate each occupation in relation to its place in the production cycle.

d. Personal Economics. Industrial arts activities in the elementary grades may be organized to emphasize planning in relation to the cost of materials so that practice in personal economics may be gained. According to a child development study by the Ohio State University School Faculty (71, p. 35) children from the ages nine to eleven have money to spend, because:

These children feel the need of earning money for special wants and needs by such odd jobs as selling papers and magazines, shoveling snow, and mowing lawns. The children may spend some of this money to satisfy their desire for hobby materials; therefore, as activities relating to hobbies are introduced it is important to discuss the cost and value of materials. This will set a pattern for the application of economic principles to their spending.

e. Consumer Judgment. Children should be afforded an opportunity to compare the quality of the products of industry. Bicknell (6, p. 19) stated that one of the theories advocated by writers in regard to industrial arts work on the elementary school level was: To contribute to young individual's knowledge as a consumer and to his knowledge of the industrial-social order in which he lives.

Students who work with materials become acquainted with the strength of the material, the value of it, and the practical application to certain types of products. This type of information helps the children to develop standards for guiding their expenditures.
4. The Objectives of Civic Responsibility. This last section
deals with the understandings and duties an individual must meet to make
a worthwhile contribution to the improvement of society.

a. Social Justice. The industrial arts activities in elementary
grades provide an opportunity to study the effects of industrial devel-
opment upon the workers and others in a community. This latter emphasis
was mentioned by Bioknell (6, p. 19) as one of the theories in regard to
this work on the elementary school level. He reported that the
objective was:

To develop an interest in the changes made in common
materials in everyday life and the social problems related
to this phase of industry.

Therefore the elementary school teacher should direct the study of
industries so the children see good or bad effects upon industrial
personnel as well as on the good of the people who consume the
products concerned.

b. Social Activity. The school can give meaning to the children's
desires to do good and thus avoid delinquency problems. Members of the
Eighth Annual Conference on Elementary Education agreed that to work
actively with the delinquency problem, industrial arts consultants
can (85, p. 20):

1) become informed as to the juvenile delinquency status
   of the community.

2) develop a school program which is designed to prevent
delinquency through the richness and effectiveness of its
general education program.

3) help community agencies develop crafts laboratories
   and programs.
4) give children security with a variety of tools and materials which will stimulate an avocational interest.

5) help children to know where and how to procure tools and materials for hobby work at home.

6) experiment with and report upon methods of developing self discipline.

Thus an industrial arts program of positive action as outlined above may combat juvenile delinquency by providing worthwhile social activities to replace destructive tendencies.

c. Social Understanding. Industrial arts can begin to develop understanding of social structures in the second grade. This was indicated by a report in the bulletin published by the Ohio State University School Faculty (71, p. 28) which stated:

Eight year olds are beginning to be curious about people who lived long ago. They are interested in comparing the early tools, machines and equipment with those of the present day. Industrial arts activities can be organized for children to work with materials in the fashion of their frontier ancestors and then try out some of the new tools and materials that have replaced the early ones. This develops understandings of the changes wrought by man in the production of goods, which improved the mode of living.

d. Critical Judgment. The ability to look objectively upon accomplishments has a concrete beginning in activity work. This was described by Welch (102, p. 35) as ability in evaluating work. To illustrate assume a girl has built a small doll chair from an orange crate. When it is finished she can put the doll in the chair to see if it fits and she can check to see that it is stable and does not have any rough edges that would give slivers. Activity work has given
the child an opportunity to make some critical judgments on her level of ability.

e. **Tolerance.** Industrial arts activities provide children with an opportunity to develop opinions of their own regarding creative work and still respect the opinions of other children. In order to develop this atmosphere the activities must be organized for social implications and not merely in attempt to teach skills. This is described by Alterman (1, p. 21) who wrote:

> These statements indicate an industrial arts program, which differs radically from the older program in which the approach was primarily vocational and from which we still suffer. The older program stressed skill and projects. The new considers skill in a relative sense and stresses the larger and wider social implications inherent in these activities. If the primary concern of education is to train people to live efficiently and effectively in an industrial society through an understanding of that society, then the problem is to organize content of a functional type, which can be justified in desirable social attainments through experiences which are conducive to the progress of society.

A choice of things to make should be allowed in order to stress creativity, selection and tolerance. If the transportation area is working on boats, the children should be allowed to choose the type of boat that they want to make. When one child insists that his tugboat is the best, he can be shown how a barge, a destroyer and an ore boat also make an important contribution to the need for transportation. A child thus learns to be tolerant of the choices of other children.

f. **Conservation.** Industrial arts activities can easily stress practical ways of conserving materials and power. The need for this was made by Otto (72, p. 190) who believed:
Conservation of human and natural resources has become such an urgent problem in the United States that in recent years the schools have been urged to give special emphasis to it. The rapid deterioration of the soil, the disappearance of timberlands, the destruction of wild life, and the diminishing supply of mineral wealth hold grave forebodings for the consumer of today and especially for the consumer of tomorrow.

It is essential for the teacher to point out to the children the need for conservation as mentioned above and then put strong emphasis on it by carefully supervising their use of material. When the children cut a piece of wood for a book rack, a piece of copper for a bracelet, or a piece of mulfilm for screen printing, the teacher can help them plan it carefully to conserve the most material and still satisfy their need for the material. Constant attention to this technique during industrial arts activities will help develop habits of conserving materials.

g. Social Applications of Science. As children use industrial arts activities to study scientific advances, they may consider these contributions to the general welfare. The bulletin, A Prospectus for Industrial Arts in Ohio (70, p. 64), showed how this topic fits into elementary school activities:

Fifth and sixth grade levels in the modern elementary school delve more deeply into mature experiences with materials and their attendant social-economic problems, all in addition to relationships involving the physical and biological sciences.

As the children study the scientific principles of radio by constructing a small crystal set, they may study how these are used in airplanes and trains to guard the safety of the passengers. Thus the activities demonstrate the operation of the principles so the application to the general welfare may come within their realm of appreciation.
h. **Law Observance.** Industrial arts activities need to be governed by strict rules regarding safe practices. Ruley (80, p. 277) mentioned this as a part of the Tulsa, Oklahoma program, saying:

> In offering elementary industrial arts craft work, it helps the children to develop confidence in their ability to make useful things with their hands. It teaches the functions, limitations and care of tools, materials and the value of safety measures.

The development of a safety program is a broad topic but the basis is a set of safety rules or laws. After the laws are carefully outlined and checked, the children then see misfortune befall them in the form of work spoiled, tools broken or minor cuts or scratches. Immediate positive action when an accident happens can emphasize the need for following safety laws. If this program is properly developed and continued with strong emphasis it will improve law observance.

i. **Economic Literacy.** The nature of the economy which is the third basis for industrial arts education that this chapter describes in detail, can be studied to improve the literacy of the children. Gunther (27, p. 4) believed that:

> Manipulation, construction and experimentation should be introduced, not primarily for the purpose of acquiring technical skill nor for the production of some usable object, but rather for the development of clearer ideas and more appreciative insights into man's work.

More appreciative insights into man's work could be developed by studying the wage scales of different occupations, the quality of articles produced, the supply of a product in relation to the demand and the scarcity of materials or products. These items need to be compared directly with the manipulation, construction and experimentation of the
children in order to develop clear ideas. In this way industrial arts activities can begin to build economic literacy.

j. Political Citizenship. Usually once or twice a year the industrial arts activities may offer children an opportunity to participate in some civic projects. To illustrate the importance of this, Horn (35, p. 413) mentioned some of them as follows:

Attention has been called repeatedly to the tendency of instruction to become formal, verbalistic and irresponsive to the needs of life. Of the methods that have been developed to redress these trends, none has grown more steadily in the estimation of teachers than various forms of overt activities; . . . . the direct participation in out-of-school activities, such as, Clean-Up Week, the beautification of the city, and safety campaigns.

Industrial arts activities in relation to "Clean-Up Week" may be repairing sidewalks, painting fences, making markers for public gardens, or trash cans for public areas. "Safety campaigns" may involve making reflectors for bicycles, constructing a school crossing sign, or making display boards for safety slogans. Thus industrial arts activities may permit the children to make a civic contribution that will make them proud of their community.

k. Devotion to Democracy. Industrial arts as well as other school activities needs to be organized in a fashion that emphasizes democratic procedures. Scobey (86, p. 14) felt that this can be accomplished:

In the elementary schools, industrial arts serves two purposes:

First, it provides the manipulative operations which are the doing activities rooted in concrete experiences. Children actually have first-hand experiences with the things they talk about and read about. Such activities supplement the curriculum, making learning more effective,
motivating interest, providing for individual differences, and lending opportunity for democratic procedures.

These procedures take the form of allowing the students to help select and plan the activities, to organize their own personnel system to care for supplies and tools and to take part in the evaluation of the work. This system can be put into practice during the industrial arts work.

This concludes the analysis of the social organization of society, showing how industrial arts activities in elementary grades may reflect society through action of the individual as an educated person, as a member of a family or community group, as a producer or consumer and as an educated citizen. Having studied the actions of an individual in society as bases for industrial arts, the next step of studying the nature of the economy follows.

**Economic Basis.** The economic structure of society is important as one of the three bases for industrial arts education along with the individual and society, because it provides the key to the selection of the materials to be worked, and the tools and machines to be used. Stratemeyer (69, p. 26) described this significance by saying:

Coloring all aspects of our society is the industrial age into which the whole world is rapidly moving. Wherever a community may be located, whatever the material conditions and the composition of its people, there are signs of the changes being brought about by our industrial civilization and the problems which inevitably accompany such vast changes. Factory smokestacks, power plants, power-driven agricultural machinery, and other multiple evidences of technological development are everywhere. Our civilization is being reshaped in an age of power. America is committed to science and technology.

To appreciate the impact of technology on society and realize its significance for industrial arts, a historical perspective is first
presented, showing how industrial arts has changed to portray the economic structure.

Before the Civil War when the manual labor movement took place in education the total production according to Table I on the following page was rated as 17.6 billion horsepower hours. It was predominantly animal energy with horses and oxen plowing the fields, people riding horseback and in stagecoaches, and treadmills producing power from animal energy. Human energy was 15.4 percent of the total output and provided the control over the animals.

By 1900 when industrial arts was starting, the total output of energy had jumped to 82.9, an increase of almost five times. Technological energy grew tremendously to increase over 30 percent in fifty years. This was possible because steam engines provided mechanical energy and transportation. The use of animals provided about half of the total, while human energy was about 10 percent of the total. This led to the development of the industrial arts general shop with its variety of work and its tools and machines.

Another fifty years saw change in the total production which jumped to about 410 billion horsepower hours, an increase of almost 500 percent. This was possible through the almost exclusive use of technological energy which became 94 percent of the total. The remaining 6 percent was divided between animal and human energy. Industrial arts is trying to meet this advance in technology by providing a revised curriculum that offers opportunity study power and transportation, construction and manufacturing, communications and management. Pulliam (73, p. 177)
Table I

ESTIMATED SUPPLY OF ENERGY*

<table>
<thead>
<tr>
<th>Year</th>
<th>% Animal Energy</th>
<th>% Human Energy</th>
<th>% Tech. Energy</th>
<th>Billions HP Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>78.8</td>
<td>15.4</td>
<td>5.8</td>
<td>17.6</td>
</tr>
<tr>
<td>1860</td>
<td>79.2</td>
<td>14.3</td>
<td>6.5</td>
<td>25.2</td>
</tr>
<tr>
<td>1870</td>
<td>73.1</td>
<td>15.4</td>
<td>11.5</td>
<td>27.8</td>
</tr>
<tr>
<td>1880</td>
<td>68.6</td>
<td>14.2</td>
<td>17.2</td>
<td>39.9</td>
</tr>
<tr>
<td>1890</td>
<td>60.5</td>
<td>12.0</td>
<td>27.5</td>
<td>61.1</td>
</tr>
<tr>
<td>1900</td>
<td>51.7</td>
<td>10.5</td>
<td>37.8</td>
<td>82.9</td>
</tr>
<tr>
<td>1910</td>
<td>34.7</td>
<td>8.4</td>
<td>56.9</td>
<td>131.4</td>
</tr>
<tr>
<td>1920</td>
<td>20.8</td>
<td>5.7</td>
<td>73.5</td>
<td>197.4</td>
</tr>
<tr>
<td>1930</td>
<td>11.7</td>
<td>4.6</td>
<td>83.7</td>
<td>238.3</td>
</tr>
<tr>
<td>1940</td>
<td>6.4</td>
<td>3.6</td>
<td>90.0</td>
<td>289.4</td>
</tr>
<tr>
<td>1950</td>
<td>3.0</td>
<td>3.0</td>
<td>94.0</td>
<td>410.4</td>
</tr>
<tr>
<td>1960</td>
<td>1.3</td>
<td>2.4</td>
<td>96.3</td>
<td>489.8</td>
</tr>
</tbody>
</table>

* Adapted from Dewhurst, America's Needs and Resources (16, p.787)
described how this change in the economic world had affected the daily life of people. He believed that industrial arts can help them adjust to this change saying:

Certain highly important skills and understandings and appreciations, which many of us learned incidentally as boys on the farms or in old-fashioned small-town homes, would help us greatly to take care of ourselves if we should lose the jobs that we now hold, have helped us all along to judge the materials and the workmanship in the things that we buy, and have afforded us a great deal of pleasurable understanding and appreciation in our everyday contacts with the physical world. Yet the average child now growing up in an apartment house will not learn most of these valuable matters at all unless the school provides definitely and generously the opportunities for him to learn them. These things are certainly highly important elements in a good, all-round general education.

Industrial arts activities are needed to replace the many learning situations that children formerly found in their homes and community, and which the changing technology replaced with the present highly industrialized society.

The economic basis for industrial arts concluded above is the last of the three given, but it is perhaps stronger and more unique to industrial arts than are the individual and societal bases. In the next section the writer attempts to draw from the three postulated bases the program requirements for the presentation of industrial arts education in the elementary school.

PROGRAM REQUIREMENTS

The program requirements for industrial arts education derived from the postulated bases and described by definition are stated here. The total program starts at the elementary school level and extends through
to the adult level as described in the *Industrial Arts Teacher* (99, p.4) as follows:

In scope, the emphasis at the childhood levels is in providing the means for integrated activity programs; at early adolescent levels in providing the orientation program concerning the technology; at later adolescent levels in providing elements of the technical program and a sound basis for a possible industrial-vocational program; at collegiate levels in providing technological studies and activities of consumption, production, and recreation in the core program, and elements of technical training in the terminal program; and at adult levels in providing recreational and consumer activities for all, along with elements of the technical in some cases.

As stated in the first chapter, this study is limited to the elementary school, and to the professional level which applies to the preparation of teachers for the elementary level, discussed in chapter VI. The fact that industrial arts should be started at this level has been established for many years, for Edgerton (21, p.?) in 1922 reported on a research study that indicated industrial arts activities were included in 85 percent of the schools selected. He stated that:

Our public school systems now recognize the need for organizing, presenting and offering industrial arts activities in the first six grades of school experience. This tendency of the past few years is due in part to the change in purpose, content, and method of the industrial work now given as a means of developing general intelligence and knowledge of the industries during the elementary school period in much of the best public school curricula. At least, this is the verdict of a majority (117) of the 141 school systems which have reported from 19 states on the industrial activities now being experienced by their elementary school pupils. Although Edgerton found industrial arts widely used, Earl (20, p. 65) in a current report made a general application to all schools, stating that industrial arts:
... will begin with the first grade and carry on throughout all elementary school grades as an integral part of the classroom work.

A bulletin from the New York State Education Department (63, p. 52) extended the level of elementary school industrial arts to the adults in the community. It described situations by quoting reports from the communities. In regard to the adult program it said the elementary school:

... extends its services to the adult population both through the use of its physical facilities and through staff participation in out-of-school activities. Examples of services to adults include the following: "An after-school recreational program is held in the school. Under a full-time director of recreation, the program includes a gymnasium program, arts and crafts, ceramics and, for adults, art and sewing."

In this manner both the physical facilities and the staff for industrial arts have an opportunity to meet the needs of adults in the community for recreational services. This extends the elementary school program of industrial arts education to the adult as well as the childhood level.

The program requirements at these levels deal chiefly with orientation to production, materials and methods, and with recreation. The first part of this chapter showed how industrial arts activities contributed as an integral part of the school program for life in the present society. Several types of contributions were described as the activities of an individual in society were quoted. To draw this together with emphasis on the industrial arts program requirements, the following is quoted from the Federal Bulletin 1957, Number 34, Industrial Arts: Its Interpretation in American Schools (68, p. 18):
To help the child understand what is going on about him in the industrial world.

To give him many opportunities to express himself concretely in a variety of media, always expecting that there will be a constantly improving technique with maturity and experience.

To open a field of leisure-time activities in which he may find an interest.

To contribute toward his acquiring the habit of thinking a job through.

To further the development of his appreciation of various people in terms of their culture.

To help him become a wiser consumer and a more intelligent participant in a society that is markedly industrial.

The program described above would fit elementary school programs generally, but as a program is usually described in terms of local personnel it may be modified to adapt to the expressions used. Usually a committee will periodically review the program for a school and evaluate the contributions of areas such as industrial arts.

The value of this industrial arts program in the elementary school was described by an elementary education specialist in the United States Office of Education (51, p. 94) who wrote:

All these purposes which are evident in the industrial arts activities described point toward this type of school experience as a method of living rather than as a subject field. School programs should be analyzed carefully to discover where and to what extent industrial arts can be used to make learning real and vital to boys and girls.

The fact that it makes learning real and vital to boys and girls seems to afford industrial arts a definite place in the elementary school, with this chapter postulating the individual, societal, and economic
bases, and indicating the program requirements. The next part gives a definition to summarize the material presented.

**A RESULTING DEFINITION**

Industrial arts, as postulated from the bases listed above, has been clearly defined as long ago as 1925 when Bonser and Mossman in their book, *Industrial Arts for the Elementary Schools*, (8, p. 5) said:

> As a subject for educative purposes, industrial arts is a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these changes.

This definition was still accepted in the field of elementary education as indicated by the following report on the Eighth Annual Conference on Elementary Education in May 1954 (85, p. 19):

> The implications of the problem (security for youth) strike at the heart of the industrial arts program; that of providing a general education for children and youth that will help them be successful citizens who are well adjusted to a democratic society in a technological culture. The goal is intelligent, responsible, democratic citizenship which demonstrates adjustment to the society through reasonable self-discipline and knowledge of the social values and the materials of living.

The common elements involved in both definitions remain materials of living and social problems involved. Note the latter definition specifically refers to the present day culture as a technological one, which is an emphasis not reflected by Bonser, inasmuch as the impact of the technology was not felt at the time of his writing.

A definition used to a greater extent by industrial arts teachers gives nearly the same thought, although worded differently. It is that written by Wilber in his book, *Industrial Arts in General Education*, (106, p. 2) which stated:
For the purposes of this book, industrial arts will be defined as those phases of general education which deal with industry - its organization, materials, occupations, processes, and products - and with the problems resulting from the industrial and technological nature of society.

A definition that echoes the same principles, but one that fits easier with the developments in this chapter is made in the Industrial Arts Teacher of March 1947 (99, p. 4) which printed:

Functionally, Industrial Arts as a school subject in this society is concerned with providing experiences that will help persons of all ages and both sexes to profit by the technology, because all are involved as consumers, many as producers, and there are countless recreational opportunities for all.

This definition includes the individual, societal and economic bases postulated in this chapter. The individual basis referred to seven principles that govern the way in which industrial arts provides experiences that will help persons. The societal basis described in detail the many phases of a school subject in this society, including objectives of human relationship, economic efficiency and civic responsibility. The economic basis described the technology which is influential in characterizing consumption, production and recreation.

Industrial arts in elementary schools has been derived from postulated bases, the program requirements drawn and summarized with a definition. To provide standards for Chapter VI, the last part draws implications for teacher education contained in this chapter.

**IMPLICATIONS FOR TEACHER EDUCATION**

A review of material presented in this chapter brings together the following points to be considered in setting standards for a teacher education program for people who are preparing to teach
industrial arts in the elementary school. An industrial arts teacher needs to:

1. Understand industrial arts as an integral part of general education and not a separate, unrelated subject.
2. Have a scientific knowledge of the nature of children as individuals.
3. Have a broad understanding of the demands of society upon education.
4. Appreciate the impact of the technological economy upon the individual in society.
5. Be able to work with the local school faculty and administration to design an industrial arts program for that community.
6. Be able to give a definition of industrial arts and be able to explain it.

The above points seem to be the features of this chapter on derivation of industrial arts education that would apply to a teacher education program. The next chapter examines the curriculum for further implications.
Chapter III
DEVELOPMENT OF CURRICULUM ELEMENTS

The presentation of a program of industrial arts education as derived from postulated bases and defined in Chapter II may be described in terms of basic curriculum essentials, the methods for presenting the materials, the physical setting required and a means of evaluating the activities. After these are discussed in this chapter the implications for teacher education will be drawn together in Chapter VI.

The bibliographical study indicated one generally accepted pattern for the derivation of industrial arts education; however, there is a divergence of opinion in matters pertaining to development of curriculum elements. This was expressed by Alterman (1, p. 31) who said:

There seems to be an agreement as to the significance of industrial arts work in the elementary school, and as to the formulation of the major objectives. The real problem is more effective analysis of instructional content and teaching methods.

This chapter points out the different content and methods used and indicates what seems to be the better ones to implement the program derived in Chapter II. The first part is a general plan or pattern to be used in implementing the program.

BASIC ESSENTIALS

Basic curriculum essentials for industrial arts education in the elementary school may be used as a point of reference to help the teachers meet program requirements. It is not intended as a rigid
Guiding Principles. The statement is intended to be used as a set of guiding principles in the fashion specified by Hornbake (36, p. 236) as follows:

The purpose of a curriculum statement should be to present guiding principles to be used in teacher-pupil-situation curriculum development.

The guiding principles may be used by teachers in their long-range planning conferences to give the program direction and unity. However, some groups of teachers prefer not to use a curriculum plan for industrial arts, but operate as described by Smith (67, p. 208) who said:

For the purpose of cultivating appreciation and of testing knowledge, the teachers in the elementary-school grades of the Laboratory Schools of the University of Chicago correlate, whenever practical, the industrial arts program with that of other subject fields.

There is no regular printed course of study or activity for the industrial-arts program, as this program varies from day to day, month to month, and year to year.

The report does indicate that certain material was generally covered even though it was not listed in a written plan to be followed. A written plan may help to stimulate the correlation by using it as a reference and the written plan might also be used for the purpose of evaluating the results. For these reasons an analysis of the basic essentials seems necessary. This does not mean the intention is to set up an isolated program of industrial arts, for the belief of Bonser and Mossman (8, p. 30) is held as basic. They wrote:

Of course, before a final assignment of work can be made to any given grade, other subjects and interests have to be
taken into account. The study of the industries cannot be
isolated from the work in most of the other subjects without
very serious loss, both to itself and to the other subjects.
The unification of experiences in each of the grades which
make for economy in learning and in time, and for breadth and
intensity of thought and interest, is a very important phase
of the work of curriculum making.

This program of the unification of experiences calls for curriculum
making conferences of the school staff. The curriculum proposal in this
chapter might be considered preparatory to such a staff conference, where
the industrial arts teacher may use it to guide his contribution to the
long range pattern to be adopted by the school faculty. Such a plan was
undertaken by the Laboratory School Faculty of the University of Chicago.

In evaluating the results of industrial arts in this curriculum plan,
Smith (67, p. 214) said:

Our experiences in the Laboratory Schools justifies the
following conclusions with regard to correlation of the indus­
trial arts with other subjects. (1) What a child can do with
his hands is one good indication of his understanding. (2)
Doing things with the hands should be an integral part of the
learning activities in an area or subject. (3) Pupils enjoy
the chance to prove their knowledge or understanding by doing
handwork. (4) Teachers can make their teaching more effective
and practical by working in the shop with their pupils. (5)
Several teachers can work together effectively in providing
hand activities for children learning about various things.
(6) Effective tool skills can be acquired through this program
of correlation. (7) Correlation vitalizes each subject concerned.
(8) Correlation gives more interest in acquiring information and
greater satisfaction in expressing ideas through action as well
as through words.

In view of these results the inclusion of industrial arts as part of the
curriculum seems to be effective when following a flexible plan. There­
fore, the following curriculum proposal is made on the basis that it
is a suggestion to a faculty group undertaking long-range curriculum
plans.
A Traditional Curriculum. Industrial arts activities in the elementary school tend to follow the traditional manual training curriculum. Earl (20, p. 65) did not favor this trend but admitted:

Industrial arts on the elementary school level has been taught in the past with too much emphasis upon the project and not enough upon what the project does for the pupil.

This project emphasis has traditionally been in the field of woodworking; however, the current trend is to add other areas of activity to follow the general shop trend at the junior high school level. This was apparent in a questionnaire survey made by Welch (102, p. 20) in 1953. He found:

These areas were: woodworking, metalwork, leathersraft, drawing, painting, electricity, clay modeling, weaving, home mechanics, ceramics, soap modeling, paper and cardboard work, and block printing.

Woodwork was the most popular area and was offered in all of the thirty-five schools responding.

Even though twelve other areas of work have been added according to that report, the primary emphasis is still woodworking. The following page duplicates a table used by Loats (48, p. 95) to show the status of activity work in another state, but the results are very much the same. The first eleven areas on the list from Loats are mentioned by Welch, if cement and plaster may be included as ceramics work. However, the literature of industrial arts began to reflect an overall curriculum making change as stated by Goodlad (25, p. 170):

The last few decades have produced much thinking and writing about the curriculum. We shifted first from the subject-alone to the child-alone point-of-view, and now we are moving toward the saner viewpoint of seeking to relate instruction to our knowledge of children, content, and the learning process.
Table II

MANIPULATIVE ACTIVITIES ENGAGED IN BY ELEMENTARY STUDENTS*

Based on Returns from 141 Elementary Teachers

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>116</td>
<td>82</td>
</tr>
<tr>
<td>Drawing and planning</td>
<td>82</td>
<td>58</td>
</tr>
<tr>
<td>Painting and finishing</td>
<td>79</td>
<td>56</td>
</tr>
<tr>
<td>Woods</td>
<td>54</td>
<td>38</td>
</tr>
<tr>
<td>Ceramics and clay</td>
<td>51</td>
<td>36</td>
</tr>
<tr>
<td>Textiles</td>
<td>48</td>
<td>34</td>
</tr>
<tr>
<td>Printing</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>Cement and plaster</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Electricity</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Leather</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Metals</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Cork</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Bookbinding</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Jewelry</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Photography</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Plastics</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Rubber</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Reeds and canes</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lapidary</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Candlemaking</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Gelatin slides</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Soap carving</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

* From Loats (48, p. 95)
The subject-alone emphasis for industrial arts, as reflected by the areas of work listed above, is slowly giving away to the process of planning the curriculum in relation to knowledge of children, content, and the learning process, termed individual, societal and economic in Chapter II. Bicknell (6, p. 19) reflects the curriculum in transition as he includes some of the traditional and some of the newer activities. The list he reported was:

The one material activity in industrial arts, namely woodwork, has been replaced by weaving, ceramics, work with elementary metals, and various handicraft activities plus the study of food, shelter, tools and machines, records, utensils, transportation and communication.

The emphasis on building projects in various areas of work has been influenced by Bonser's units of food, clothing and shelter and the newer studies of transportation and communication.

Impact of Technology. The technological advances which have so strongly influenced the industrial arts curriculum were described under the economic basis in Chapter II. Caswell (12, p. 8) described their influence on the school curriculum as follows:

And so the necessity for curriculum change which arose out of our national commitment to new social goals has been intensified and accelerated by the rapidly changing nature of our society. The far-reaching significance of the application of power and machines to problems of production and of other scientific discoveries to the many facets of the lives of our people has only come to be appreciated during the recent decades. Social change in its many aspects is now quite generally recognized as a fact of tremendous consequences to schools which in this modern age will never permit a static curriculum.

This indicates the necessity for the school curriculum to be reviewed in terms of reflecting the technological advance described. This change was recognized in the elementary schools of New York State as evidenced by
the opening statement to the curriculum bulletin just off the press, 
A Design for Improving Elementary Education in New York State, (63, 
Foreword). It said:

Two distinct forces have strongly influenced the development of elementary education in recent years. The first force is social change. Within a single lifetime revolutionary innovations have taken place in transportation, communications and occupations. Not only have they created a new physical environment, but they have affected habits of thought and behavior as well.

The technological advance influencing the development of elementary education can be reflected in the industrial arts program. This was explained by Ditzler (17, p. 9) who wrote:

Through Industrial Arts activities teachers can help to transmit the historical past and the practical present, as well as enrich the ideas of the young for the improvement of the culture. Through industrial arts activities the abstract becomes meaningful, learning becomes more effective, and technology is better understood.

Because of the nature of industrial arts activities, the construction of the industrial arts curriculum emphasizes the activities portraying the impact of technology on a democratic society.

Under the leadership of Professor William E. Warner, industrial arts education graduate students at the Ohio State University have discussed curriculum improvement for several years. They stressed a need for change in the industrial arts curriculum due to the rapid change in the nature of the technology, much the same as the need described in the quotations above. To keep the industrial arts curriculum materials abreast of this change, the group at Ohio State produced a written proposal in 1947. It was published by the American Industrial Arts Association and featured at the annual, national convention in Columbus
with the title, *The New Industrial Arts Curriculum* (101). The Florida State Department of Education then used this curriculum report as the basis for its publication, *Florida Presents A Guide to the New Technology in Industrial Arts* (23). A revision of the original statement was published in 1955 by Epsilon Pi Tau Fraternity under the title, *The Industrial Arts Curriculum: Development of a Program to Reflect Technology* (100). This curriculum is now being studied by the students of at least four industrial arts teacher education programs: those at the Ohio State University; the University of Maryland; the State College at San Francisco; and the State University of New York, Teachers College, Oswego.

**A Curriculum Reflecting Technology.** This curriculum, as well as reflecting the technological developments, follows the current trend in the organization of the elementary school. This was described by Klehm (41, p. 1) who wrote:

> We now recognize handwork in this school as a means to an end and not an end in itself. The elementary school teacher has as her chief responsibility the development of the pupils in the use of the tool subjects (Reading, Spelling, Arithmetic, etc.) common to all in a democratic society. Any skill developed by the children in manipulating tools and materials is merely a by-product of her chief efforts. If this is true, she will not offer handwork as a subject by itself but instead will use it as a means to develop the large centers of work she has chosen as teaching units.

Thus to keep the industrial arts curriculum in line with current teaching methods it should be designed in terms of teaching units. Jones (39, p. 1) accepted the fact that this approach of using teaching units is valid, saying:

> The unit has been in use for a long enough period to test its validity as a basis for directing learning effectively. Its validity is now generally recognized, and it remains to consider
the most effective ways for putting it to use as a professional tool.

Thus the group at the Ohio State University used a valid approach to design an elementary school curriculum. They found that the technology, as described in the section of Chapter II on economic basis for industrial arts, could be studied using six units or divisions. These are named in the Epsilon Pi Tau publication (100, p. 6) as: Power and Transportation, Construction and Manufacture, Communications and Management. These units can be used in the elementary school curriculum according to a study reported by Otto (72, p. 183). He showed a summary of the group activities or units found in 420 different classrooms relating to the topic, "Industries and Occupations in the Modern World". They were:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Farming, Gardening, Stock Raising</td>
<td>314</td>
<td>75</td>
</tr>
<tr>
<td>2. Transportation</td>
<td>257</td>
<td>61</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>232</td>
<td>55</td>
</tr>
<tr>
<td>4. Communication</td>
<td>212</td>
<td>51</td>
</tr>
<tr>
<td>5. Mining and Quarrying</td>
<td>159</td>
<td>38</td>
</tr>
<tr>
<td>6. Lumbering, Forestry, Forest Products</td>
<td>147</td>
<td>35</td>
</tr>
<tr>
<td>7. Fishing</td>
<td>132</td>
<td>31</td>
</tr>
<tr>
<td>8. Storekeeping</td>
<td>121</td>
<td>29</td>
</tr>
<tr>
<td>9. Recreation Industry</td>
<td>97</td>
<td>23</td>
</tr>
<tr>
<td>10. Local Occupations in General</td>
<td>91</td>
<td>22</td>
</tr>
<tr>
<td>11. Construction Workers and Industry</td>
<td>80</td>
<td>19</td>
</tr>
<tr>
<td>12. Electric Power Industry</td>
<td>63</td>
<td>15</td>
</tr>
</tbody>
</table>

The three units of Transportation, Manufacturing and Communication are used in over half of the classes surveyed and are three of the six units presented in the industrial arts curriculum. The first item, "Farming, Gardening, Stock Raising", is included in the industrial arts curriculum under the subhead of agriculture in the Manufacturing Unit. Mining, Lumbering, Fishing and Local Occupations are also covered under
Manufacturing. The last two topics in the table, Construction and Electric Power, are given as the respective units of Construction and Power, the latter being somewhat broader than the electric power specified above. Roush (77, p. 62) reported the following units being used in his elementary school:

Our program of industrial arts activities as planned and carried out in the three upper grades (4, 5 and 6) included study of and work in communication, transportation, power and electricity, food, clothing and shelter.

Communication, Transportation and Power are mentioned directly; while Bonser's titles of food and clothing are used for Manufacturing, and shelter for Construction. Therefore, the curriculum units as expressed above are already studied in elementary school classrooms.

Curriculum Units. The six units of the industrial arts curriculum, Manufacturing, Transportation, Communication, Construction, Power and Management are briefly described below to show how they undertake to study the economic basis described in Chapter II.

1. Manufacturing. This unit includes a study of processing raw materials and fabricating them into useful goods. The three phases concern basic materials in gaseous, liquid, or solid form; their fabrication through chemical or physical processes; and the distribution of the output to industrial consumers or the ultimate consumer. In this unit studies are found involving the production and use of cellulose fibers, ceramics, chemical compositions, food, leather, metal, rubber and textiles.

There is a difference between the studies undertaken in this unit and the former practices of making projects in the areas of ceramics,
electricity, metal and wood. It is described by Scobey (82, p. 372) who wrote:

In industrial arts at the elementary school level, the child, through actual experience, observation, or study is developing an industrial, technological concept of himself. This concept includes understandings about materials, processes, and products of manufacture as well as the contribution of people engaged in industry. Manipulative participation is important, but industrial arts goes beyond the manual skill to the intellectual understanding of the process and its relation to the world in which we live.

Thus the emphasis is placed on understanding the process and its relation to life, instead of on making something. In the manufacturing unit the attention of the student is first focused on some process like the production of cloth. The children study the types of fibers and their sources and the process of carding, spinning and weaving. Opportunities are given with each step to handle and test the materials and then as a culminating experience, the children may weave a table mat or scarf. In the former approach to industrial arts activities the child did the weaving first and then the teacher tried to encourage the study of the process. The latter usually lost its effectiveness because the project was complete and the students preferred starting another project to learning about spinning fibers.

2. Transportation. This unit is concerned with the movement of goods and personnel over land and sea, and through the air. Land transportation includes such small items as bicycles and motor bikes, and such large items as automobiles, busses, railroads and trucks. Sea transportation includes barges, canoes, kayaks, motorboats, ocean going vessels, rowboats, sailboats and tugs. Air transportation extends from solid and flying models through the most modern jet planes. In other
words the design, production and operation of all types of transportation equipment is considered.

The emphasis in transportation as well as in manufacture should be the use of facilities of everyday life. In a curriculum leaflet of the Los Angeles City School District (49, p. 4) the statement was made:

Insofar as practical, the articles built reflect the different aspects of community life. The building of just trucks does not necessarily portray transportation and the building of boats does not portray the fishing industry.

The emphasis needs to be placed on the types of boats used in the fishing industry so the children develop an appreciation of the industry through the activity of building boats. If groups work on different boat models the culminating activity might be an oral report telling the capacity and use of each of the different boats. This would stimulate research that develops an appreciation of the whole fishing industry, which would be the major emphasis of the study instead of the manipulation of tools and materials.

3. Communication. This unit treats the recording and transfer of thoughts and ideas which occur in three phases: composition and duplication, transmission and reception, and finally interpretation. There are two major parts of this unit: the graphic arts part, and the electric and electronics part. The former part is chiefly concerned with the written word (books, magazines, papers) and the latter with the spoken word or ideas (radio, telephony, television).

The activities used in each of these three units are not entirely concerned with making things, but take advantage of the techniques
mentioned in the New York State Education Department Bulletin (65, p.40) which said:

There is in every community a wealth of opportunity for bringing children into contact with the on-going culture. It brings them into contact with business life of the community by visits to communication and transportation businesses, large and small manufacturing companies, banks and farms.

Community visits during the communication unit may be to a broadcasting or television studio, a local newspaper or the telephone office. The children can learn through first-hand observation, and then plan activities such as an assembly program, a room newspaper, or a telephone line to apply the information they gained from the visit.

4. Construction. This unit includes studies of the development of buildings and facilities for transportation, on the location of their use, like roads and bridges. The latter qualification distinguishes this unit from manufacturing and transportation. Even where overlapping may seem likely, the over-ruling fact is that they are arbitrary lines within the school curriculum and a natural transition can be made from one to another. The framework of studies in a construction unit includes plans, earthmoving, foundations, structures, coverings, fixtures and furnishings treated in the order named. Within this framework come areas such as airports, bridges, canals, factories, homes, public buildings and roadbeds.

Arthur D. Roloff of Salem, Oregon reported success in using a model house construction unit in his class, using an exact scale and real house plans. After the class built the model home they made some of the furnishings for it, using textiles for rugs and drapes. In summary Roloff (76, p. 70) stated that:
... "minimalic" construction allows exceptional pupils to contribute their abilities to the group.

Pupils learn how to accept responsibility through individual application.

"Minimalic" construction offers an opportunity for realism in the classroom.

Personal satisfaction is gained by the pupils after the project is completed.

The construction unit as used in this class gained several concomitant learnings that were discussed in Chapter II in the scientific study of the individual as a basis for the curriculum. The other units of the curriculum offer the same opportunities.

5. Power. This unit is basic to the other units as in the technology. It brings about the transformation of natural resources into useful energy, the sources of power being natural (food, sun, water, wind), electrical (chemical and physical) and thermal (atomic, gasses, liquids, solids). These sources are studied in view of the generation, transmission, and utilization of the power developed.

There is a natural transition from one unit of the curriculum to another as described by Earl (20, p. 65):

The relationship may be seen in the project of building an airport in the classroom. A few of the areas to consider would be construction, transportation, communication and power. If these areas are broken down, they may be related to mathematics, history, science, English and geography.

The building of an airport would involve a power unit that considers the use of power for: driving busses, cars, planes and trucks; the radio and electronic devices to guide the planes; lights and signs to direct traffic; and heating for the hangars and terminals. And as Earl pointed out, this study of power can develop competence in the fields of
mathematics, history, science, English and geography. Mathematics can be used to measure the size of the parts and to scale the size of the buildings. History may undertake to show how the development of the new uses of power made the operation of an airport possible. Science may include the study of types of engines that provide power for cars, planes and trucks, such as diesel engines, gasoline and jet engines. Good English is used when writing to airline companies for pamphlets describing their activities. Geography is involved in the study of airline routes that connect parts of the United States or extend outside. Thus the power unit utilizes the common learnings that are stressed in the elementary school classes.

The graphic description on the next page illustrates how this industrial arts curriculum interlocks to provide an Integrated Experience Program to develop Citizenship in a Free Technological Society. The five areas of the industrial arts curriculum portrayed by the spokes provide the means for the subject areas (art education, citizenship education, health education, language arts, numbers, science) to reach the goal of developing Citizenship in a Free Technological Society.

6. Management. The management unit outlines the organization of goods and personnel into an efficient operating unit. The study of the five units may seem a large undertaking but they reflect the extent of technological development which was described statistically as an economic basis for a curriculum. The use of the last unit, management, aids in the selection of teaching methods and applications. Once the class of students is organized to work together under the direction of
Illustration I

CURRICULUM ESSENTIALS FOR INDUSTRIAL ARTS

Adapted from a Chart by Dr. William E. Warner
the teacher, and the classroom and laboratory are well organized physically, the six units of the curriculum can be utilized.

Curriculum Statistics. The data in Chapter II showed the economic basis for industrial arts education, but further statistics may be used to describe activities to be included in each of the areas. These are published quarterly in a report from the United States Department of Commerce called Survey of Current Business (95). The figures quoted in Appendix 3 give the number of workers in the industries related to the five areas of the curriculum. The information can be used to guide the studies into the most important industries. Bonser and Mossman (8, p. 21) established this pattern by saying that:

Those industrial activities only be selected which have the largest common elements in relationship to these purposes. In other words, that field of industry comes first which has the largest relationship to the common needs of life.

Applying this principle and using the statistics in Appendix 3 for the transportation unit, the industries with the largest number of employees are the railroad, automobile and aircraft. In the manufacturing unit, the agriculture, primary metal, machinery, and textile industries stand out as having more workers. In communications the telephone industry is the largest, while in construction the maintenance of highways is largest. The last unit, power, has the most workers in gas and electric utilities. Thus, the teacher who guides the children in the selection of work for these units can indicate the relative number of workers in each, as one basis for selection.

The publication, Survey of Current Business, gives other types of statistics such as the wages and hours, the dollar value of products and
the volume of products produced in each industry. These all might be used to describe the activities of industries in each of the curriculum areas.

**Recreation.** One of the program requirements named in Chapter II was to open a field of leisure time activities in which the child may find an interest. These activities grow naturally from the activities in the areas of the curriculum; for example, after studying textiles in the manufacturing area some of the children might want to do further weaving or stenciling as a hobby. If the children do not seem to pick up enough hobbies, special activities can be started for this purpose.

Nihart (69, p. 304) said:

> To satisfy pupils' needs for leisure-time activities, a number of handicrafts are carried on in classrooms and later in home workshops. These include copper tooling, silk screen, leaf printing, leather and plastics.

Careful observation of the hobby activities or lack of them among the children may be an indication of need for greater emphasis on this factor or the need for handicraft classes as Nihart calls them. A list of these activities used in the Campus School at Oswego, New York was reported by Hornbake (37, p. 153). This list is given in Table III on the next page. Although Hornbake indicated a grade placement of the activities, he was careful to explain that such a procedure was not to "freeze" the activities to the given grade restricted to the activities listed for it. This list may be used as a guide to select hobby activities for development or to select a type of activity to fit into one of the curriculum units. Bonser and Mossman (8, p. 31) stated that in the use of such a list:
### Table III

**INDUSTRIAL ARTS AREAS OF EXPERIENCE**

Available at the Campus Elementary School, by Hornbake (57, p. 155)

<table>
<thead>
<tr>
<th>Area of Activity</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Graphic Expression</td>
<td>X</td>
</tr>
<tr>
<td>Drawing</td>
<td></td>
</tr>
<tr>
<td>Lettering</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
</tr>
<tr>
<td>*Papermaking</td>
<td></td>
</tr>
<tr>
<td>*Letter-press Printing</td>
<td>X</td>
</tr>
<tr>
<td>*Block Printing</td>
<td></td>
</tr>
<tr>
<td>*Bookmaking</td>
<td></td>
</tr>
<tr>
<td>Photography</td>
<td></td>
</tr>
<tr>
<td>*Ceramics</td>
<td>X</td>
</tr>
<tr>
<td>*Woods</td>
<td>X</td>
</tr>
<tr>
<td>*Metals</td>
<td></td>
</tr>
<tr>
<td>*Leather</td>
<td></td>
</tr>
<tr>
<td>*Textiles</td>
<td></td>
</tr>
<tr>
<td>*Electricity</td>
<td></td>
</tr>
<tr>
<td>Puppets and Marionettes</td>
<td>X</td>
</tr>
<tr>
<td>Art Appreciation</td>
<td></td>
</tr>
<tr>
<td>Color Harmony</td>
<td></td>
</tr>
<tr>
<td>Poster Making</td>
<td></td>
</tr>
<tr>
<td>Mural Painting</td>
<td></td>
</tr>
</tbody>
</table>

*Responsibility of the Industrial Arts Consultant*
Lines cannot be sharply drawn between the grades in the distribution of work. Some problems may be almost equally well adapted to second or third grade, or others to fourth or fifth grade. But suggestions of sequence may be reasonably definite and yet provide for sufficient flexibility to permit of needed variations and adaptations.

Therefore, the list in Table III should be used with care as to the abilities of students undertaking the activity.

This concludes the description of basic essentials that offer suggestions of "what" may be covered by industrial arts education in the elementary school and the next part suggests "how" it might be covered.

METHODS OF TEACHING

The emphasis upon industrial arts education in the elementary school as expressed in the program requirements of Chapter II is to develop and enrich the classroom program which is the basic unit of organization. This approach was emphasized by Caswell (11, p. 240) who stated that:

The best basic unit of organization yet devised is the self-contained classroom in which a group of children of approximately the same social maturity are grouped together under the extended and continuous guidance of one teacher.

The self-contained classroom work may be organized in several ways to include industrial arts activities. Duncan (18, p. 5) made a survey of methods that were preferred by classroom teachers, and found those used by 50 percent or more of the respondents were:

Planning by teacher and pupils
Separate group projects
Construction of central group projects
Construction of individual projects
Working sketches prepared by teacher and pupils
This indicates a variety of methods used to start industrial arts activities, extending from the whole class working on one project, through several small groups, to individual projects. The first and last method named indicate the emphasis on teacher-pupil planning of projects, which was also mentioned by Klehm and Duncan (42, foreword) who felt that:

Creativeness in designs of projects is always desirable and should be encouraged. To insist that designs be wholly original is often very difficult and sometimes frustrating for children. Patterns taken from source materials can usually be modified to suit personal needs and adapted to the situation at hand. This also carries some degree of creativeness and can be justified by observing most industrial practices.

Creativeness is stressed as much as possible, but in some activities the teacher may use his judgment in regard to the ability of the children and allow them to select and adapt a pattern to their need. Patterns tend to defeat the development of creative ability but in some cases can be justified on the basis of saving time and providing a practical base to start. The latter is essential to the satisfactory completion of the work, which must be maintained as often as possible.

The main purpose of this study is to specify standards for teacher education, so the emphasis in this section is on the duties of the different teachers involved: the classroom teacher, the industrial arts consultant and the classroom teacher with special training or abilities in industrial arts activities.

The Classroom Teacher. The place of industrial arts as an integral part of the classroom program, as indicated in Chapter II contributes to the role of a classroom teacher as the key to the organization used.
Bicknell (6, p. 19) found this to be true according to the theories he stated were advocated by leading writers in regard to industrial arts on the elementary school level. He reported two theories as:

1. Most writers agree that elementary industrial arts in the early grades should be taught by the regular classroom teacher.

2. In reference to methods, the majority of writers suggested that industrial arts be presented as part of the regular classroom activity, supplemented by individual shop instruction.

The classroom teacher has the responsibility for including industrial arts as an integral part of the classroom program. Many teachers do not have any such activities so Knox (44, p. 56) made some suggestions for starting the program. She advised:

In trying this work for the first time it will be well for the teacher to let it grow out of the regular school subjects (nature study, geography, history) which contain many natural suggestions for handwork. Until the workers can shake loose from the old ways of doing things and from the new hesitations and uncertainties, it will be wise, to choose a quiet type of activity (drawing, painting, sewing or weaving), which involves fewer movements and adjustments. By degrees there may come greater freedom in choice of both topic and material and any worthwhile interest or experience or need can be worked out.

The classroom teacher who follows this advice has the advantage of using suggestions that integrate the industrial arts activities directly with nature study and history. Using a "quiet type of activity" will avoid organizational problems such as noise, dirt and extensive tools until the management or housekeeping details are established.

Starting in the fashion suggested by Knox seems to be preferable to some other suggestions of starting with a period for activities without any relation to other subject matter. Once the children establish the
routine of using industrial arts alone in an activity period it is
difficult for them to transfer the use of activities to the enrichment
of other subject matter areas. Consequently, the main purpose of the
activities is not achieved because of the inability to make the applica­
tion to subject matter. Once industrial arts has been used in the
program, McMurray (52, p. 117) was very strong in his claim for its
effectiveness, saying:

We may conclude, therefore, that well chosen units of
construction in the industrial arts have a far-reaching
importance: first, in determining the main features in the
course of study; second, in laying the basis for a preliminary
deliberative thought movement which wisely controls later
activities in construction, thus combining thought and action;
and third, in providing for continuous self-reliant effort.
No other study, not even arithmetic, combines so well all the
elements of a sound method of teaching as the problem-solving
projects of the industrial arts.

The point of emphasis is that industrial arts activities establish
a base or pattern for the other work of the classroom. If this base is
to be sound and make a positive lead, the activities need to be carefully
selected to lead the right way. This can be established in long-range
planning first among teachers and second by a teacher with his children.
Greenfield (26, p. 52) set a pattern for this method by saying:

Another facet of a broad problem of developing suitable
curricular experiences is long range planning. The teacher
can and should do some advance planning even though the
necessity for planning with children has been emphasized. It
is the better teacher who sees that the pupils have plenty of
opportunity to acquire skills and knowledges that are needed
by the children.

The emphasis is on planning with the children as well as among the
teachers, because this helps the children establish a need to select
certain types of activities that best suit the purposes they are
striving to attain.
The organization of the elementary school provides that the teachers have help in planning and guiding classroom work. Koate (45, p. 16) indicated how the nature of this help can foster development of new methods. She said:

All teachers could live and teach more creatively with the guidance of creative supervision. Supervision alone can provide an atmosphere where the climate of opinion is such as to support, encourage and stimulate creativity. In such an atmosphere the teacher would feel more secure in his creative adventure.

The administrator needs to be sympathetic to the use of industrial arts in order to create the atmosphere in which the teacher will try to improve his method of using them. A supervisor can offer constructive criticism and praise the accomplishments in such a manner that the teacher will feel free to try different or new methods with other classroom work. If the school board can be convinced of the need to hire an industrial arts consultant, he can provide supervision as well as other help.

The Industrial Arts Consultant. A teacher with a special background in the field of industrial arts can be of considerable help in developing and operating the program. The duties of such a person were stated in the bulletin, *Industrial Arts: Its Interpretation in American Schools*, (96, p. 38) as follows:

The (industrial arts) specialist should work with the classroom teachers in planning for the children's needs. His broad background of industrial information and his specific skills will supplement the classroom teacher's specific knowledge of the children and their work. Industrial arts studies may be carried on by the regular teacher in her classroom or by this teacher and the specialist working together with the children in the classroom or in the shop as the need arises.

This was published eighteen years ago, but the method of operation is used in the elementary schools of New York State today as indicated in...
the newest bulletin, *A Design for Improving Elementary Education in New York State* (63, p. 39). Industrial arts, or crafts as it is called, was mentioned as one of the areas used in the school which has:

For areas requiring special training, the elementary school provides special teachers, such as art, music, crafts, science, physical education and home economics teachers. The New York State Teachers Association reports: "The use of the special teacher is recognized as an integral part of the classroom program and as a desired resource in the regular teacher's work with her pupils. The special teacher implements study in her specific field of learning by providing materials, by acting as a consultant, and by demonstrating teaching techniques."

1. **Classroom Resource Material.** The industrial arts teacher can provide resources of tools and materials, confer with the teachers and pupils, and demonstrate processes and operations. The duty of supplying tools and materials is important because of the limited experience of regular classroom teachers in the field. Duncan and Klehm (42, p. 114) reported that not having suitable supplies has been one of the major problems of the classroom teacher and not knowing what to buy or where it could be obtained has added to the problem. An industrial arts consultant to obtain and provide supplies for all the teachers removes this major problem that hinders classroom teachers.

Some schools that have the services of a special teacher for industrial arts tend to set up classes in the laboratory as a separate subject for upper and possibly intermediate grade children. Bonser and Mossman (6, p. 74) did not believe this a good practice because:

The problem can hardly be used at all in any natural sense of the term under a departmental plan, since life problems do not classify naturally on the basis of the school subjects as organized. Because of its very extensive relationships, industrial arts, of all subjects, should not be taught by a special teacher. It is not a special subject in
the sense of being unrelated to other subjects, but, quite on the contrary, it is rather the most general subject of all in its far-reaching relationships.

The emphasis all through Chapter II provides evidence enlarging upon Bonser and Mossman's statement that industrial arts needs to become a functional part of the classroom work and not be taught as a separate subject in the laboratory. A statement in the bulletin, A Design for Improving Elementary Education in New York State, (65, p. 39) seemed to favor using the special teacher as a consultant and not setting up a schedule for separate subjects. It stated:

There is a range of practice in the use of special teachers. In some schools the special teacher takes over the class for the teaching of the special subject. In such cases time is set aside for the special subject in a fairly rigid schedule. The trend however, is toward using the special teacher more as a consultant and resource person for the regular teacher. In some instances the special teacher does some assigned teaching but has a proportion of his time set aside for consulting service. In other cases, the special teacher does no teaching, except to demonstrate technique or to help another teacher through a difficult situation. This use of the special teacher permits greater flexibility in the use of time and provides for greater adaptability in the program.

The advantages of flexibility in the use of time and greater adaptability in the program seem to place the emphasis on an industrial arts program taught by the classroom teacher who uses the industrial arts consultant to strengthen the program.

2. Consultant "On-Call". One method of organizing this type of program worked very well for Culpepper (14, p. 89) who acted as a consultant to elementary classes at Suffolk, Virginia. He explained that in this method:

The teachers indicated their desire to use the program by "signing up" on a blank provided for that purpose in the principal's office, listing their name, room, and the unit
being studied. As soon as a teacher made her desire known, the industrial arts instructor scheduled a conference with her in which the unit was discussed and the projects that could be made in the unit were listed. The teacher then presented the unit to the class and in a discussion with the students let them choose the activities they wanted to construct, being certain that these activities were agreed upon by the teacher and the industrial arts instructor in a preliminary conference. The list of the available projects was determined by the tools and materials available for their construction.

The students then divided the class into committees for the purpose of working on the unit.

This method of organizing industrial arts activities leads directly towards a program correlated with classroom subjects. Even if a unit of work is not studied, the industrial arts consultant can show the classroom teacher how the suggested activities can be related to other classroom work. Some problems do arise from this method, but they can be solved if the teachers and their classes are willing to cooperate. Without scheduling there is likely to be a time when several classes have need of limited facilities at the same time. Tippet (92, p. 340) reported that these problems have been solved as follows:

Shops and laboratories have been made available many times when it meant squeezing two or more classes into them. All of this shifting of the rather fixed parts of the daily program has been influenced by the desire to satisfy the demands of a curriculum much of which necessarily has to be made on the spot.

The entire curriculum is not made "on the spot" but the use of such facilities as the industrial arts laboratory may be needed almost immediately if the planning with children turns up a need for supplies, tools or work space. Occasionally the demands might occur simultaneously so the existing facilities need to be shared. The industrial arts consultant needs to be conscious of the safety of the children, because some operations with tools and machines are hazardous in crowded places.
3. **Community Relations.** The industrial arts consultant may find objections to his methods of teaching coming from outside the schools. Influential parents and members of the school community are familiar with the traditional program and may not understand the newer methods used. This may be one reason Pulliam (73, p. 182) said:

> The other chief obstacle to extending arts and crafts education lies in the fact that the general public as well as the people who control the schools do not yet have a clear vision of its importance in general education.

Industrial arts consultants need to use every connection they have to try to explain the program to the public. Some of the ones that have been effective are assembly programs to which people in the community are invited, a demonstration of industrial arts work by children at a meeting of a civic organization, an exhibit in the school hall, an exhibit in a store window, open house with industrial arts work displayed in the classrooms, a program for the Parent Teacher's Association and a television show. Pulliam (73, p. 182) placed the responsibility for this promotional work directly with the industrial arts consultant, with all of the classroom teachers cooperating.

4. **In Service Training.** The City of Los Angeles has a program in the elementary grades which is served by industrial arts consultants. In addition to providing tools, supplies, information and giving classroom demonstrations, Nihart (69, p. 303) explained that these consultants conduct in-service training classes for classroom teachers. Some of the latter recognize a deficiency in guiding industrial arts activities and are willing to spend their time after school to improve their abilities. In this case the industrial arts consultant helps the
group determine their needs and guides their efforts in meeting them.

An in-service training program similar to this was set up by Wurzbacher (110, p. 685) who described his situation as follows:

Now, two years later hobby groups are being taught in the first three elementary grades with the mothers having almost complete charge during an hour period once a week beginning the early days of November. The shop instructor has a five week "in-service" training program for parents active in these classes. Supplies and materials are furnished by the P. T. A. and school board. The search for projects runs widely afield. Children are making toys, tie racks, wall placques, tin can bird houses, pins and earrings, ceramic bowls, ash trays and flower containers.

This unique program not only met the children's need for activities that developed hobbies, but also provided the opportunity to utilize the willing services of parents. This extended the value of the consultant by permitting him to spend his time in a fashion that was beneficial to a group of parents and to a larger group of children than the consultant had time to reach by himself. Then his time was open to devote to special needs of classroom groups for special assistance.

5. Small School Program. It is not always possible for the smaller schools to employ a consultant, so Reavis (74, p. 224) made the following suggestion:

Larger schools find it expedient to employ a collaborating teacher whose headquarters will be the arts and crafts room. This type of program will make possible a more flexible pupil use of the room and its facilities, and has many advantages to offer. In some cases, where the space is available in the small school for such a room, the services of a collaborating teacher can be shared with a neighboring school to provide a program.

This method of two schools sharing the services of an industrial arts consultant places a burden on the consultant to maintain the physical facilities and order supplies for two schools, so the results are not
as effective in terms of service time rendered to classes of children; however, the aid of a consultant half time is better than not having any consultant.

6. Radio Program. The city of Cleveland, Ohio has pioneered in a method of introducing industrial arts activities through the use of radio broadcasts. This unique presentation was explained by Barich (4, p. 257) who wrote:

Another feature of the Cleveland plan is that the work is augmented with a radio handcraft program. Programs are presented by Radio Station WBOE, the pioneer school station in America. These broadcasts are given each week to 7000 youngsters. While the radio broadcast is going on, each school shows slides, usually colored to assist the pupils in performing their work. The same slide is shown simultaneously in each of the 100 schools. It should be emphasized that the industrial arts work or elementary handcraft as it is called in Cleveland is closely correlated with art, science, arithmetic, English and social studies.

An evaluation of the effectiveness of this method of introducing industrial arts to elementary classrooms is not given in the reference. It is difficult to conceive how 7000 youngsters could be brought to a point of readiness for an integrated program of activities at the scheduled time of the broadcast. Perhaps the use of radio is intended to introduce techniques of using common materials or in the development of recreational interests. It certainly does not seem to be a substitute for the services of a consultant to help a group of children satisfy an immediate need in regard to a classroom problem.

A statement by Hornbake (36, p. 248) summarized this subject by describing methods of teaching industrial arts when a consultant is employed. He said:
The province of the special teacher lies in offering suggestions for the development of the curriculum and in suggesting procedures for carrying out the plan. The special teacher might well work with the whole class or with individual members during a specified period (preferably planned daily) or at random times, helping them to effect their purposes. The point of emphasis is unity with enrichment.

The emphasis on unity and enrichment indicates the basic approach to the method used as well as indicating the value of having a consultant.

The Classroom Teacher with Special Training. Elementary schools that are operating without the services of an industrial arts consultant may seek as a substitute a classroom teacher who has had special training or who has special ability to work with tools and materials. Herold (54, p. 5) explained her duties in such a capacity as follows:

The writer served in a dual capacity as teacher of subject matter in the fourth grade and as instructor and advisor in industrial arts in the fourth, fifth and sixth grades.

The classroom was used for planning and some handicraft work. The workshop was in a nearby room which permitted the instructor to plan the program so she could supervise and assist the pupils in both rooms during the same period.

Telitha Herold had no more teacher education work in industrial arts than the other teachers, but through reading and experimentation she developed a fine program in her own classroom. Her supervisor even encouraged her to assist the other teachers in the school with their industrial arts activities. By placing a workshop near her room she could supervise her children or others who came from other classrooms.

Koste (45, p. 16) made this general application:

Supervision can help provide an environment where teachers may experiment with materials and ideas. Talented staff members may be used as leaders in workshops where experimentation can take place.
The combination of an interested supervisor and a master teacher can share the benefits of increased use of industrial arts experiences by cooperation. These workshop groups by combining the efforts of several teachers may build resource units and plan the purchase of tools and materials to be shared by all of the teachers. The teacher who has made the most extensive use of this method of teaching is the logical leader for the workshop. Reavis (74, p. 225) mentioned another administrative technique to use the teacher with special training or ability. He said:

The classroom teacher can do a very satisfactory job if he will make use of the newer materials available; but if a person with some special preparation can be secured, it will help insure the success of the program. In some cases a classroom teacher can spend part time with this activity while the other staff members share his class responsibilities.

A classroom teacher with special training or ability for industrial arts might trade classes with another teacher in order to give children special assistance. This is not as satisfactory as having a full time specialist because the regular classroom teacher is not able to learn with the children, and it is an additional burden to the classroom teacher with special training because these excursions to other classes require special preparation of tools and materials. However, this may be one method to get industrial arts started in several classrooms, so the parents and school board can be shown the results of the program before they are requested to hire an additional teacher to expand it.

Industrial arts consultants or special teachers should not be used to add another subject to the program. The emphasis is to use the industrial arts as a method of teaching that creates live experiences for children. Dakin (15, p. 281) summarized this idea as follows:
The activities outlined above are not intended to provide a "method" for "learning" geography, history or science. These divisions of subject matter, as such, are of no significance to children.

Obviously an educational program designed to promote the types of growth listed above must be organized into jobs, projects, and enterprises continuing over periods of days, perhaps weeks. Mere description of things seen, done and read about, with repetitious expositions in writing, have little permanent educational value.

The classroom teacher, the industrial arts consultant and the classroom teacher with special training are responsible for creating situations where learning can take place without regard to subject matter lines. The method they use is to emphasize work with tools and materials to enrich the classroom environment. The next section describes the physical setting in which they operate.

**PHYSICAL SETTING**

The proper physical setting for industrial arts education in the elementary school is essential for teachers to utilize the methods discussed above. The various types are described in the bulletin, *A Design for Improving Elementary Education in New York State, (63, p.38)* which explained that:

Some schools prefer the self-contained classroom - one equipped for carrying out all of the day's learning activities. Such rooms have tools, a work bench and work space, science materials, a hot plate and so on. Other schools have special rooms for many activities, as a special music room, an art room, a science laboratory, shop and home economics rooms.

The special room for industrial arts can be a small workroom between two classrooms or a shop or laboratory, providing three possible types of settings: the classroom, the workroom and the...
industrial arts laboratory. Each of these three is discussed in turn on
the following pages.

Classroom. The general appearance of a classroom is important to
the effectiveness of the room as a learning environment, especially when
the children use industrial arts activities. Koste (45, p. 26) expressed
this point by saying:

For a creative atmosphere, much depends upon the room
itself. Drab, cluttered surroundings will certainly glean
drab, unimaginative results. The attractive classroom speaks
for itself the value which is placed upon creative activities
by the persons who occupy that classroom. The teacher who
truly values a creative classroom atmosphere will put as much
thought and planning into classroom decorations as he would
into his own home.

The teacher can enlist the aid of the children, as one of their first
group undertakings, to plan and make attractive classroom decorations.

If suitable decorations already exist the children could plan and make
another set of decorations to use as a change in the appearance.

The self-contained classroom needs special equipment and facilities
to provide for effective use of industrial arts. These were described
by Nichols (54, p. 17) as follows:

The classroom becomes in effect, a laboratory - a labora-

tory having work and display counters, a sink, cupboards
and cases for tools and supplies, files for such materials as
bulletins and pictures and charts, cases for maps and the means
for displaying them, cubicles and cases for the accommodation
of pupils' unfinished work, library shelves accessible to the
children and near a convenient reading table, trays for con-
struction paper, a clay bin, a growing table, desks which may
be moved and rearranged in response to the needs of a variety
of activities. . . . .

Let us acknowledge, when we build, that we need not just
the sixteen or eighteen square feet per pupil necessary for
sitting, but the twenty-five or thirty square feet required
for active learning and the equipment that goes with it.
A pictorial view of a workroom including this type of equipment is shown on the next page. The work counter for industrial arts is shown at the upper right and the display counters to show completed work are along the windows at the right. Work benches are stored under the counter at the back until they are needed. The sink is adjacent to the work counter at the top right. Cupboards and cases for tools are found under and over the work counter. The teacher has a file near his desk in the lower left for such resource units as bulletins, pictures and charts. Cases for maps and the means for displaying them are not mentioned in the illustration, but are usually placed over the chalkboard shown at the bottom of the page. Cubicles and cases for the accommodation of unfinished work are under the windows at the right. The library shelves near a reading table are at the upper left. Trays for construction paper are in the supply cabinet near the upper left. A clay bin could be placed under one of the work benches or under a counter in the work center at the top of the page. Desks and tables are labelled as movable. This room has all of the items essential to a program that includes industrial arts activities.

The room plans from the Connecticut State Education Department in Illustration II, specify a minimum space of about 850 square feet. This is similar to the United States Office of Education Bulletin, Designing Elementary Classrooms, (90, p. 30) which recommends at least 900 square feet. Fordell (24, p. 56) in evaluating the size of rooms they use said:

All teachers of children, regardless of whether they have the advantages of the all-day block or freedom from a rigid schedule, recognize the larger classrooms with their 1200 square feet as the most delightful feature of the self-contained classroom.
Illustration II

PLAN FOR AN ELEMENTARY CLASSROOM

From Connecticut State Department of Education

LIBRARY CORNER

WORK CENTER

WORK COUNTER WITH CUPBOARDS OVER AND UNDER

WORK BENCHES UNDER COUNTER

PUPILS MOBILE DESKS

PUPILS TABLES

TEACHER'S CORNER

TEACHER'S CLOSET

RECORD FILE

TEACHER'S DESK

SUPPLY CABINET

WARDROBES

PAPER STORAGE UNDER COUNTER

TACKBOARD PANELS

BUILT-IN SEAT

TEACHER'S CLOSET

RECORD FILE

TEACHER'S DESK
Industrial arts activities often require considerable floor space so a program including them would need the 1200 square feet that Fordell reports as delightful. A considerable amount of space is required for the industrial arts activity center. The New York State Education Department bulletin, *The Elementary School Curriculum: An Overview*, (64, p. 136) explained how such a construction center may be organized:

1. Plans for establishing and using a work center should be developed cooperatively by teachers and pupils.

2. One center at a time should be planned and organized. Its care and use should be routinized before others are added.

3. Materials and equipment should be labelled, well organized and easily accessible. They should be properly stored after using.

4. A committee of children should assume responsibility for maintaining each work center.

5. Centers should be colorful and neat, and the room in general should reflect the immediate activities of the children and present a coordinated artistic effect.

The emphasis is on the children planning and developing the work center. This will help them in the development of their home workshop or hobby work as mentioned in Chapter II. Then, as the center is established, the functions of a management unit are used to store the materials and organize the class to maintain a neat organization.

Tools are quite expensive items to purchase when they are placed in every classroom in the school. A saving can be made by putting some of the infrequently used tools in a central supply. The bulletin, *Planning for America's Children*, (56, p. 14) stated:

Every school needs a tool box with indicated places for every tool. It should be provided with handles for moving and with lock and key. Such provision can supplement, or in small schools substitute, for the central workshop equipment.
The handles are needed to move it from some central storage to the classroom and back. The lock is to keep the children from using keen edge tools while the teacher is not free to supervise their use. In this way several classrooms can share some of the tools that they do not need to have in their classroom all of the time. Welch (102, p. 42) made some useful suggestions for tool kits. He wrote:

The tools and supplies could be arranged in portable kit form. A type of kit could be worked out that not only provides for tools and supplies, but when placed on a desk or table would provide a work area as well. Such kits should be provided with protective pads to prevent marring of the finish on the desk or table. When the period of work is over, the kits could be returned to a central storeroom.

Another plan which could be used is a crafts cart which is essentially a work table with a vise for holding work, a storage cabinet for tools and supplies in the base, mounted on wheels or casters, and rolled into the classroom for the work period.

The combination of the portable tool kit and work surfaces would do very well for activities such as cutting linoleum blocks, model building or silk screen printing. A crafts cart is a very popular idea and appears many times in the literature. Each school that develops it uses the equipment at hand as a base and adds the tools needed for the program. Gulpepper (15, p. 90) explained a rather unique system of storing the craft cart used in his school. He reported:

The toolmobile was kept in the hall just outside the library and was considered a part of the library. Any teacher in the school could "check out" a tool in the same manner as she checked out a book, and use it in her classroom. The keys for the toolmobile were kept in the custody of the librarian.

The library assumed this function of caring for the tools because there was no laboratory in the elementary building, and all of the work was carried on in the classrooms.
An extensive study was made by Klehm of the need for a classroom workbench. In his final report of the results (41, p. 1) he concluded:

To carry on an activity program of this character the elementary teacher needs a workbench in her room that is totally different from the traditional manual training type. She needs a bench that is a self-contained unit and has more than one pupil station; a bench that can be a library, study or art table when not being used for tool work. In addition, this bench must harmonize with the furniture of the room; it must be easily moved about the room or from room to room; it must be equipped with tools designed for use by children in working materials not confined to wood; and it must not be prohibitive in cost.

The bench that Klehm designed to meet the above standards is shown in the illustration on the next page. It contained the following tools:

- 2 Bench hooks
- 3 Bits, auger, 7/32, 8/32, 9/32
- 3 Bits, dowel, 3/8, 1/2, 3/4
- 1 Brace, plain sleeve, 8"
- 2 C-clamps, 2"
- 8 Drill points, 1/16 to 11/64
- 4 Files, cabinet, 8", with handles
- 1 File, square, 8", second cut, with handle
- 1 File, round, 8", second cut, with handle
- 1 Hammer, ball pein, 4 ounce
- 1 Hammer, claw, 10 ounce
- 1 Hand drill
- 1 Nail set, 1/16 tip
- 1 Plane, block
- 1 Pliers, long-nosed
- 1 Punch, prick
- 1 Rule, bench, 12 inches
- 4 Sanding blocks
- 1 Sanding dowel
- 1 Saw, back, 10 inches
- 4 Saws, coping
- 1 Saw, hand, 16 inch
- 4 Sawjacks
- 1 Screwdriver, 4 inch blade
- 1 Speed knife
- 1 Tinsnips, 8 inch
- 1 Try square, 6 inch blade

The bench is delivered with all the tools named above installed in their proper place with suitable hangers. The children can bolt the legs in
Illustration III

ELEMENTARY CLASSROOM WORKBENCH

Made by Stoner Wood Products, Charleston, Illinois
place and it is ready for use. This saves time and effort required to specify and purchase a basic set of tools and mount them in a rack.

Several references give lists of tools and supplies to equip the classroom industrial arts center. An extensive study was reported in the United States Office of Education Bulletin, Designing Elementary Classrooms, (90, p. 8). This illustrated bulletin showed how they are used in the classroom program as well as indicating how they can be incorporated in the design of the classroom. Other references are Culpepper (14, p. 89), The Elementary School Curriculum: An Overview (64, p. 138), Greenfield (26, Appendix), Harris (31, p. 12), The Los Angeles City School District Bulletin (49, p. 8), Nihart (69, p. 304), Planning the Elementary Classroom (66, p. 14), and Rowand (78, p. 269).

**Workroom.** Some elementary schools that have industrial arts in their programs when planning for a new building have made a variation of the classroom work center by installing separate workrooms. The reason for this was explained by Hornbake (36, p. 247) who said:

> It is not inadvisable to separate from the rest of the room, by a steel and glass partition, those activities which make for dust and noise.

It is very important that the separating partition have large windows so the classroom teacher can watch the children who are carrying on activities in the workroom. Many times the noise of hammering or sawing would distract other children who might be trying to read or discuss a problem. If these noisy activities are placed in a sound-treated room a small group can carry on activities while the remainder of the class carries on its work. It is much easier to confine an activity like ceramics to a separate room than to try to draw limits around the work
area in a classroom. The definite limit of a doorway makes the housekeeping much simpler.

Illustration IV on the next page shows plans for a workroom designed by the Connecticut State Department of Education. Notice the large window and the glass in the door so the teacher can observe the activity in the workroom from the classroom. The same features are included as in a classroom work center: display shelves, material storage, workbench and work counter. The minimum size specified is 170 square feet.

The upper elementary grade classrooms may have a workroom in between two rooms as illustrated in an article in the School Board Journal of April 1947. In this way a workroom may serve the children in two rooms keeping the cost for extra facilities to a minimum. It is still essential to have large windows for each teacher to observe the children in the workroom. Polarized glass might be used so it is not possible to see from one classroom through the workroom into the other classroom. This need for a glass window is of importance to the success of using the rooms. It will be noted in Chapter V that rooms were left unused because of lack of such a window and because of lack of acoustical treatment. A workroom common to two rooms is not used in the lower grades in Wichita because the younger children are not as able to share the facilities as older children.

According to a survey of opinions of classroom teachers by Duncan (18, p. 5) the physical facilities for industrial arts activities listed in order of preference were:

1. An adjoining room, with benches and hand tools.
2. A regular classroom with worktable and hand tools.
3. A special activities room or industrial arts shop.
Illustration IV

ELEMENARY SCHOOL WORKROOM

Designed by Connecticut State Department of Education

[Diagram of an elementary school workroom with dimensions and labels for different sections and areas.]
The group of teachers consulted by Duncan preferred the workroom to the classroom activity center for industrial arts. Welch (102, p. 40) suggested a workroom for the purpose of making larger projects. When they are set up in a workroom they can be left. A classroom work center usually is used for other purposes during the different times in the day and it is not easy to leave larger projects such as relief maps.

The tools and supplies are very similar to those suggested for a work center in a classroom. References to them are given under the head of classrooms earlier in this chapter.

**Industrial Arts Laboratory.** Industrial arts activities in the elementary school often require facilities that need to be set up in a laboratory. Bonser and Mossman have been quoted to indicate their strong emphasis on keeping industrial arts as an integral part of the classroom work, however, even they (8, p. 81) indicated this need:

> For each school building, it is desirable to have one room equipped with the necessary furnishings and tools for the work of all of the first six grades. Much of the work can be done in most fields in the regular grade room. But it is worth while to have one room to which any grade may go when the work requires it, especially adapted to these needs.

This is recognized by elementary school administrators today as indicated in a survey by the National Council of State Consultants in Elementary Education. In the book, *Planning for America's Children,* (58, p. 3) they tabulated teacher demands for services which require special rooms, based upon replies from 106 administrators. In schools with seven or more teachers, 86 percent felt a need for a "shop" room. Some basic specifications for this room were set by Hornbake (36, p. 247) who wrote:

> Specially equipped rooms for music, a foods laboratory, or a laboratory of industries might also supplement the
classroom facilities. This arrangement would make it possible for the whole class to pursue, on some occasions, one type of activity. These rooms should centrally house that equipment which is too large, too expensive, or so seldom used as to make inadvisable its placement in every classroom.

The central location is important because the children are constantly travelling back and forth from their classrooms to the laboratory and the industrial arts consultant is moving tools and supplies from the laboratory to the classrooms and returning the tools. Machines even though they are small are relatively expensive and can be shared by all of the classrooms if they are set up in the industrial arts laboratory, thus cutting the costs of placing them in several locations. Care must be taken in the purchase of equipment, supplies and tools to select the ones best suited to the capacities of children. In regard to this Klehm (41, p. 2) advised:

A careful study of the problem revealed that equipment would need to be provided that fitted the strength, height and muscular coordinations possessed by boys and girls. In tool-work, as in other work muscular coordination and rhythm is only possible when the individual is performing the act with ease. This means tools of the right size, correct working techniques and benches and work surfaces of the correct height to make possible good posture.

The cheapest grade of equipment and tools will not withstand abuse in the learning process and the smallest size is not always suitable; for example, first graders have trouble with a short saw pulling out of the kerf. The most extensive description of the facilities for an industrial arts laboratory encountered during the bibliographical study was that given by Newkirk in his book, Integrated Handwork for Elementary Schools, (62). He described supplies giving the exact specifications with the amount and cost of each, a list of tools specifying the sizes,
specifications for placement of equipment in a laboratory, and a list of tools and supplies that children can bring from home. Other suggestions were given by: Alterman (1, p. 39), Bonser and Mossman (5, p. 61), and Moore (56, p. 28). Further information regarding the physical setting of an industrial arts laboratory for elementary schools is found in Chapter V where visits to New York State schools are described. It is very difficult to anticipate all of the needs for tools and materials without overstocking things that will not be needed. Harris (31, p. 12) believed there was an advantage in acquiring them gradually. He wrote:

Unless the program is being introduced into a brand new school that has been completely equipped it will be found that a number of years will be necessary to accumulate all the desired or necessary tools and items of equipment. Quite frequently this gradual acquisition of tools fosters a marked amount of initiative and resourcefulness on the part of the teacher and the pupils.

A school financing a new building may include industrial arts equipment and tools along with other equipment for the building; however, a school adding them from current expenses may need to spread the cost of additions over several years. In the latter case, the program could operate using only a few tools and items of equipment to start activities. Once the advantages can be seen by improvement in the school program additional money should be easier to acquire. Pulliam (73, p. 182) believed high cost to be one of the chief factors that have stood in the way of much faster development of industrial arts. It is possible to reduce the cost somewhat through the use of free materials. Koste (45, p. 19) listed some of these as:

Weeds serve very well in weaving projects. The local lumber yard, both from a need to be rid of and from a genuine desire to help, will supply heaps of scrap wood. Scraps of
tin, copper, aluminum, wire, scrap linoleum, rubber tile and different kinds of insulation can be obtained from local industries for the asking. Children can and will bring scraps of wallpaper, scraps of material from mother's latest sewing project, threads, yarn, buttons and odd bits of paint left over from jobs at home.

The use of these waste materials not only defrays some expenses for materials but also helps to teach the conservation of materials mentioned in Chapter II. It also brings children into contact with local industry, either through a trip to the factory to procure the materials or through an explanation of where the materials come from. Herold (34, p. 6) explained that the parent-teachers association in her school conducted a money raising project to buy tools and equipment for industrial arts. There does not seem to be any tendency to charge the pupils for materials, Reeder (75, p. 167) saying:

> The tendency everywhere is toward furnishing free instructional supplies to all pupils; this practice is followed especially in the elementary school.

The industrial arts consultant can select supplies of lower cost material, for example he can order pigskin instead of top grade calf, or thin sheets of plastic material instead of the expensive blocks and use paper stencils for silk screen instead of nu-film.

This section on physical settings as an element of curriculum seems to be summarized by the following statement by Ditzler (17, p. 9):

> Care must be taken in selection of activities and consideration given to authenticity of materials and processes.

If a laboratory is available its best use, as with a library, appears as a resource center.

The description of curriculum essentials in this chapter has shown how care in the selection of activities governed by basic essentials and methods, and the laboratory as a resource center combines with the
classroom and workroom to provide the physical setting. To ascertain if
the curriculum essentials have met the derived program of industrial arts
education, the next section, evaluation, is used.

EVALUATION OF ACTIVITIES

The classroom teacher was the key person in the organization of the
industrial arts activities in the elementary school and he remains the
key person in the process of evaluation. Gustin and Hayes (28, p. 23)
illustrated how evaluation may function during activity work by writing:

Each teacher will need to check the effectiveness of her
program. Some informal notes made about each child are valuable
records for the teacher. Perhaps John's second year record
shows that he read well but did not work well with other children
at the beginning of the year. By the middle of the year it shows
that he worked well with the group while building a store and
often helped some of the other children read stories about their
activities.

The informal notes made by the teacher can be reviewed in checking the
effectiveness of the activity work. The industrial arts consultant may
check these records with the teacher and suggest further activities or a
change in the methods of presentation to improve the program. Wahlquist
(98, p. 4) indicated the teachers are not alone in evaluation. He says:

The children are expected to have a share in the preliminary
planning, in criticizing and evaluating plans, in executing
plans, and in evaluating products.

The children use evaluation as an integral part of the learning
process. Before they put a plan into operation they look it over to see
if they have forgotten any part or if they have selected the best means
of arriving at the stated goal. After the work is completed children
are encouraged to compare it with the purposes they stated in the
beginning. An example of how this works was given by Kallen (40, p. 20)
who explained how a group of children evaluated the work of one of their classmates. She explained:

The teacher and the class praised the good points in his work and discussed ways of improving it or the best means of carrying it to completion. This actively led the children to make the sort of observation and investigation which Dr. John Dewey considers so important in training children to think well.

Some people object to students evaluating one another's work in class, but when it is done the teacher can keep the approach positive by having the children look for good points. After class the children criticize each other's work and by doing some of it in class the teacher can set a pattern that will help them become less caustic in their remarks.

The beginning section in this chapter indicated how the basic essentials of the curriculum have changed. Klehm (42, p. 5) explained how the process of evaluation needs to change to keep up with the curriculum change, saying that:

Testing of acquisition of facts by the old formal examination is changing to tests of ability to meet important life situations. The entire examination system is rapidly changing from an instrument for the elimination of pupils to an instrument for helping pupils to learn more effectively. The test for mastery is becoming more a test of ability to do certain coordinated and unified activities having life values, e. g., ability to write a social letter of a certain standard.

The purpose of evaluation has changed along with the techniques. The purpose has become to use evaluation as a process to stimulate the improvement of teaching methods by cooperative review between teacher and pupil of the accomplishments. This change of purpose can only be effected by adding the new techniques of evaluation to the old process of measuring achievements. Roush (77, p. 74) enumerated some of the newer techniques as follows:
We arrived at our conclusions as to the success or failure with individual pupils through a number of different means. We noticed the progress made over a period of time. We kept anecdotal records of behavior under different circumstances, watched any changes in habits or skills, and determined whether or not any development was made in acquiring desirable social attitudes, sense of values and appreciations. We noted activities in which the children engaged outside of school. We listened to the comments and opinions of parents and outsiders. For the most part, however, we had to base our evaluation on our own judgment. We were the ones most familiar with both the children and the program.

The techniques used above are keeping a progress chart, making anecdotal records of behavior, recording out-of-school activities, soliciting comments from parents and then using the judgment of the teachers in regard to the effect of the program on the children. A summary of this program is found in a list printed in the New York State bulletin, *The Elementary School Curriculum: An Overview*, (64, p. 150). The points were:

1. A good evaluation program is continuous. Since evaluation is concerned with more than end products, it must be a continuing process throughout the child's school life.

2. It is cooperative. Evaluation should not be done by the teacher alone, but by children, parents, teachers and supervisors working together.

3. It is functional. The process of evaluation and the results revealed by evaluation should produce growth.

4. It uses various techniques. No one pattern or technique for evaluating should be used to the exclusion of others.

5. It is consistent with the educational objectives agreed upon.

The classroom teacher and the industrial arts consultant can use the above list to bring the use of evaluation into the program of industrial arts, and to check to see if the program is meeting its objectives.

This chapter on development of curriculum elements has described the basic essentials that are used in the fashion stipulated by the methods.
suggested. These factors establish the base for the physical setting while the techniques of evaluation described determine if the curriculum elements have met the program requirements derived in Chapter II. The section below reviews this chapter to draw the implications for teacher education to be used in Chapter VI.

**IMPLICATIONS FOR TEACHER EDUCATION**

The material presented in this chapter is now reviewed in terms of the recommended experiences for preparing specialists for the elementary school program. In terms of the information presented in this chapter the industrial arts consultant in an elementary school needs to:

1. Provide the school curriculum planning group with material that indicates the resources of industrial arts education.

2. Effect a transition from the traditional areas of work to the units of the curriculum reflecting technology.

3. Encourage the teachers to consider the implications of technological developments for the school curriculum.

4. Understand and use the unit of study method of creating learning experiences.

5. Guide children's activities in the six units of the industrial arts curriculum: power and transportation, construction and manufacture, communications and management, with emphasis upon production, consumption and recreation.

6. Operate freely within the organization of elementary schools.

7. Help the classroom teacher organize learning experiences utilizing the best possible methods under the circumstances.
8. Initiate industrial arts activities by correlation with other subjects in cooperation with classroom teachers, and not resort to separate subject emphasis for industrial arts.

9. Work directly with the children in the classroom or industrial arts laboratory to guide their learning experiences.

10. Initiate the use of a consultant program, using various techniques to foster closer working relations.

11. Foster good relations with the people of the community to promote industrial arts as a part of the school program.

12. Conduct in-service workshops for classroom teachers to improve their ability to use industrial arts in their classroom.

13. Develop the best possible classroom or workroom physical setting with the means at hand.

14. Develop the best possible laboratory with means at hand.

15. Assist the classroom teacher in evaluation of children's work.

16. Use the various techniques of evaluation as an integral part of daily teaching.

The classroom teacher with special training would need to be able to do as many of the above as possible in the time available for training and still have the ability to organize a full classroom program.

The above points indicate the implications for consideration in Chapter VI which sets up standards for preparing specialists. This concludes the bibliographical study of the derivation of industrial arts education and of the development of curriculum elements, and leads to the survey of needs for consultants in Chapter IV.
Chapter IV
SURVEY OF NEW YORK STATE NEEDS FOR SPECIALISTS

The description of industrial arts education presented in the last two chapters can be considered from the point of view of the current need of the elementary schools in New York State for industrial arts specialists. The fact that demand for teachers seems to be exceeding the supply, colors the picture somewhat, because an elementary school needs teachers for all of the classrooms before it needs special teachers. However, a school that can offer classroom teachers the help of specialists will have a better opportunity for obtaining new teachers and improving the education of the children.

Chapters II and III indicated the need for including industrial arts in the elementary school, but the problem considered here is the viewpoint of the administrators concerned. This information is sought from two sources: teacher placement records and the opinions of administrators. The former is used because it indicates an immediate demand for teachers of certain qualifications. The latter is sought because their opinions will determine the actual demand for industrial arts specialists in the future.

TEACHER PLACEMENT RECORDS

The State University of New York, Teachers Colleges at Buffalo and Oswego have divisions specializing in the training of industrial arts teachers. Their placement offices would be the logical place for
administrators to address requests for industrial arts specialists. A letter was sent to each office requesting a statement of the number of requests for industrial arts consultants to serve in the elementary school within the last academic year.

**Oswego.** The reply from Clarence W. Ridgeway, Director of Placement at Oswego read as follows:

To give you an exact figure of requests for Elementary Grade Industrial Arts people is rather difficult because it is not categorized that way. We have had a total request of nearly 300 Industrial Arts people and they are still coming in. There is an increasing demand for those people trained in the Elementary field and a great growing need for expansion in this area.

There has been such a demand for teachers that it is not possible for the two people in the placement office to keep extensive records of the calls received. Their efforts are spent in the direction of maintaining an active file of jobs available for those who seek the services of the office for teaching positions.

The statement of the placement director at Oswego is inadequate for the needs of this study, but it indicates there is an opportunity for industrial arts teachers with training at the elementary school level to obtain teaching positions as consultants.

**Buffalo.** The reply from June H. Truesdale, Placement Secretary at Buffalo said:

...we have checked calls for industrial arts teachers that have come to us during the past school year. We find, out of approximately 145 notices, four requested teachers for grades below the seventh.

The four requests indicate that there is a need or trend, although small at present, for industrial arts graduates to act as consultants. These
requests were made knowing that the men are trained primarily for the secondary schools and do not have college preparation to teach at the elementary school level. It might be expected that the requests would increase if the administrators knew that some of the training was to prepare for teaching children in the elementary school. The two reports indicate some call for industrial arts graduates to work at the elementary school level, with the record at Oswego where training of specialists has been initiated, apparently indicating more requests than Buffalo.

ADMINISTRATOR OPINIONS

A survey of administrators was made to ascertain their belief in relation to the use of industrial arts activities in the elementary schools. The method of a questionnaire survey was selected to reach a representative sampling of opinions. Elementary school principals were selected because it was felt they are closer to classroom needs than are school superintendents. The following purposes were stated as a basis for constructing the questionnaire:

1. To find out if principals see a need for industrial arts activities in kindergarten through the sixth grade.

2. To find out what type of teacher education experiences elementary school principals prefer for teachers in their schools.

3. To find out what factors impede the development of industrial arts in the elementary school.

Construction of the Questionnaire. The questionnaire attached to page 109 was carefully constructed to gather the information stated in the above purposes. The first one is covered by the sixth
question which asks if the principals favor other areas of activities in place of industrial arts. The second purpose is covered by the first five questions which attempt to check five possible situations for teacher education preparation. The third purpose is covered by the last question about the factors that impede the development of industrial arts. Whitney (104, p. 136) listed ten points to evaluate a questionnaire:

1. **Is it adequately sponsored?** The president, dean of instruction, and director of industrial arts at the State University of New York, Teachers College, Oswego agreed to the use of the name of the college and the position of the writer as a sponsor.

2. **Is the purpose frankly stated?** The letter to the principal states that the resulting opinions would be considered in the development of the teacher education program at Oswego. A full report of the results has been presented to the president, the dean of instruction, the director of industrial arts and interested faculty members of the college.

3. **Is it a worthy topic?** The topic was worthy enough to be considered by a graduate committee for dissertation study at the Ohio State University.

4. **Is it well organized?** The organization of the questionnaire was checked with the dissertation committee, administrators of the College at Oswego and by a sampling of elementary principals. Revisions were made in light of the suggestions offered.

5. **Is it clearly and briefly worded?** The clarity was judged by the people listed above who checked the organization. The brevity is indicated by the fact that it fitted on a double postcard.
Illustration V

QUESTIONNAIRE TO ELEMENTARY SCHOOL PRINCIPALS

STATE UNIVERSITY OF NEW YORK
TEACHERS COLLEGE
OSWEGO

Dear Principal:

We are developing a teacher education program in the area of industrial arts at elementary grade levels - kindergarten through six. In order to provide teachers in this area who fit the needs of the elementary schools we would like to have your advice.

Please check the other half of this postcard and return it to us.

Sincerely yours,

Harold G. Gilbert, Ass't. Prof.
Elementary Industrial Arts

If industrial arts is defined as manipulative experiences or activities integrated with the classroom program and reflecting our industrial society, rather than as a *handicraft* or as an old fashioned *busy work* program, do you favor:

1. All classroom teachers to have some industrial arts training? ____________________________

2. A classroom teacher with an industrial arts minor in each school? ________________________

3. The use of an industrial arts specialist in each school? _________________________________

4. A combination of number one and number two? _________________________________

5. A combination of number one and number three? _______________________________

6. Using other areas such as: _______________________________________________________

What factors hinder the development of this program? ________________________________

109
6. Can it be answered briefly - by check mark? The questions were worded so a check could indicate a reply although space was left for comments. The last two questions required a brief phrase for an answer.

7. Is the information not available elsewhere? The bibliographical study did not reveal any such information.

8. Is it the proper mechanical form? The proof of the card was folded to check the position of the parts. The return address was on the reverse side of the questions asked.

9. Are the demands reasonable? The only demands were to check their opinions and return the postcard in the outgoing mail.

10. Is a summary promised respondents? This was not done because of lack of space and the fact that the information did not seem to be of great value to an individual principal. There was room for them to request a summary as two of them did.

Favorable answers were provided to nine of the ten points proposed by Whitney for evaluation so the cards were printed as illustrated on page 109.

Selection of Administrators. The Directory of Elementary School Principals and Supervisors of New York State (65) listed 1,394 elementary school principals for the 1953-54 school year. This does not include principals who spend half time or less teaching. These were eliminated in favor of principals who spend more time in supervisory work. Those supervising kindergarten through sixth grade were selected in favor of those supervising kindergarten through eighth grade because this study deals with the former grade levels. The Directory is divided into three parts: cities, villages and schools in supervisory districts. The latter
are the centralized school districts and are referred to in most of the tables only as districts.

Sending a questionnaire to every third principal seemed to give sufficient coverage and still keep the mailing to a reasonable size. Every third principal in the directory was selected, which brought the total to 465. The remaining 31 cards were sent to the smaller villages and supervisory districts that had one or two principals and had been passed over without representation in the process of selecting every third principal. This gave a coverage of every city, village and supervisory district except 18. There were four cards spoiled beyond use in the printing, so the total sent was 496. As the cards were addressed, a number was placed on the return address side so the return could be identified with the principal who checked it.

**Tabulation of Returns.** Exactly 300 of the 496 cards were returned which was a total of 60 percent. 52 percent of the city principals, 59 percent of the village principals, and 67 percent of the principals in supervisory districts returned their questionnaires.

Table IV on the following page is a tabulation of the principals who did return the questionnaire compared with the principals who did not return the questionnaire. The distribution of returns is broken down by the number of teachers that the principals supervise.

The number of teachers supervised by a principal did not seem to affect his tendency to answer the questionnaire. In each column the median group of the total is underlined. This shows that within cities, within villages, within supervisory districts and within totals, the median (as indicated in the table by the underlined number) falls
Table IV

NUMBER OF PRINCIPALS RETURNING QUESTIONNAIRES

According to Number of Teachers in School

<table>
<thead>
<tr>
<th>Number of Teachers</th>
<th>Cities Did</th>
<th>Cities Not</th>
<th>Villages Did</th>
<th>Villages Not</th>
<th>Districts Did</th>
<th>Districts Not</th>
<th>Totals Did</th>
<th>Totals Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6 - 10</td>
<td>14</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>14</td>
<td>41</td>
<td>27</td>
</tr>
<tr>
<td>11 - 15</td>
<td>23</td>
<td>17</td>
<td>8</td>
<td>6</td>
<td>40</td>
<td>19</td>
<td>71</td>
<td>42</td>
</tr>
<tr>
<td>15 - 20</td>
<td>22</td>
<td>24</td>
<td>11</td>
<td>8</td>
<td>37</td>
<td>15</td>
<td>77</td>
<td>47</td>
</tr>
<tr>
<td>21 - 25</td>
<td>9</td>
<td>14</td>
<td>5</td>
<td>4</td>
<td>20</td>
<td>6</td>
<td>34</td>
<td>24</td>
</tr>
<tr>
<td>26 - 30</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>4</td>
<td>17</td>
<td>6</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>31 - 35</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>12</td>
<td>8</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td>36 - 40</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>41 - 45</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>46 - 50</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>51 - 55</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>56 - 60</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>61 - 65</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>66 - 70</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>71 - 75</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Totals:</td>
<td>88</td>
<td>82</td>
<td>48</td>
<td>33</td>
<td>164</td>
<td>81</td>
<td>300</td>
<td>196</td>
</tr>
<tr>
<td>Returns:</td>
<td>52 Percent</td>
<td>59 Percent</td>
<td>67 Percent</td>
<td>60 Percent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

112
within the same size group of teachers. Close inspection of the table
does not seem to indicate any significant departure from this pattern.

1. **All Classroom Teachers.** The first question dealt with the
desires of principals to have their classroom teachers receive some
preparation in industrial arts education. The answers were interpreted
to mean either **yes** they should have training or **no** they should not. A
check mark was interpreted to mean a **yes** answer, assuming the principals
would check the answers they favor. Only one of the 279 answers indicated
any doubt of the respondent and that one answer was discarded. The
answers are tabulated in Table V on the next page.

Considering that 500 questionnaires were returned, 257 or 86 percent
of the principals were in favor of classroom teachers receiving some
industrial arts training, while 21 or 7 percent objected to it. Only 22
or 7 percent indicated no preference. Inspection of the parts of the
table does not indicate any appreciable variance from this pattern among
schools with more or fewer teachers or among the cities, villages or
districts.

2. **A Minor for Classroom Teachers.** The second question dealt with
the opinion of principals toward having a classroom teacher with an
industrial arts minor in each school. Again, to tabulate the results
the answers were interpreted to mean either **yes** there should be one or
**no** there should not be one. A check mark was interpreted to mean a **yes**
answer, assuming the principals would check the answers they favor.
This question drew 12 doubtful replies in addition to the 133 that gave
a positive **yes** or **no**. The answers are tabulated in Table VI on page 115.
### Table V

REPLIES TO QUESTION NUMBER ONE

All Classroom Teachers to Have Some Industrial Arts Training?

<table>
<thead>
<tr>
<th>Number of Teachers in the Schools</th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-up</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>45</td>
<td>13</td>
<td>7</td>
<td>75</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>VILLAGES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>15</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>DISTRICTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26</td>
<td>64</td>
<td>33</td>
<td>20</td>
<td>143</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>38</td>
<td>123</td>
<td>54</td>
<td>42</td>
<td>257</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>12</td>
<td>4</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>Replies</td>
<td>44</td>
<td>148</td>
<td>64</td>
<td>44</td>
<td>300</td>
</tr>
</tbody>
</table>

PERCENTS AND TOTALS OF REPLIES TO QUESTION ONE

<table>
<thead>
<tr>
<th></th>
<th>Cities</th>
<th>Villages</th>
<th>Districts</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>85</td>
<td>81</td>
<td>87</td>
<td>86</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>10</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Replies</td>
<td>88</td>
<td>48</td>
<td>164</td>
<td>300</td>
</tr>
</tbody>
</table>
# Table VI

**REPLIES TO QUESTION NUMBER TWO**

A Classroom Teacher with an Industrial Arts Minor in Each School?

<table>
<thead>
<tr>
<th>Number of Teachers in the Schools</th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-up</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>24</td>
<td>3</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td><strong>VILLAGES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td><strong>DISTRICTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7</td>
<td>21</td>
<td>9</td>
<td>6</td>
<td>45</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>17</td>
<td>7</td>
<td>3</td>
<td>32</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10</td>
<td>34</td>
<td>16</td>
<td>10</td>
<td>70</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>45</td>
<td>14</td>
<td>9</td>
<td>77</td>
</tr>
<tr>
<td>Replies</td>
<td>44</td>
<td>148</td>
<td>64</td>
<td>44</td>
<td>300</td>
</tr>
</tbody>
</table>

**PERCENTS AND TOTALS OF REPLIES TO QUESTION TWO**

<table>
<thead>
<tr>
<th></th>
<th>Cities</th>
<th>Villages</th>
<th>Districts</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>17</td>
<td>25</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td>No</td>
<td>36</td>
<td>27</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Replies</td>
<td>88</td>
<td>48</td>
<td>164</td>
<td>300</td>
</tr>
</tbody>
</table>

115
About one-fourth of the principals (23 percent) made a positive statement and about one-fourth (26 percent) made a negative reply regarding a classroom teacher with an industrial arts minor in each school. About one-half or 51 percent did not give any answer to this question. The positive and negative answers nearly balance each other among schools with different numbers of teachers and among cities, villages and districts in all situations but one. Principals from city schools with eleven to twenty teachers are against this proposal. Only seven were for it while twenty-four were against it. This group swung the total of city school principals toward the negative side while the district principals favored the proposal.

3. An Industrial Arts Specialist. The third question considered the use of an industrial arts specialist in each school. The same pattern for tabulation is used with the interpretation of yes meaning they should have a specialist and no meaning there should not be one. A check mark was interpreted to mean a yes answer, assuming the principals would check the answers they favor. Only four of the 244 answers were in doubtful categories and could not be tabulated as yes or no. The replies to this question are shown in Table VII which is on page 117.

About two-thirds (65 percent) of all the principals replying were in favor of using an industrial arts specialist in an elementary school, while only 15 percent were against using one. This question was not answered by one-fifth of the principals. The pattern of replies appeared fairly constant throughout the table.

4. Combination of One and Two. The principals were asked if they favored a combination of number one, all classroom teachers having some
Table VII

REPLIES TO QUESTION NUMBER THREE
The Use of an Industrial Arts Specialist in Each School?

<table>
<thead>
<tr>
<th>Number of Teachers in the Schools</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CITIES</td>
<td></td>
<td>VILLAGES</td>
<td></td>
<td>DISTRICTS</td>
<td></td>
<td>Totals</td>
<td></td>
<td>Replies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-10</td>
<td>11-20</td>
<td>21-30</td>
<td>31-up</td>
<td>Total</td>
<td>1-10</td>
<td>11-20</td>
<td>21-30</td>
<td>31-up</td>
<td>Total</td>
<td>1-10</td>
</tr>
<tr>
<td>CITIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>38</td>
<td>13</td>
<td>4</td>
<td>63</td>
<td>14</td>
<td>8</td>
<td>10</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>17</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VILLAGES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>47</td>
<td>26</td>
<td>13</td>
<td>101</td>
<td>99</td>
<td>47</td>
<td>27</td>
<td>196</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>12</td>
<td>3</td>
<td>3</td>
<td>20</td>
<td>5</td>
<td>24</td>
<td>4</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISTRICTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23</td>
<td>99</td>
<td>47</td>
<td>27</td>
<td>196</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>24</td>
<td>4</td>
<td>11</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replies</td>
<td>44</td>
<td>148</td>
<td>64</td>
<td>44</td>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PERCENTS AND TOTALS OF REPLIES TO QUESTION THREE

<table>
<thead>
<tr>
<th>Cities</th>
<th>Villages</th>
<th>Districts</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>72</td>
<td>67</td>
<td>62</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Replies</td>
<td>88</td>
<td>48</td>
<td>164</td>
</tr>
</tbody>
</table>

117
industrial arts work, and number two, a classroom teacher in each school having a minor. Yes means they favored it and no means they did not favor it. A check mark was interpreted to mean a yes answer, assuming the principals would check the answers they favored. Only two answers out of 111 were in the doubtful category and were not used. The results are indicated in Table VIII found on the next page.

The results indicate that 17 percent of all the principals who replied were in favor of a combination of one and two, while 19 percent were against it. However, there is a difference of opinion among the groups. The city principals within the replies made to the question were definitely opposed while the district principals seemed to favor it to a greater extent. The principals with more teachers favored it over the ones with fewer teachers. The majority or 64 percent of the principals did not answer this question.

5. **Combination of One and Three.** The principals were asked if they favored a combination of number one, all classroom teachers having some industrial arts work, and number three, an industrial arts specialist in each school. Yes means they checked in favor of the combination while no means they wrote a negative comment to it. A check was indicated as a yes answer, assuming that the principals would check the answers that they favored. Only one answer was not used because it could not be placed in one of the categories. The results are in Table IX on page 120.

One half of the principals were in favor of the combination while 14 percent recorded their opposition. Only one slight irregularity upset the pattern. City principals in schools having 31 or more teachers indicated three yes's against five no's. This was the only place where
### Table VIII

**REPLIES TO QUESTION NUMBER FOUR**

A Combination of Number One and Number Two?

<table>
<thead>
<tr>
<th>Number of Teachers in the Schools</th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-up</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>17</td>
<td>3</td>
<td>2</td>
<td>27</td>
</tr>
<tr>
<td>VILLAGES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>DISTRICTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
<td>14</td>
<td>8</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>12</td>
<td>4</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Totals</td>
<td>Yes</td>
<td>7</td>
<td>25</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>7</td>
<td>32</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Replies</td>
<td>44</td>
<td>148</td>
<td>64</td>
<td>44</td>
<td>300</td>
</tr>
</tbody>
</table>

**PERCENTS AND TOTALS OF REPLIES TO QUESTION FOUR**

<table>
<thead>
<tr>
<th></th>
<th>Cities</th>
<th>Villages</th>
<th>Districts</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>12</td>
<td>19</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>No</td>
<td>31</td>
<td>21</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Replies</td>
<td>88</td>
<td>48</td>
<td>164</td>
<td>300</td>
</tr>
</tbody>
</table>
Table IX

REPLIES TO QUESTION NUMBER FIVE

A Combination of Number One and Number Three?

<table>
<thead>
<tr>
<th></th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-up</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Teachers in the School</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>25</td>
<td>10</td>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td><strong>Villages</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td><strong>Districts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>36</td>
<td>22</td>
<td>10</td>
<td>80</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>20</td>
<td>71</td>
<td>38</td>
<td>20</td>
<td>149</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>20</td>
<td>6</td>
<td>11</td>
<td>42</td>
</tr>
<tr>
<td><strong>Replies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>148</td>
<td>64</td>
<td>44</td>
<td>300</td>
</tr>
</tbody>
</table>

PERCENTS AND TOTALS OF REPLIES TO QUESTION FIVE

<table>
<thead>
<tr>
<th></th>
<th>Cities</th>
<th>Villages</th>
<th>Districts</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>52</td>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>17</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td><strong>Replies</strong></td>
<td>88</td>
<td>48</td>
<td>164</td>
<td>300</td>
</tr>
</tbody>
</table>

120
there seemed to be a significant deviation and it was in the smallest group. A total of 36 percent of the principals did not reply to this.

A comparison of the percentages for or against each of the five questions is made in Table X on the next page. The principals heavily favored all classroom teachers having some industrial arts experiences. Their second choice was having an industrial arts specialist in each school. These were the only two proposals that received approval from more than half of the principals. The use of a classroom teacher with an industrial arts minor was favored by less than one-fourth of the principals and met with more opposition than did the others.

6. Using Other Areas. There were only fifty-four suggestions of using other areas. No principal suggested another area without checking one of the first five. Some principals suggested two or more areas so there were less than one-sixth of the principals suggesting the possibility of another area instead of industrial arts.

Art was suggested seventeen times with four being a combination of art and industrial arts. Science was mentioned eight times and social studies seven times. Other subject matter areas and the number of times they were mentioned are: home economics - 4, physical education - 3, reading - 2, agriculture - 1, and mathematics - 1. Several items mentioned a few times were outside of subject matter areas such as: club programs - 3, dramas - 2, industrial visits - 1, parents and hobbyists - 1, mentally retarded - 1, and industrial arts with audio-visual - 1.

7. Factors that Impede Growth. The principals were asked to give factors that impede the growth of the program. They are listed in Table XI on page 124, with the ones mentioned most nearest the top. Cost for
Table X

COMPARISON OF REPLIES TO QUESTIONS NUMBER ONE TO FIVE

By Percentages

<table>
<thead>
<tr>
<th></th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cities</td>
<td>Yes</td>
<td>85</td>
<td>17</td>
<td>72</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>7</td>
<td>36</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>Villages</td>
<td>Yes</td>
<td>39</td>
<td>25</td>
<td>67</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5</td>
<td>27</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Districts</td>
<td>Yes</td>
<td>87</td>
<td>26</td>
<td>62</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>6</td>
<td>20</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Totals</td>
<td>Yes</td>
<td>86</td>
<td>23</td>
<td>65</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>7</td>
<td>26</td>
<td>15</td>
<td>19</td>
</tr>
</tbody>
</table>

Rank: 1 4 2 5 3
supplies or for a teacher's salary headed the list with lack of space second. The latter was as important as cost in the villages and districts where the population growth affects the schools, but the city principals did not give lack of space as much emphasis. Third on the list was lack of teachers which included the general teacher supply problem or a lack of training to handle industrial arts work. Lack of facilities included such items as equipment, materials and tools which may be closely related to cost. Lack of time implied that there were other subjects or activities that were more important than industrial arts.

At that point the frequency of mention dropped from 43 to 16. The factor with the latter number was that teachers are disinterested, which was followed by formal or traditional program, large classes, and public does not accept. The factors mentioned by four principals were: board of education objects, inertia, lack of awareness to need, and teachers feel incompetent. Size of school was mentioned by principals with four, five and eight teachers. The factors mentioned by two principals were: more art for industrial arts teacher, no storage, time for teacher training, and traditional concept of industrial arts. Only one principal mentioned each of the following: double sessions, an increase in children per teacher, laziness, poor acoustics in school, and room planned for agriculture shop.

The principals from cities, villages and supervisory districts seem to place about the same emphasis on each of the factors judging by the frequency of mention. The lack of space was one exception to this pattern and was discussed above.
Table XI

FACTORS THAT IMPEDE GROWTH OF INDUSTRIAL ARTS
Mentioned by Principals

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cities</th>
<th>Villages</th>
<th>Districts</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (supplies or salary)</td>
<td>36</td>
<td>7</td>
<td>43</td>
<td>86</td>
</tr>
<tr>
<td>Lack of space</td>
<td>16</td>
<td>8</td>
<td>43</td>
<td>67</td>
</tr>
<tr>
<td>Lack of teachers</td>
<td>22</td>
<td>9</td>
<td>26</td>
<td>57</td>
</tr>
<tr>
<td>Lack of facilities</td>
<td>15</td>
<td>6</td>
<td>33</td>
<td>54</td>
</tr>
<tr>
<td>Lack of time</td>
<td>12</td>
<td>9</td>
<td>22</td>
<td>43</td>
</tr>
<tr>
<td>Teachers disinterested</td>
<td>4</td>
<td>2</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Formal or traditional programs</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Large classes</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Public does not accept</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Objection of Board of Education</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Inertia</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Lack of awareness to need</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Teachers feel incompetent</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Size of school</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>More art for I. A. teacher</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>No storage</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Time for teacher training</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Traditional concept of I. A.</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Double sessions</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Increase children per teacher</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Laziness</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Poor acoustics in school</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Room planned for agriculture shop</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Totals</td>
<td>126</td>
<td>52</td>
<td>206</td>
<td>384</td>
</tr>
</tbody>
</table>

124
8. Unsolicited Comments. The following includes all of the unsolicited comments made on the questionnaire. These are the ones in addition to stating a position on one of the six questions or naming an impedance to the growth of the program. The comments in regard to the definition of industrial arts were:

We need more creativeness on the part of these people, not pattern followers.

I do not understand your meaning of industrial arts - to us the curriculum is known as arts and crafts which is manipulative and integrated with the classroom program.

I do not feel that industrial arts should become a major program but integrated in regular classroom work with a definite purpose. Therefore I feel that it could best be handled by each teacher. I like your definition very much.

See no need of setting industrial arts apart from fine arts and handicraft.

Yes, but let's get away from the old-fashioned industrial arts program. The need for manipulative experiences should come from the classroom.

Mainly, that our schools are becoming too one sided with activities. There should be a balance between academic learning and activities. The major activities should take precedence and I don't feel industrial arts should be a major activity in the elementary grades.

I do not understand this phrase (reflecting our industrial society). I should like to feel that this type of industrial arts program would stimulate pupils' interest in handicraft.

The comments above seem to rise from the fact that the definition as written on the card was not adequate to carry the full import of the meaning or organization of the industrial arts program due to the limited space. Each comment made does not oppose the derivation of industrial arts reported in Chapter II.
The remainder of the comments were in relation to the five proposals for the implementation of industrial arts in the schools. They were:

How much industrial arts training has the teacher of the handicapped? or mentally retarded in our public schools? Here is a great need for much industrial arts background.

I think the time has come when every elementary school with enrollment of 500 students should have an industrial arts specialist.

Maybe an industrial arts consultant in the system. (He answered "no" to using one in the school.)

This combination works well in my school. (Industrial arts consultant and all classroom teachers having some industrial arts experiences.)

Must devise a cooperative school-wide, even system-wide program, and introduce relationship of industrial arts to other subjects.

Size of school would hinder #2 (The use of an industrial arts consultant). That is where #1 fits in (Classroom teachers with industrial arts experiences).

These suggestions for implementing the program have been treated in Chapter III, Development of Curriculum Elements.

Interpretation of Results. A careful study of the data recorded above leads to the following statements that attempt to interpret the results in terms of the objectives of this study. They are:

1. The principals in supervisory districts were more disposed to answer the questionnaire (67 percent) than were the principals in the cities (52 percent). The difference of 14 percent does not seem to indicate any significant implication for the study except that the results seem to be representative of the cities, villages and supervisory districts.

2. The distribution of returns with the medians falling into identical size groups indicates that principals with large numbers of
teachers and principals with small numbers of teachers were equally disposed to return the questionnaires. This may indicate that the results reflect the opinions of principals in large and small schools.

3. The total of 86 percent of the replies in favor of all elementary classroom teachers having some industrial arts indicates that these experiences should be required of all elementary teachers in college.

4. About one-fourth of the principals favored having a classroom teacher with an industrial arts minor in each school, while about one-fourth were against it. Also two-thirds of the city school principals were against such a proposition while the district principals were slightly in favor of it. This indicates that the use of classroom teachers with an industrial arts minor would have a better chance of starting in schools of the supervisory district group. The negative replies carry a heavy weight because the principals had to write in a negative reply as compared to only a check for a positive reply. The half who did not check would be in favor of a different type of training although not opposed to the use of the teacher with an industrial arts minor.

5. Almost two-thirds or 65 percent of the principals favored the use of an industrial arts specialist. This suggests that the industrial arts teacher education program should emphasize specialization at this level to prepare teachers for the schools. A rather unique divergence in the pattern showed up, when it was noted that 45 percent of the replies of principals from schools of thirty or more teachers did not favor it. It would seem that the larger schools could better afford a specialist and thus be stronger in favor of the plan.
6. The possibility of all teachers having some industrial arts and one teacher having a minor in industrial arts was favored by less than one-fifth or 17 percent of the principals while almost one-fifth or 19 percent were definitely against it. The latter seems to carry more weight because it required a written statement as compared to a check mark for a positive reply. This proposal does not seem to be well received, with only the supervisory district principals giving the "yes" answer a higher percentage than the "no" answer.

7. The possibility of all teachers having some industrial arts and one teacher being an industrial arts specialist was favored by one-half of the principals with only 14 percent objecting. This seems to indicate that the combination would be received fairly well.

8. Questions one and three were the only proposals receiving approval by more than half of the principals. This would indicate that elementary principals favor some industrial arts for all classroom teachers and the use of an industrial arts specialist in each school.

9. The use of a classroom teacher with an industrial arts minor met with more opposition than approval.

10. No principal suggested using another area of specialization without checking an answer to one of the first five questions. The principals do not feel that another area should receive preference over industrial arts to accomplish the goals of the questionnaire.

11. Judging by the frequency of mention the five outstanding factors that impede the growth of industrial arts are cost of supplies or teacher salary, lack of space, lack of teachers, lack of facilities
and lack of time. The other seventeen factors listed received only a third or less of the mention that the five above received.

12. About half of the unsolicited comments seemed to deal with an interpretation of the definition of industrial arts, expanding upon it rather than objecting to the basic philosophy. The other half of the comments made suggestions for implementing the program in the schools.

Three purposes were given for the use of the questionnaire at the beginning of this section on administrator opinions. The following statements interpret the result in terms of the three statements:

1. Elementary principals definitely seem to favor using industrial arts experiences in their schools.

2. Elementary principals would like all classroom teachers to have teacher education experiences in industrial arts. They strongly favor using an industrial arts specialist in preference to a classroom teacher with a minor in industrial arts.

3. Elementary principals feel that the greatest factor that impedes the growth of industrial arts is the cost of the program, which includes the cost of supplies, teacher salaries and facilities. Other strong factors were the lack of space, teachers and time in the program.

Judging from the above interpretations and the statements from teacher placement directors, the elementary principals are in general agreement with the derivation of industrial arts education in Chapter II and the development of curriculum elements in Chapter III. This includes both the analysis of statements by directors of teacher placement and the survey of administrator opinions in the survey of New York State needs for specialists. The last section attempts to list implications
for teacher education which will be used in Chapter VI to prepare the recommended standards for preparing specialists.

**IMPLICATIONS FOR TEACHER EDUCATION**

The survey of New York State needs for specialists scrutinizes statements from teacher placement directors and administrator opinions to assess the conditions in schools in regard to suggestions for preparing teachers. The following statements result:

1. Industrial arts majors who specialize at the elementary grade level will be able to secure a position as a consultant.

2. Elementary principals are almost unanimous in their belief of including industrial arts in the elementary school program.

3. Elementary principals favor all elementary classroom teachers having teacher education experiences in the area of industrial arts.

4. Elementary school principals favor the use of an industrial arts consultant in each school.

5. A few principals would like to have a classroom teacher with an industrial arts minor in their schools; most would not.

6. Elementary principals feel that the cost of the industrial arts program is the strongest factor impeding its growth. Other factors are lack of space, teacher supply and training, and time in the program.

This concludes the survey of New York State needs for specialists which samples the elementary school situations across the state with regard to using industrial arts. The next chapter is an analysis of the school situations that exist and of the work of the specialist.
Chapter V

ANALYSIS OF THE WORK OF THE SPECIALIST

Industrial arts specialists in order to promote the program derived in Chapter II and described by the developments of curriculum elements reported in Chapter III must be able to cope with the teaching situations in the schools which Chapter IV indicates are available. A close inspection and analysis of existing situations in elementary schools of New York State will provide material to assist in the preparation of recommended standards for preparing specialists in Chapter VI. According to a Directory (see Appendix 4) from the office of Roy G. Fales, Chief, Bureau of Industrial Arts Education, the State Education Department, there were 80 schools with 64 industrial arts consultants in New York State as of March 1954. To prepare this report 16 schools and 14 consultants were visited. The latter schools were in three divergent geographical areas of the State: Long Island, Upstate New York and Western New York. The names of those visited are listed in Table XII on the next page.

SCHOOL SITUATIONS

An inspection and analysis of industrial arts teaching situations in elementary schools calls for a written plan or outline. The one devised is summarized in Table XIII on page 133 and given in full in Appendix 5. The emphasis is placed on the operational features of the program, such as the organization, physical setting and extra duties of
Table XII

INDUSTRIAL ARTS CONSULTANTS VISITED

<table>
<thead>
<tr>
<th>City</th>
<th>School</th>
<th>Consultant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Buffalo State</td>
<td>Campus</td>
<td>Jean Eastwood</td>
</tr>
<tr>
<td>2. East Norwich</td>
<td>East Norwich</td>
<td>Henry Roy</td>
</tr>
<tr>
<td>3. Freeport</td>
<td>Cleveland Avenue</td>
<td>Charles S. Deubel</td>
</tr>
<tr>
<td>4. Garden City</td>
<td>Stewart Avenue</td>
<td>Alfred Milano</td>
</tr>
<tr>
<td>5. Garden City</td>
<td>Stratford Avenue</td>
<td>John S. Powell</td>
</tr>
<tr>
<td>6. Great Neck</td>
<td>Cumberland</td>
<td>Alfred Cavanaugh</td>
</tr>
<tr>
<td>7. Great Neck</td>
<td>Kensington</td>
<td>Alfred Cavanaugh</td>
</tr>
<tr>
<td>8. Great Neck</td>
<td>Parkville</td>
<td>John L. Roberts</td>
</tr>
<tr>
<td>10. Oswego State</td>
<td>Campus</td>
<td>Vito L. Pace</td>
</tr>
<tr>
<td>11. Oyster Bay</td>
<td>Oyster Bay Public</td>
<td>Marion Stock</td>
</tr>
<tr>
<td>12. Rochester</td>
<td>Public School 46</td>
<td>Catherine Morse</td>
</tr>
<tr>
<td>13. Roslyn</td>
<td>East Hills</td>
<td>Damon Kroh</td>
</tr>
<tr>
<td>14. Roslyn</td>
<td>North Roslyn</td>
<td>Arthur Krinke</td>
</tr>
<tr>
<td>15. Roslyn</td>
<td>Roslyn Heights</td>
<td>Robert Hatcher</td>
</tr>
<tr>
<td>16. Roslyn</td>
<td>Roslyn Highlands</td>
<td>Robert Hatcher</td>
</tr>
</tbody>
</table>
Table XIII

OUTLINE USED IN VISITING SIXTEEN SCHOOLS

I. PROGRAM ORGANIZATION
   A. Planning with teachers
   B. Laboratory activities
   C. Classroom assistance
   D. Community visits made by classes

II. PHYSICAL SETTING
    A. Laboratory
    B. Classrooms
    C. Workrooms

III. EXTRA DUTIES OF THE CONSULTANTS
    A. Teacher workshops
    B. Community programs
    C. Community displays
    D. Dramatics
    E. Television programs
    F. Assembly programs
    G. Civic organizations and clubs
    H. Others

IV. PROFESSIONAL PREPARATION OF THE CONSULTANT
    A. Institution and degree
    B. Brief analysis of preparation
    C. Suggestions for improving undergraduate work
consultants and the last part deals with suggestions for professional preparation. The detailed review of each teaching situation was written out (using the check list shown in Appendix 5) immediately after the visits. The following parts of this chapter contain a summary of the information obtained from the check lists.

Program Organization. A majority of the schools place the initiative in the hands of the classroom teacher to request assistance from the industrial arts consultant. One technique to implement this plan is to place a list in the school office where the classroom teacher signs up when he wants the industrial arts consultant to visit his classroom. The industrial arts consultant usually schedules a half day for these conferences so other responsibilities do not postpone the conferences beyond the time of their value. Some consultants schedule regular periods each week for visiting a classroom and go so far as to confer with the teacher previous to that period in order to make plans for the activities of the regularly scheduled visit.

The consultant may make informal visits to a classroom to check the progress of the children or to consider future plans. All consultants are available for conference whenever the situation arises, especially if it requires tools, materials or advice to meet a crisis in some classroom activity. Although the emphasis is on long-range planning there is always immediate assistance offered when a child or teacher has a specific request to keep the learning situation active. In one case the industrial arts program operated in total isolation from the classroom, but plans were afoot to change the situation to an integrated program. It is considered the responsibility of the industrial arts consultant
to develop the contacts with the teachers and if the contact does not arise from natural situations he needs to seek conferences with teachers.

There are two general patterns used to organize industrial arts activities: the free pattern and the formal schedule pattern. The former is based almost entirely on the on-call system, where the consultant works with the classes only when the need arises. The formal schedule pattern places the consultant at the disposal of each classroom at a specified time each week, usually for one fifty minute period. Most of the schools use the industrial arts laboratory only when the nature of the work requires it, but five of them have their formal schedule of classes in the laboratory. Four of these five confer with classroom teachers to integrate the work with the classroom program. Even where the formal schedule of classes in the laboratory is used, consultants are always ready to answer questions of children who come into the laboratory, or to help an individual or committee, or to issue tools and materials as a need arises. Classes are usually quite informal and the consultant can handle brief interruptions with little harm to the regular class scheduled in the laboratory.

The consultants in the schools visited were hesitant to name specific activities typical of a certain grade level, or of laboratory and classroom types. Due to the fact that the programs are so closely tied in with the classroom work they vary from year to year. The consultant guides the activities to the extent that pupils in one class will have a variety of experiences with different tools, materials and processes in the six years they progress through the grades. Some of the classroom teachers have certain units they cover each year, but the
industrial arts activities vary within these units. The two illustrations on the next page show classroom activities observed on the visits. The one exception to the program correlating with classroom activities was the formal program where the boys first made a lamp by hand and then a wall shelf using a jig saw.

The industrial arts consultants did not seem to have any special program of community visits or direct responsibility for class visits. Occasionally a consultant went on a community visit when it was directly related to some industrial arts activity planned for the class.

The Physical Setting. The industrial arts laboratories in the schools visited varied a great deal in size and in nature of the furnishings. The smallest one was about 1000 square feet and the largest about 2100 square feet. Both included storage space. The consultants with 1800 to 2100 square feet of space seemed to be satisfied with the size, but the ones in smaller rooms felt they needed more space. The smallest room (about 1000 square feet) was purposely left small so the program would need to operate in the classroom and not become a separate shop subject. However, there are times when two or three committees want to use the laboratory at the same time and there is no room for them. This small laboratory does not have enough storage space or room for larger construction work such as stage scenery.

One school tried putting art, industrial arts and science laboratories all in one room. They found it to be unsatisfactory and plan to separate the three when arrangements can be made, because one activity always seemed to conflict with another. The art consultant needed space for painting stage scenery when the industrial arts consultant needed
Illustration VI

INDUSTRIAL ARTS ACTIVITIES

A PLAY KITCHEN DEVELOPED BY GARDEN CITY CHILDREN

STORE CONSTRUCTED BY OYSTER BAY CHILDREN
the same space for preliminary construction for a post office. The science consultant wanted to explain an experiment to his group, but the industrial arts group was making too much noise hammering. It was possible to save money by building a combination laboratory, but it did not fit the needs of the program. One school found an art room adjacent to the industrial arts room to be a successful working arrangement. A glass partition with a door separated the two rooms. Occasionally the art consultant brought children to use the ceramics facilities of the industrial arts laboratory and occasionally the industrial arts consultant used the tables in the art room for planning or layout. These adjacent but separate facilities avoided the duplication of facilities without sacrificing the convenience of using them as separate rooms.

The size of the equipment in the industrial arts laboratories was adapted to the size of the children. Usually there were some 26" and some 28" or 30" benches to adapt to different sizes of children. The tool boards were placed low enough on the wall so the highest tool was only four feet off the floor. The machines were left at standard height, but a sturdy box or platform was provided in some cases when children in the lower grades used a machine like the jig saw.

Portable units were not used to a great extent in any of the schools. Great Neck used the classroom tool board and supply box shown in the top picture on the next page. These were made from orange crates and a piece of pegboard as a tool rack. Orange crates were used to show the children how they can make something useful from discarded material, emphasizing economy and conservation. The peg board was used for the back because the hooks can be quickly changed to accommodate different
Illustration VII
PORTABLE CLASSROOM UNITS

COMBINATION TOOL BOARD AND SUPPLY BOX USED AT GREAT NECK

PORTABLE CLASSROOM BENCH USED AT ROSLYN
tools. The only portable machine for classroom use noted was a Vibro Saw.

No neighborhood schools (kindergarten through grade three) visited had an industrial arts laboratory but each had a small room of about 400 square feet for storage of tools and supplies. The consultant was scheduled to be in such a school for about one day a week. Two of the consultants who worked in neighborhood schools mentioned the fact that they liked to have a classroom teacher in these schools who can take care of the tools and issue supplies when they are not at the schools. They selected a teacher who had experience or ability to guide industrial arts activities and the other teachers sought her assistance when the consultant was not available. One of the neighborhood schools had a portable classroom bench shown at the bottom of the page before this one. It has rollers and can be moved from one classroom to another, saving the cost of a work bench in each room. The tools are kept in the drawer of the bench.

There was not time during the visits to make a detailed analysis of the laboratory equipment. Wood and craft facilities were included in all laboratories. Bench metal work, ceramics and textiles were included in almost all of them. Graphic arts was limited to screen and block printing in most cases but four laboratories had units in letter press work. Very little was done with electricity except as experiments. Power and transportation, construction and manufacture, communications and management were not in evidence as units of study, but parts of them were used in the work. Hand tools were used almost entirely, as compared to machine work. A jig saw and drill press were commonly used but only
three of the schools allowed the children to use any other machines. A circular saw, jointer and band saw were found in almost all of the schools, primarily for the use of the consultant in milling supplies.

Storage space was a problem for all of the consultants. They had contact with a large number of children and that means considerable space is necessary to store work in progress. The classrooms have difficulty taking care of this storage because they are already crowded with oversize classes. The top illustration on the next page shows cupboards under machines and benches for storage of student work and supplies. The storage arrangement preferred by the consultants was sufficient space in the laboratory for project and supply storage, but several of them needed to use auxiliary storage in basement or other rooms away from the laboratory. This involved extra work storing and retrieving supplies and is not satisfactory.

The classroom facilities for industrial arts activities varied considerably in the schools visited. Some sort of workbench was made available when the teacher requested it. Some were regular work benches with a woodworking vise attached while some were improvised from a steady table. Only a few of the schools had work centers as extensive as the one pictured at the bottom of the following page. The projects under construction were usually left on the table or bench in the work center, although a few of the newer classrooms had cubicles for storage. In the schools with consultants there was no storage of tools or supplies in the classroom except the ones in current use, because the consultant could always send in whatever was needed from his stock. Many of the classrooms were overcrowded but none used that as an excuse for
Illustration VIII

PHYSICAL SETTINGS FOR INDUSTRIAL ARTS

STORAGE UNDER BENCHES AND MACHINES AT OSWEGO CAMPUS SCHOOL

CLASSROOM WORK CENTER AT GREAT NECK
eliminating industrial arts activities. In the newer schools even the upper grade rooms had wash sinks to facilitate cleanup and supply water, while most of the lower grade rooms had sinks in all schools.

The teachers and consultants were hesitant about describing typical individual or group classroom activities, because they vary with each class as explained above. The illustrations on the next page show some of the displays of activities observed during the visits.

The individual projects at Oyster Bay were correlated with the current reading material, while the train was an outgrowth of a study of transportation in the community. The only activity that was commonly found in all the schools was the making of relief maps. Even though this type of activity was common there was a variety of materials including gesso, plaster of Paris, powdered asbestos, salt and flour, sand, and sawdust and lacquer. The level varied from second to sixth grades. Other activities varied as widely in grade placement and in materials used, so it does not seem practical to try to list activities typical of classroom work at any particular grade level.

Three schools had workrooms for industrial arts activities but they were not used for that purpose. The main objection was that teachers could not observe children at work because of the blank wall. The consultants in those schools seemed to feel that a large glass window between the rooms would eliminate this objection.

Extra Duties of the Consultants. Classroom teacher workshops related to industrial arts activities were conducted by the consultants in ten of the sixteen schools. They varied in length from four to ten weeks with one meeting each week which usually included manipulative
Illustration IX

INDUSTRIAL ARTS CLASSROOM ACTIVITIES

A DISPLAY OF INDIVIDUAL FELT PROJECTS AT OYSTER BAY

GROUP CONSTRUCTION WORK, TRAIN AT OYSTER BAY
activities as well as discussion of and planning for industrial arts activities related to the classroom program.

The most extensive community program resulted in the Parent Teacher Association conducting a money raising activity each year to buy additional equipment for the industrial arts laboratory. In another school, the children built booths and sold things that they made, such as belts, wallets, ceramic and metal dishes and popcorn. However, this money was used for the classroom treasury. Seven of the consultants conducted evening craft programs for adults and had an afternoon craft program for school children. They received additional pay for the classes.

There was no community display for promotion of the program, but almost all of the schools had a hall display case with children's work shown. An open house for the industrial arts laboratory was common during the regular school or Parent Teacher Association program. One school used an issue of a community newsletter to describe the industrial arts program. Another school sent letters to parents requesting scrap materials for the laboratory and has received wood, tiles, plywood and cloth in considerable quantity and of suitable quality for activity work.

A common part of a consultant's work was construction of stage scenery and props for dramatic productions. This was so important to one school that they placed the industrial arts laboratory across the hall from the stage entrance.

Most of the schools had a mimeographed bulletin describing their program and making suggestions to teachers. The Great Neck staff combined efforts to produce the following mimeographed bulletins:
The purpose of the above was to meet repeated demands for suggestions. Their industrial arts staff feels that written material placed in the hands of the teachers not only will stimulate the use of industrial arts activities, but also free the staff from recurrent problems.

Professional Preparation of Consultants. The consultants visited were mostly men preparing for high school industrial arts and moving to the elementary level. Six were graduated from Oswego, two from Buffalo, three from New York University and one from New Jersey State Teachers College at Trenton. Two were classroom teachers who extended their preparation through craft classes and one added industrial arts to a background of social studies. Eleven of them expressed a wish for more elementary school industrial arts in their undergraduate preparation, but they were not specific as to details.

The expansion of the school to meet increased enrollments is a problem in almost all of the communities visited. In one school system the industrial arts consultant was drawn into the junior high program until the new elementary school buildings are finished, when the program will be renewed. The consultants predicted a great increase in the demand for industrial arts teachers for elementary schools because of the increase in the number of schools and also because of the growing
popularity of industrial arts activities as an integrated part of classroom work.

There are so many industrial arts consultants in the Long Island area that they have formed an "Industrial Arts Club for Consultants in Elementary Schools". The group received their official charter from the State Steering Committee of Industrial Arts Clubs in April 1955. The Long Island Club holds monthly meetings during the school year to discuss common problems and share ideas.

CORRESPONDENCE WITH SCHOOLS

Correspondence with school personnel in New York State indicates a tremendous increase of interest in the development of industrial arts activities at the elementary level. The following reports are a review of the various contacts with people seeking help this last school year:

An industrial arts consultant starting a program in a centralized elementary school was planning the addition of equipment to the laboratory and wanted information in regard to suppliers.

A school superintendent making plans to start the program in elementary grades was seeking advice on techniques for starting the program.

A director of industrial arts and vocational education sought advice in regard to planning an industrial arts laboratory for each of five new elementary schools.

A central school administrator sought advice about a combination of art and industrial arts in their new elementary grade laboratory.

A principal has an industrial arts laboratory but will not be able to hire a consultant for a year or two and wanted advice about the management of the laboratory.

An industrial arts consultant in a State School for handicapped children sought advice about types of activities for his children.
A large city has appointed a committee to study the expansion of industrial arts into the lower grades.

Three different high school industrial arts teachers wanted advice in regard to the work they were doing with elementary school classes.

Several elementary teachers in the Oswego area came to the College with specific questions about industrial arts activities that they were trying in their classrooms.

The Oswego Young Men's Christian Association asked for advice in organizing a hobby program for children of elementary school age.

The situations listed above indicate that industrial arts activities are expanding in the schools. Certainly only a few of the people trying this work would seek help at Oswego State. Questions were directed the Teachers College at Oswego from distant parts of the State, indicating that the industrial arts teachers in the locality were not able to give sufficient help. This would seem to indicate a need for more industrial arts teachers to become familiar with the program at the elementary level. Most of the questions pertain to starting an elementary industrial arts program so that would be a good point to emphasize.

RESPONSIBILITIES OF CONSULTANTS

The observation of teaching situations of industrial arts consultants in elementary schools and a review of correspondence with elementary schools indicate that the consultant will find himself facing the situations described in the following paragraphs.

He will need to organize workshops for classroom teachers in which industrial arts activities are planned and tried out. He will need to write an annual report or a description of his work to present to teachers, visitors and administrative personnel. This material is
needed to promote an understanding of industrial arts among children, teachers, administrators and the people of the community as well as visitors from outside.

He will serve on committees planning or evaluating the curriculum of the school and needs to show the contribution that industrial arts can make. As a member of a curriculum workshop he may help develop resource materials for the six units of an industrial arts curriculum reflecting technology. This is a different approach to the industrial arts curriculum than is now in use and will have to be carefully explained when first introduced.

He uses a variety of methods for inaugurating and developing industrial arts activities as an integral part of the classroom work. The teachers or administrators of a school may prefer to use a free pattern of organization placing the consultant on call for assistance as the teaching situations develop, or they may prefer a formal schedule of having the consultant work with each class at a definite hour each week. In either situation the consultant can plan to use methods that emphasize the enrichment of classroom learning situations rather than creating a program in isolation from the classroom.

He needs to be ready to provide classroom teachers with the tools and materials they need to incorporate industrial arts activities in their work. He can help them develop a classroom work center so they can work comfortably and take proper care of tools and materials. He needs to provide the necessary facilities in the industrial arts laboratory that supplement the classroom work center as the need arises. He needs to be ready at all times to answer questions or issue tools and
materials that are needed. When he spends part-time in a small school he needs to seek assistance from a classroom teacher in that school as his helper when he is not at the school.

He needs to be able to promote the industrial arts program during such school functions as an open house, Parent Teacher's Association program, and to make showcase displays and written materials to distribute to teachers. He can call upon parents or other members of the community for financial assistance or the donation of materials if they are convinced of the value of the program. He is called upon to conduct craft programs for the adults in the community.

He will need to seek the fellowship of the other industrial arts consultants in his area of the state, to discuss professional topics and to seek ways of improving their programs. He may turn to graduate work as another means of acquiring this professional improvement. Regular professional associations for classroom teachers also provide this type of assistance.

**IMPLICATIONS FOR TEACHER EDUCATION**

The responsibilities of an industrial arts consultant in an elementary school have been studied by visitation of sixteen school situations and a review of correspondence with schools. These indicate that a consultant needs to be able to:

1. Make a written statement of the basic philosophy for an industrial arts program.

2. Provide a set of basic essentials that contribute to the curriculum of the school.
3. Use various methods for inaugurating and developing industrial arts activities as an integral part of a free pattern or formal type of program.

4. Develop the physical setting of the classrooms or industrial arts laboratories.

5. Seek assistance from a special classroom teacher when he spends part-time in a school.

6. Promote the development of industrial arts in the school or community.

7. Seek professional improvement through further education or participation in professional organizations.

This concludes this chapter on the work of the specialist which supplements the derivation of industrial arts education, development of curriculum elements and a survey of New York State needs for specialists to develop a set of recommended standards for preparing specialists, which follows in the next chapter.
Chapter VI
RECOMMENDED EXPERIENCES FOR PREPARING SPECIALISTS

The teacher education program for preparing industrial arts consultants for the elementary school is the substance of this chapter. The data have been developed from the derivation of industrial arts education in Chapter II and the development of curriculum elements described in Chapter III. The survey of New York State needs for specialists made in Chapter IV and the analysis of the work of the specialist surveyed in Chapter V are also considered in order to keep the teacher education experiences compatible with the teaching duties of the graduates. There are many areas in a program of teacher education to prepare industrial arts specialists for elementary schools. A study sponsored by the Commission on Teacher Education and reported by Troyer and Pace (93, p. 9) uses the following:

... selection, orientation and guidance, professional education, student teaching, follow-up, growth of individual teachers in service, evaluation of in-service programs.

The importance of the interrelation of the above factors is recognized in this study, but for reasons explained in the first chapter, the major emphasis is professional education. In industrial arts education, another factor not mentioned above needs to be considered, namely, technical education. It is used by Callan (10, p. 162) in describing the national pattern for industrial arts teacher education. In his summary he said:
In this final analysis one sees a pattern composed of approximately one-third general education and one-third technical education. These two phases of the program occupy exactly 66 percent of the total curriculum pattern. Professional education courses occupy 22 percent of the total pattern, and 12 percent of the program is given to free electives.

The one-third technical education consists of work with tools and materials in experiences that reflect the technological society described in Chapter II. Because of this emphasis it is closely related to general education which deals with an understanding of society. The technical education is organized in a way that reflects the operation of a school laboratory and some discussion is centered around methods of teaching which closely associate with professional education. So although industrial arts teacher education programs identify a technical area it might be a part of what Troyer and Pace labelled general and professional education. The recommended experiences for preparing specialists given in this chapter are listed under professional education, technical education and other areas. The latter touch upon parts of selection, orientation and guidance, student teaching, general education and follow-up. Growth of individual teachers in service, and evaluation of in-service programs do not apply to this study as explained in Chapter I. These seven areas are mentioned only when the experiences might be different from the regular teacher education program or when experiences interrelate with those seven areas.

The program initiated at Oswego State as described in Chapter I seems to be the only program in the United States that proposes to specialize in the preparation of industrial arts consultants. The bibliographical research carried out for this study revealed none, and
Oallan (10, p. 133) reported on an extensive, national, catalog study of industrial arts teacher education programs as follows:

Particular attention should be given to the fact that elementary industrial arts occurs in but four programs, while 33, or 89 percent of the programs, make no provision for work on this level. Frequent mention is made of elementary industrial arts in these catalogs, but this work is not made available to industrial arts majors. Only 11 percent of the colleges require some preparation in this area as a part of the major. It is not listed even as an elective in any other program.

Each of the four programs mentioned above contain a single course of two or three hours in length according to Oallan. He deems this inadequate in view of the evidence that elementary industrial arts comprises 10 percent of the industrial arts teacher's load. There does not appear to be any significant practices to examine as a basis for recommended experiences for preparing specialists in industrial arts.

**TEACHER EDUCATION IN NEW YORK STATE**

The teacher education programs of the eleven teachers colleges under the State University of New York are basically the same because they all are under the same administrative dean, and the graduates are certified as teachers by the same bureau. These two influences have tended to standardize practices of selection, orientation and guidance, general education, professional education, student teaching and follow-up. Within the divisions of elementary education, industrial arts, and other subject-matter areas the physical plant, staff, budget, organization and curriculums are nearly identical. One example of a divergence from the pattern is the fact that Oswego has been authorized to develop programs for preparing industrial arts specialists. Otherwise the basic program for industrial arts is the same at Buffalo and Oswego, and the basic
program for elementary education is the same for Oswego and the nine other colleges concerned. The following gives a brief view of the industrial arts and elementary education programs and then reviews current trends in teacher education that should be considered in a curriculum revision.

**Industrial Arts Teacher Education.** Oswego and Buffalo each offers a four year teacher education program leading to a Bachelor of Science Degree in Education and a license to teach industrial arts at any grade level in the schools of New York State. A summary of the courses offered at Oswego is given in Table XIV on the next page. There are 39 semester hours in general education, 27 in professional education, 41 in technical education and 25 hours of free electives, which may be in any of the three areas. This is very similar to the national average quoted from Callan (page 155 of this chapter).

At a meeting of the Buffalo and Oswego faculties during a State Convention in Syracuse in October 1954 a comparison was made of the Buffalo and Oswego curriculums. The differences were so small that they do not seem to be significant for this study. One difference was two compared to four semester hours in mathematics and another was placing the orientation course in the sophomore year as compared to the freshman year. Other differences occurred in the timing of similar courses.

**Elementary Teacher Education.** Ten of the eleven teachers colleges in New York State offer a Bachelor of Science Degree in Elementary Education and a license to teach in the elementary schools. A summary of the courses offered at Oswego is given in Table XV on page 157. There are 68 semester hours in the area of general education, 36 in the
### Table XIV

**INDUSTRIAL ARTS CURRICULUM AT OSWEGO**

Distribution of Courses by Fields of Study

for Industrial Arts (88, p. 76)

<table>
<thead>
<tr>
<th>Field</th>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL EDUCATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Composition</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Health and Safety Education</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Industrial Arts Design</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Physical Education</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Science</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Social Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Modern Culture</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Modern World History</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>United States in the Twentieth Century</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>PROFESSIONAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Psychology</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Introduction to Industrial Arts Teaching</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Principles and Practices</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Student Teaching</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td><strong>TECHNICAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawing</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>General Laboratory</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Metals</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Wood</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Each student elects two of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceramics</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Elementary Industrial Arts</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Graphic Arts</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Textiles</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td><strong>ELECTIVES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL SEMESTER HOURS REQUIRED</strong></td>
<td></td>
<td>130</td>
</tr>
</tbody>
</table>
**Table XV**

**ELEMENTARY EDUCATION CURRICULUM AT OSWEGO**

Distribution of Courses in Fields of Study

for Elementary Education (88, p. 74)

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL EDUCATION</strong></td>
<td></td>
</tr>
<tr>
<td>Art</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Art Structure</td>
<td>4</td>
</tr>
<tr>
<td>Art as Expression</td>
<td>2</td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
<tr>
<td>Speech and Composition</td>
<td>9</td>
</tr>
<tr>
<td>Introduction to Literature</td>
<td>3</td>
</tr>
<tr>
<td>Contemporary Literature</td>
<td>3</td>
</tr>
<tr>
<td>Health</td>
<td>2</td>
</tr>
<tr>
<td>Industrial and Practical Arts</td>
<td>2</td>
</tr>
<tr>
<td>General Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Music</td>
<td></td>
</tr>
<tr>
<td>Introduction to Music</td>
<td>2</td>
</tr>
<tr>
<td>Essentials of Music</td>
<td>4</td>
</tr>
<tr>
<td>Physical Education</td>
<td>4</td>
</tr>
<tr>
<td>Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Science</td>
<td></td>
</tr>
<tr>
<td>Physical Science</td>
<td>3</td>
</tr>
<tr>
<td>Biology</td>
<td>6</td>
</tr>
<tr>
<td>Geography</td>
<td>3</td>
</tr>
<tr>
<td>Social Studies</td>
<td></td>
</tr>
<tr>
<td>Western Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Modern History</td>
<td>3</td>
</tr>
<tr>
<td>Sociology</td>
<td>3</td>
</tr>
<tr>
<td>American Civilization and Government</td>
<td>6</td>
</tr>
<tr>
<td><strong>PROFESSIONAL SEQUENCE</strong></td>
<td></td>
</tr>
<tr>
<td>Child Development</td>
<td>6</td>
</tr>
<tr>
<td>The Child and the Curriculum</td>
<td>9</td>
</tr>
<tr>
<td>Student Teaching</td>
<td>15</td>
</tr>
<tr>
<td>Seminar</td>
<td>3</td>
</tr>
<tr>
<td>The Teacher in the Elementary School</td>
<td>3</td>
</tr>
<tr>
<td><strong>ELECTIVES</strong></td>
<td>26</td>
</tr>
<tr>
<td><strong>TOTAL SEMESTER HOURS REQUIRED</strong></td>
<td>130</td>
</tr>
</tbody>
</table>

157
professional sequence and 26 of free electives. One course listed under
general education is industrial arts for two semester hours as a required
course. In addition to this, elective courses of two hours each are
available to those who desire more experience. This compares favorably
with the national pattern for training elementary teachers as determined
by Loats (48, p. 151) who said:

The majority of the teacher-training institutions offered
from two to four quarter hours of credit or from two to three
semester hours of credit for the courses offered in industrial
arts for the preparation of elementary teachers.

The one course in industrial arts is required of all elementary teachers
preparing in New York State as a certification requirement by the
University of the State of New York which issues teaching licenses.

Pattern for Teacher Education. The National Society of College
Teachers of Education made a four year study to determine the content or
learning experiences necessary to train teachers, and included assumptions
in the final report regarding a basic pattern of teacher education. In
this basic pattern were eight characteristics believed essential in a
program that will develop competencies in instruction and curriculum
(61, p. 8). Each of these eight characteristics is quoted below and
discussed in regard to its implications for the basic program of teacher
education or the recommended experiences for preparing specialists. They
are also used at the end of this chapter in an attempt to evaluate the
experiences listed.

1. The organization of the teacher education program
will be characterized by a longer block of time daily during
which a group of about thirty students work under a coordinator
who uses all the resources at hand in the institution and
locality: people, courses, services, organizations, schools.
This follows the trend in education discussed in Chapter III, stressing units of activity developed from problems of living. A coordinator helps the group identify the problems and plan activities to solve them, using the best resources available regardless of subject matter lines or scheduled classes. It has been found that this method of organization is more effective in gaining teaching competence than the method of a formal schedule of separate subjects. The latter do not conform to a pattern in which problems of living can be studied without repetition.

This goal cannot be achieved entirely under the limitations established in Chapter I for this study, because the basic teacher education program is a separate subject curriculum. However, the principle of a longer block of time under a coordinator can be utilized within the experiences added to the curriculum. Emphasis can be placed upon drawing together resources of the institution and locality. Although the divisions of technical, professional and other areas are made, the lines need not be drawn rigidly in preparation of learning experiences.

2. During the early years of college, the center of interest for such a core program will be general education, with the interest in professional aspects stressed in the later years.

The early emphasis on general education develops the student's background to understand problems of living before the professional phase considers how to help children study these problems. The college student is better able to accomplish this if he has a broad background.

The experiences recommended can follow this pattern by covering the general and technical education during the early years and developing the professional phase in the later years. The technical area may serve by
furnishing the broad problems studied in blocks of time. In the first years the laboratory courses may consider an understanding of the economic society. By the junior year they may consider the professional emphasis dealing with the creation of learning experiences for children studying the economic society. By this time the student has had many opportunities to observe and participate in activities with children.

3. A first-hand study of children and adolescents; of communities, their organizations and people; and of schools will be prominent throughout the period of college education. The study of children is important because the specialists will be working with children and need to understand them in order to guide their experiences. The study of adolescents is of equal importance because the industrial arts specialist often works with both groups. From a general education viewpoint a study of children and adolescents provides a broad background for home and community contacts. The industrial arts curriculum leads to a study of power and transportation, construction and manufacture, communications and management units that deal with the economic side of community organizations and people. As mentioned before, the technical studies are constantly related to schools, while the professional deals directly with the schools.

4. The work in these groups will be organized around significant problems with subject matter drawn from various areas.

The reasons for using significant problems are discussed in Chapter II under postulated bases. A scientific study of the individual indicated principles such as we learn what we live, we always learn several different things at once and we learn a great deal and learn it rather permanently by example. The first one indicates the best learning
situation occurs when the student takes an active part in solving a problem, which is difficult to accomplish under strict subject matter lines. The problems tend to lead into a number of fields if they are ones faced in living. We learn several different things at once, so instead of trying to limit study to a single subject matter area it is natural to draw upon several subject matter areas in the same study. The last principle, learning by example, indicates the college classes will set a pattern for teaching that the students will carry over to their elementary school teaching. The significant problems or unit approach has been suggested for elementary schools so college instruction can promote that by setting the proper example.

The experiences recommended can be organized around significant problems although the basic part is drawn around separate areas. The technical area inclines naturally toward significant problems using the general education emphasis. The technical skills develop with the problem and professional work can be related at pertinent points.

5. The future teacher will live for a period of time in a school and community away from the campus, preferably for at least a semester; will plan with the coordinator many types of experiences with pupils and teachers; and will study and work with a community.

The semester away from campus is necessary to give the student teacher a period of concentration on all phases of teaching. This provides directed contact with children throughout all of the school day and also an opportunity to work with the school faculty and the community agencies. A part time student teacher misses some of the situations that he will face as a teacher and consequently does not have the breadth of experience to be a better teacher. The emphasis on the student teaching center
being away from campus is to insure a break with college life so the student will be free to devote full time to try the various types of work under the guidance of his master teacher and college coordinator.

This plan for student teaching has been established for all of the State University of New York Teacher's Colleges. The students spend nine weeks in each of two schools away from the college campus. A college supervisor visits the students at least twice in each of these centers and full participation is encouraged in community activities. The supervising teacher attempts to draw the student teacher into all types of school activities as a participating teacher.

6. The coordinator will follow up a group for a longer period of time than a quarter, semester or year in order to get to know his students well, a factor considered an essential part of good instruction. The guidance function will rest with this coordinator.

If the coordinator knows his students he can guide their learning situations to make them more profitable. It will eliminate unnecessary repetition in favor of moving on to new and broader experiences. The scientific study of individuals in Chapter II indicated each individual is unique. The coordinator who knows his students well can account for these unique features and give more effective guidance.

The separate subject curriculum places this function of coordinator upon the student's advisor or counselor. He follows the student for four years helping him to select courses, advising him in regard to college activities and being available for special help. Occasionally the advisor has his advisees in a class.

7. The instructor who is to help students gain competencies in the area of instruction and curriculum will be selected for
his skill as a teacher who puts into effect the principles and practices that characterize these competencies.

The scientific study of the individual in Chapter II stated that we learn a great deal and learn it rather permanently by example. The college student will learn from the example set by his instructor. This takes place in the technical area as well as in the professional area. The student will tend to teach in the same manner that he acquired technical competencies that he seeks to develop in the children. In industrial arts it is essential to use the curriculum elements developed in Chapter III if they are to be the elements of the grade school program, because the industrial arts teacher will tend to use them if his college instruction is in that pattern.

8. All people involved in the instruction of future teachers will consider teacher education as their function, and consider it a particular responsibility to be acquainted with schools and their needs.

The first characteristics of teacher education emphasized the significant problems or unit approach cutting across subject matter areas. To accomplish this all instructors need to assume the responsibility of professional development whenever the occasion arises, drawing upon their knowledge of schools and their needs. Therefore, this characteristic designates the type of personnel that is needed to make the program of instruction effective.

The full application of this is beyond the limits of this study as it applies to the total college program. The work of the specialist was analysed in Chapter V so the recommended experiences could be made with the elementary school program in view. The implications from that
chapter will serve as a guide to keep the experiences of future teachers in line with the needs of school children.

This concludes a brief review of industrial arts and elementary education teacher education programs that form the base and general pattern for teacher education that provide a framework for the recommended experiences for preparing specialists. These are divided into two sections: experiences for industrial arts education specialists and experiences for elementary education specialists in industrial arts.

INDUSTRIAL ARTS EXPERIENCES

The material presented in this study so far has been to recommend experiences for industrial arts specialists that will prepare them to act as consultants for industrial arts activities in elementary schools. These are described in this section; first, their need and, second, a listing of experiences in the professional, technical and other areas of teacher education.

Need for Specialists. The bibliographical study in Chapters II and III attempts to establish the program of industrial arts in the elementary school and also that the classroom teacher needs the assistance of a consultant to enable him to improve the quality of the learning experiences. The second implication in Chapter IV, "Elementary principals are almost unanimous in their belief of including industrial arts in the elementary school program", substantiates the part of the above statement referring to establishing the program of industrial arts in the elementary school. In the sixth implication given in Chapter IV, elementary school principals listed teacher training as an important factor that impedes the growth of industrial arts in the elementary schools.
The specific need for consultants in New York State may be drawn from the first implication at the end of Chapter IV: "Industrial arts majors who specialize at the elementary grade level will be able to secure a position as a consultant". This is supported by the fourth implication in that chapter: "Elementary school principals favor the use of an industrial arts consultant in each school". Chapter V indicates that industrial arts consultants are being used successfully in the schools visited. These items indicate a definite need for a teacher education program to prepare industrial arts consultants.

**Recommended Experiences.** The recommended experiences for preparing specialists in industrial arts teacher education are derived by examining the implications for teacher education at the end of Chapters II, III, IV and V. Each implication was carefully studied and placed in one of three categories: first, those that seem to be covered in the basic teacher education program; second, those that seem to be of professional nature; and third, those that seem to be of a technical nature. This division is made to place recommended experiences in a pattern parallel to the existing curriculums of the colleges where the professional and technical areas have separate courses. The fourth characteristic suggests significant problems as a pattern for organization, so as the recommended experiences are described there will be evidence of overlapping between the professional and technical. The fourth category used below shows how the other areas listed by Troyer and Pace correlate with recommended experiences.

1. **The Basic Program.** The industrial arts teacher education program contains experiences that seem to fulfill the purposes of some of
the implications. The experiences are described as the implications are listed.

"Understand industrial arts as an integral part of general education and not a separate, unrelated subject" (Chapter II, first implication). "Have a broad understanding of the demands of society upon education" (Chapter II, third implication). "Be able to give a definition of industrial arts and be able to explain it" (Chapter II, sixth implication). "Make a written statement of the basic philosophy for an industrial arts program" (Chapter V, first implication). This set of four implications is the heart of the professional sequence starting with the orientation to education which places industrial arts in a context of general education which is an integral part of the elementary program.

Enlarging upon this, further study in the area of general education as well as professional, points out the demands of society upon education. After the students progress through a methods course and student teaching, the post-teaching seminar discussions help to translate their beliefs into a definition and a written statement of the basic philosophy of an industrial arts program. This provides them with the broad understanding they need, to make their contribution at a particular level coordinate with the other school work.

"Appreciate the impact of the technological economy upon the individual in society" (Chapter II, fourth implication). Although this appreciation may be considered as general education, industrial arts students have the opportunity to develop it to a great extent in the technical courses offered in ceramics, electricity, graphic arts, mechanical drawing, metal, textiles, transportation and wood.
Chapter III indicates a more effective division of the economy into units in power and transportation, construction and manufacture, communications and management. In order to effect a gradual transition, units of communication might be offered in electrical, graphic arts and mechanical drawing laboratories. Construction units could be used in metal and wood. Manufacture units could be used in ceramics, metal, textiles, and wood laboratories. Power is essentially in the electricity laboratory and transportation already exists as a unit. In this way the effectiveness of the laboratories in interpreting the technology may be increased, and the technical program would be closer to the school studies. The latter correlation is emphasized in the seventh characteristic of a good teacher education program, which is quoted above.

"Use the various techniques of evaluation as an integral part of daily teaching" (Chapter III, sixteenth implication). According to the eighth characteristic of teacher education quoted above, this implication is the responsibility of all the teacher education faculty. They should practice the techniques of evaluation in their college classes so the future teachers will fully appreciate the application and effectiveness of good evaluation. This is especially true in the technical courses where the work with machines, materials and tools is organized in a fashion similar to the work with machines, materials and tools in school.

"Foster good relations with the people of the community to promote industrial arts as a part of the school program" (Chapter III, eleventh implication). "Promote the development of industrial arts in the school or community" (Chapter V, sixth implication). The college should develop a public relations program using the same techniques that can be
used in an elementary school. The purpose of the college program has more emphasis on teacher recruitment, but techniques such as exhibits or demonstrations in community centers, display of work, newspaper releases, open house, professional meetings, radio programs and television shows can be practiced by the college students.

"Seek professional improvement through further education or participation in professional organizations" (Chapter V, seventh implication). Although a year of further education is required to maintain a teaching license the undergraduate should be acquainted with the places and types of further education available so he can select the program that will best meet his needs. The opportunity to participate in professional organizations should be available to the college student so he has a chance to ascertain the advantages of this type of association and get acquainted with the various organizations that will offer him memberships when he is teaching.

This completes the group of eight implications for teacher education that seem to be covered in the existing industrial arts programs. The next two sections of recommended experiences deal with implications that are not covered by the programs but are necessary in the preparation of industrial arts specialists for the elementary school.

2. In Professional Area. The following implications were the ones more nearly related to the professional area than to the technical or other areas.

"Have a scientific knowledge of the nature of children as individuals" (Chapter II, second implication). A good point to introduce this study of the nature of children is after the students have a chance
to study the purpose of education in a democratic society. Then the students will have a basic understanding of the environmental forces that act to develop children. Both the colleges at Buffalo and Oswego have programs that undertake this task for elementary teachers. The regular industrial arts students usually do not take these courses but limit their study to adolescents. It might not be possible for the industrial arts student to devote as much time to child development as the elementary education student because the former has a heavy program of technical education. The scientific knowledge of school children can be developed through lecture, discussions, readings and many contacts with children in school, community and home environments. The third characteristic of a teacher education program quoted above emphasizes first-hand study of children that implies that the students should observe and participate in activities with children. This study of children extends through all the work in the professional and technical areas and does not stop with the first introduction.

"Be able to work with the local school faculty and administration to design an industrial arts program for that community" (Chapter II, fifth implication). "Operate freely within the organization of elementary schools" (Chapter III, sixth implication). "Help the classroom teacher organize learning experiences utilizing the best methods possible under the circumstances" (Chapter III, seventh implication). "Assist the classroom teacher in his evaluation of the children's work" (Chapter III, fifteenth implication). These four implications deal with the organization of the elementary school from the program through classroom practices. The first one involves an understanding of the school
program so that industrial arts might be included as a basic part of it. The second one deals with the operation of a program that will contribute to the smooth functioning of the school organization without upsetting the program. The third one indicates that the industrial arts teacher needs to know how the classroom teacher organizes the daily program so that enrichment through industrial arts activities may be included. The last one emphasizes evaluation as an important part of the daily program. The logical person to guide the study of the college student in this phase of professional education would seem to be one who has had elementary school teaching and administrative experiences. Visits to schools and classrooms illustrating the various common types of organization would seem to be an essential supplement to lectures, discussions and reading. The emphasis of the visits would center about discussions with principals and teachers rather than observation of children at work.

"Provide the school curriculum planning group with material that indicates the resources of industrial arts education" (Chapter III, first implication) and "Provide a set of basic essentials that contribute to the curriculum of the school" (Chapter V, second implication). Although the culmination of this preparation would seem to be included in the post-teaching seminar, information can be developed through all of the professional, technical and student teaching areas. This post-teaching seminar would seem to need the guidance of one who has had experience teaching industrial arts, an acquaintance with the current situation in elementary schools and an ability to direct the college students in the summation of their experiences through discussions, readings and writing.
The graduating senior should have assembled a wealth of materials which he can make available to elementary school curriculum groups.

"Initiate the use of a consultant program, using the various techniques to foster closer working relations" (Chapter III, tenth implication) and "Use various methods for inaugurating and developing industrial arts activities as an integral part of a free pattern or formal type of program" (Chapter V, third implication). First-hand contact with techniques and methods of organizing industrial arts experiences in the elementary school occur in the professional, technical and student teaching areas. The post-teaching seminar might be used to list the various techniques and methods that have been observed and discuss the merits of each one. This will tend to compound the experiences of the students and give each one a broader view as well as considering the proper one to use in a certain type of teaching situation.

This completes the review of implications that seemed to relate to the professional area of recommended experiences for industrial arts specialists that might be added to the basic program.

3. Technical Area. Another phase of the professional area for the preparation of elementary industrial arts specialists was separated as the technical area and included the work with machines, materials and tools. The implications from Chapters II, III, IV and V that seem to relate closely to this area are quoted below and then the recommended experiences for preparing specialists are described as they apply to the implications listed.

"Effect a transition from the traditional areas of work to the units of the curriculum reflecting technology" (Chapter III, second implication).
"Encourage the teachers to consider the implications of technological developments for the school curriculum" (Chapter III, third implication). "Understand and use the unit of study method of creating learning experiences" (Chapter III, fourth implication). "Guide children's activities in the six units of the industrial arts curriculum: power and transportation, construction and manufacture, communications and management, with emphasis upon production, consumption and recreation" (Chapter III, fifth implication). According to the seventh characteristic of teacher education quoted on page 162 of this chapter, the four implications above call for actual work experiences in a classroom or laboratory in the six areas of the curriculum reflecting technology. In order to gain competencies in the area of instruction and curriculum using this type of curriculum, the college students actually need to put them into effect rather than merely talk or read about them. The basic program of teacher education is not likely to afford this opportunity because it is set in the traditional areas of the industrial arts curriculum, so the recommended experiences in the technical area will need to meet these implications.

The second implication listed above indicates that the experiences of the college students should have the professional slant of relating to the elementary school curriculum, so the work needs to be qualified to this extent. The third implication suggesting the unit of study method of creating learning experiences is basic to the curriculum reflecting technology, and so it is more likely to be used than in the traditional areas of industrial arts. The last implication of the four listed in this section carries from college laboratory experiences to
working with children in the six units of the curriculum reflecting technology. The elementary schools in the community afford an excellent opportunity to practice this transition. The Oswego city schools have been very cooperative in this type of work because it offers help to their teachers as well as an opportunity to contribute to the effectiveness of the teacher education program.

"Initiate industrial arts activities by correlation with other subjects and cooperation with classroom teachers, and not resort to separate subject emphasis for industrial arts" (Chapter III, eighth implication) and "Work directly with children in the classroom or industrial arts laboratory to guide their learning experiences" (Chapter III, ninth implication). The real opportunity to put these implications into practice comes during student teaching but the technical area can serve as an introduction to these techniques and still accomplish the work with machines, materials and tools. Experimentation with this technique at Oswego has indicated that the college students gain in technical competence and knowledge as they prepare for their work with a group of school children. So they can include an introductory experience in working with children as well as gaining competence in the technical area as suggested as necessary in the paragraph above. This serves the dual purpose of a gradual introduction to student teaching and a realistic opportunity to gain technical competence.

"Conduct in-service workshops for classroom teachers to improve their ability to use industrial arts in their classrooms" (Chapter III, twelfth implication). The real opportunity for college students to conduct a workshop may come during student teaching. However, only
about one out of four student teachers will be in the school when the workshop is being conducted. Therefore, such a workshop may be held for classroom teachers in the college community with the college students conducting it as part of their work in the technical area. They can gain the technical competence while practicing them for a real, immediate purpose: instructing the classroom teachers. Again the college program becomes more real and vital while the use of industrial arts in the community schools is promoted.

"Elementary principals feel that the cost of the industrial arts program is the strongest factor impeding its growth" (Chapter IV, sixth implication). The activities in the technical area can be organized with this principal in mind. The college students may acquire free materials from the local community to use in activities where they serve the purpose. As they study the development of classroom and laboratory physical facilities they may consider ways of economizing to make the best use of the funds available.

"Develop the best possible classroom or workroom physical setting with the means at hand" (Chapter III, thirteenth implication). "Develop the best possible laboratory with the means at hand" (Chapter III, fourteenth implication). "Develop the physical setting of the classrooms or industrial arts laboratories" (Chapter V, fourth implication). The technical work can help develop these abilities if it reflects the type of setting found in an elementary school. The basic program of industrial arts teacher education is in the traditional curriculum and reflects the secondary school program, so it seems advisable to have one additional laboratory to reflect the elementary school program. When the college
students work in such a setting they have an opportunity to acquaint themselves with the things they will find or will need to develop in an elementary school. If each college student makes a contribution to the improvement of this setting it will offer him an opportunity to meet a situation similar to ones he will face when teaching, and it will improve the college facilities so they will reflect newer and more ideas in the organization of facilities.

The recommended experiences for the technical area described above call for a laboratory that reflects the elementary school settings of the classroom and industrial arts laboratory. The laboratory in use at the Teachers College, Oswego is illustrated on the next page. It contains 2100 square feet of floor space and is 83 feet long and averages 25 feet in width. The lighting is fluorescent and both 110 and 220 volt electrical outlets are distributed around the room. There are also outlets for compressed air and natural gas. The floor is maple except for the tile in the ceramics and hot metals areas. The walls have four foot high glazed tile wainscoting with acoustical plaster above. The Pittsburg Color Dynamics system is used throughout. The estimated value of the furniture, machines and tools is $20,000.

The room is divided into four sections: elementary classroom at the lower right of the drawing, industrial arts laboratory to the left, and the communications and work rooms at the upper right. The classroom contains group and individual tables, a library center, with the sewing center next to it in the upper middle. The "Stoner" bench is the classroom work bench which can be pulled away from the wall to provide four work stations. The art supplies are in the upper right corner next to
OF NEW YORK, TEACHERS COLLEGE, OSWEGO, N.Y.

INDUSTRIAL ARTS LABORATORY

HAROLD G. GILBERT, INSTRUCTOR

LIGHTING - BANKS OF FLOURESCENT FIXTURES HANGING EAST & WEST

WAINSCOATING - GLAZED TILE

FOUR FEET HIGH

33 FEET LONG - 26 ft FEET WIDE

2100 ft SQUARE FEET - SPACE
the chalkboard. The writing center is next to the door at the lower right with the wardrobe and storage along the inside wall of the building. The teacher's desk and files are conveniently located at the rear of the classroom and not separating the class and chalkboard.

The industrial arts laboratory is similar to one found in elementary schools starting with areas of wood, textiles and crafts at the middle and ceramics, metal and plastics at the back. Space for construction activities is made by moving the four-place work benches, while the machines are found in the manufacturing area. Transportation models are displayed from the bench to the left of the library center. The communications room contains facilities for electrical and graphic communications including letter press, duplicating by ditto, silk screen, block printing, radio, telegraphy and telephony. The work room serves as a supplement to the classroom work center, providing work space for noisy activities, storage for supplies and portable tool units, and a bench for finishing work.

College classes used the room for four years with the chief obstacle being the lack of space in each section of the room. Also it is too long and narrow, making control of the distant ends most difficult. The proposed layout in Illustration XI on the next page contains a total of 2500 square feet, an addition of 1400 square feet. This enlarges the laboratory section by 600, the classroom 400, the communications room by 100 and the workroom by 300. The latter is then large enough to add a laundry unit and more essential storage space. The laboratory benches are smaller to increase the flexibility of the arrangement. The room is reduced from a three to one proportion to a room that is nearly square.
Illustration XI

PROPOSED ELEMENTARY INDUSTRIAL ARTS LABORATORY
PROPOSED
TARY INDUSTRIAL ARTS LABORATORY
PREPARED BY HAROLD G. GILBERT

UNIVERSITY OF NEW YORK, TEACHERS COLLEGE, OSWEGO

FIRST AID
WASH SINK

SCALE: \( \frac{1}{4} = \) ONE FOOT

SPACE REQUIREMENT:
75 sq. ft. per student
WORKROOM & PROJECT STORAGE 900
ELEMENTARY CLASSROOM 500
OFFICE FOR 2 INSTRUCTORS 240
TOTAL 50 ft. 3500

LIGHTING: FLUORESCENT FIXTURES IN CROSSED BANKS

FURNITURE: WORK BENCHES 72" LONG -
50" WIDE - 30" HIGH, UNLESS OTHERWISE
SPECIFIED. DIMENSIONS SPECIFIED IN
INCHES. ALL CABINETS & DRAWERS
WITH LOCKS

WAINSCOAT: GLAZED TILE FOUR FEET HIGH
EXCEPT ON PARTITIONS

PARTITIONS: NON LOAD BEARING,
GLASS FROM 3' TO 6' UP

OUTSIDE WINDOWS: FROSTED EXCEPT
STREAK PLATE & RACK

ELECTRICITY: 110 VOLTS EVERY 10'
ALONG WALLS. 110 & 220 VOLTS AS
NEEDED FOR EQUIPMENT. ALL FLOOR
OUTLETS FLUSH RECEPTACLES

FLOOR: MAPLE. TILE IN CERAMICS

EXHAUST: WOODWORKING MACHINES
CONNECTED TO BASEMENT EXHAUST

CEILING: ACOUSTICAL TILE

SCALE: \( \frac{1}{4} = \) ONE FOOT

SPACE REQUIREMENT:
75 sq. ft. per student
WORKROOM & PROJECT STORAGE 900
ELEMENTARY CLASSROOM 500
OFFICE FOR 2 INSTRUCTORS 240
TOTAL 50 ft. 3500

LIGHTING: FLUORESCENT FIXTURES IN CROSSED BANKS

FURNITURE: WORK BENCHES 72" LONG -
50" WIDE - 30" HIGH, UNLESS OTHERWISE
SPECIFIED. DIMENSIONS SPECIFIED IN
INCHES. ALL CABINETS & DRAWERS
WITH LOCKS

WAINSCOAT: GLAZED TILE FOUR FEET HIGH
EXCEPT ON PARTITIONS

PARTITIONS: NON LOAD BEARING,
GLASS FROM 3' TO 6' UP

OUTSIDE WINDOWS: FROSTED EXCEPT
STREAK PLATE & RACK

ELECTRICITY: 110 VOLTS EVERY 10'
ALONG WALLS. 110 & 220 VOLTS AS
NEEDED FOR EQUIPMENT. ALL FLOOR
OUTLETS FLUSH RECEPTACLES

FLOOR: MAPLE. TILE IN CERAMICS

EXHAUST: WOODWORKING MACHINES
CONNECTED TO BASEMENT EXHAUST

CEILING: ACOUSTICAL TILE
This concludes the description of recommended experiences for preparing specialists in the technical area of industrial arts teacher education. This supplements the basic program with the professional and technical areas and leaves other areas of teacher education which inter-relate with them.

4. In Other Areas. The other areas of a teacher education program mentioned by Troyer and Pace that concern this study are: selection, orientation and guidance, student teaching and follow-up. The implications of Chapters II, III, IV and V have some relationship to these areas but it seems that no major reorganization would be necessary to revise them in the program for preparing specialists for the elementary school. Each of these other areas is considered in the following paragraphs with recommendations made in regard to minor adaptations.

Selection of students for the teachers colleges in New York State is based upon high school average, high school recommendation, a battery of entrance tests and two interviews by college staff members. It seems that at the time of the interview it would be difficult to direct people into the elementary school level of industrial arts. It would be good to advise them they will have the opportunity to specialize at the beginning of the second year. At that time the student will have a broader basis for making his choice.

Orientation and guidance are separate functions in the teachers colleges. The orientation to college life and activities is carried out before school and through half of the first year by the dean of personnel services. There seems to be no connection with this program. Orientation to the teaching profession and to industrial arts in particular is
a function covered in the first professional course in the first or early part of the second year. Here a careful distinction between preparation for the elementary and secondary levels would seem to be proper. School visits give a picture of teaching situations, while informal discussions with teachers and college seniors help the student develop a more comprehensive outlook. The faculty advisor is responsible to help the student if he cares to select the specialization that would give him more experiences at the elementary level. From that point on the student should have a faculty advisor who is familiar with industrial arts at the elementary school level.

The follow-up of the student in his first teaching position seems to fit in with the responsibilities of the student's advisor. At the present time no provision is made for the faculty to make trips to the parts of the state furthest from the college for the purpose of this follow-up. The program needs further development to be of greater benefit to the graduates and to keep the faculty in touch with the teaching situations in the schools.

The student teaching is well organized according to the characteristic explained under the head, pattern for teacher education on page 161. It would seem essential for the student specializing at the elementary school level to spend one-half or nine weeks of the student teaching semester in an elementary school under the direction of an industrial arts consultant. The college supervisor who visits the student in this situation should be familiar with the elementary school program to be of the greatest possible assistance to the student teacher.
The work related to student teaching such as school visits, reports and evaluation should be adapted to the elementary school.

This completes the recommended experiences for preparing specialists for industrial arts teacher education in the areas of the basic program, professional area, technical area and other areas. The experiences for specialists in elementary education are now examined in the same pattern.

EXPERIENCES FOR ELEMENTARY SPECIALISTS

The teacher education program for classroom teachers may be used as a basis for preparing industrial arts specialists. This possibility is examined from the points of view of need for this type of specialist and the recommended experiences that can be used in the preparation.

Need for Specialists. The need for an industrial arts consultant was pointed out earlier in this chapter, but the problem considered here is the need for a classroom teacher to have special preparation in the industrial arts field. According to the second and third implications in Chapter IV the elementary school principals surveyed indicated almost unanimously that they favored the use of industrial arts and most of them favor all the classroom teachers having some industrial arts teacher education experiences.

The fifth implication of the fourth chapter indicated: "A few principals would like to have a classroom teacher with an industrial arts minor in their school; most would not". Even though a principal prefers an industrial arts major as a consultant he may need to use a classroom teacher with a minor in industrial arts until the program becomes extensive enough to require a full time consultant. This was expressed
in some of the correspondence with school administrators quoted on pages 147 and 148. The operation of this type of program was described in detail starting on page 83.

The fifth implication in Chapter V, "seek assistance from a special classroom teacher when he spends part-time in a school", brings out another use of the classroom teacher with an industrial arts specialization. This occurs in communities that have neighborhood schools with about six or eight teachers, not large enough to justify a full-time consultant. In such a case the consultant would be spending part-time in a school and could use a classroom teacher with industrial arts preparation to help the other classroom teachers when he is not there.

Schools that do not have a consultant or a classroom teacher who has specialized in industrial arts, do not use industrial arts. This was concluded by Duncan (19, p. 4) who surveyed the use of industrial arts activities by classroom teachers.

Special training in the practical arts subjects had a direct bearing on the extent to which teachers used these activities. The responses showed that teachers who had less than five semester hours of practical arts subjects did little or nothing in utilizing them in their programs, and they had the least desirable room setup for conducting their activities, while those with the most special training used the activities the most and were the most successful in providing the preferred physical arrangements and obtaining budgetary allowances for materials.

The classroom teachers in New York State have had from two to four semester hours of industrial arts work, so it seems unlikely that they would make much use of industrial arts unless there is a consultant or special teachers to assist them. Therefore, the evidence described above seems to indicate some need for a classroom teacher who has the
appropriate preparation, although not as extensive as the need for an industrial arts major as a consultant.

**Recommended Experiences.** A set of experiences recommended for the education of classroom teachers specializing in industrial arts may be based upon the implications made in Chapters II, III, IV and V. The qualifications at the end of the implications given in Chapter III states: "The classroom teacher with special training would need to be able to do as many of the above as possible in the time available for his training and still have the ability to organize a full classroom program." For this reason only the implications that seem essential to the classroom specialist are selected to prepare the recommendations. The implications are studied in relation to the basic program, professional, technical and other areas of the elementary teacher education program.

1. **In Basic Program.** The program already includes one required course in industrial arts. This course may still be used in the program for classroom specialists as explained below under other areas.

The second implication in Chapter II, "Have a scientific knowledge of the nature of children as individuals", is very well covered by two introductory courses that include observation in the campus elementary school. This is enlarged upon in other courses in the professional sequence.

The general education courses where the nature of society is studied and the professional courses in curriculum should serve to meet the third implication in Chapter II, "Have a broad understanding of the demands of society upon education". This sets the pattern for specific contributions that industrial arts can make to enrich the program.
2. In Professional Education. The classroom teacher who specializes in industrial arts would need to pursue the regular professional sequence for elementary teachers. This would serve to emphasize the nature of the first implication of Chapter II, "Understand industrial arts as an integral part of general education and not as a separate, unrelated subject". With this approach the curriculum and methods work does not differ from that of the regular elementary teacher. The education instructor must have a sound understanding of industrial arts and devote to it a fair proportion of time. The post-teaching seminar might consider the problem mentioned in the sixth implication of Chapter II, that the specialist "Be able to give a definition of industrial arts and be able to explain it". This would be necessary for the identification and promotion of industrial arts activities and the discussion in the seminar class would give the students an opportunity to practice their explanation of industrial arts.

3. In Technical Area. This area which contributes to the general and professional education, is where the additional recommended experiences for elementary teacher education make the largest contribution. As the implications are quoted from the other chapters the experiences are discussed.

"Understand and use the unit of study method of creating learning experiences" (Chapter III, fourth implication). The understanding of the unit of study may stem from the professional area but the technical area can provide the practice in the use of industrial arts experiences within a unit. This has the dual purpose of giving opportunities to develop technical skills and to apply practice in the use of the unit of
study method. Technical competence gained in manipulative practice does not get transferred very easily to units of study with industrial arts activities. The same methods should be used in the technical area that the teachers are expected to use in the schools.

"Guide children's activities in the six units of the industrial arts curriculum: power and transportation, construction and manufacture, communications and management, with emphasis upon production, consumption and recreation" (Chapter III, fifth implication). This provides the basis for selection of instructional materials in the technical area. Units in manufacture help the student get acquainted with tools and materials and develop basic hand skills that are used in the other areas of the curriculum. These skills may be practiced further and enlarged upon as the students study construction, communications, power and transportation. The management problems are dealt with in the organization of class personnel and operation of a classroom work center. This is a pattern of organization similar to that used in elementary school units.

"Initiate industrial arts activities by correlation with other subjects and cooperation with classroom teachers, and not resort to separate subject emphasis for industrial arts" (Chapter III, eighth implication). At the time the elementary education students are working in the technical area they are participating in the classrooms of the campus elementary school. As opportunities to use industrial arts in the classroom arise students should be encouraged to use the time in their technical work to prepare teaching materials. In this way they
gain technical skill and practice the application of industrial arts activities to enrich the classroom experiences they are directing.

"Foster good relations with the people of the community to promote industrial arts as a part of the school program" (Chapter III, eleventh implication) and "Promote the development of industrial arts in the school or community" (Chapter V, sixth implication). As in the program preparing industrial arts consultants, the classroom teachers who specialize in industrial arts need to participate in promotional activities in the college community. Their contacts with the regular elementary education students should be cultivated in view of promoting industrial arts. This may be done through their participation in the programs of Future Teachers Association, Association for Childhood Education, and Parent Teachers Association. These organizations usually sponsor open house or teacher workshop programs where industrial arts activities can be illustrated.

"Develop the best possible classroom or workroom physical setting with the means at hand" (Chapter III, thirteenth implication). The technical work can be offered in a laboratory that offers the opportunity to work in a classroom setting. Such a laboratory was described and illustrated in the section above on the technical area for industrial arts students. As a matter of convenience the elementary teachers may work in the industrial arts laboratory or communications room parts of the laboratory, but the emphasis in their technical work would be on classroom activities. They also contribute to the development of the physical facilities of the classroom so they will know how to proceed in the development of their classrooms. The maintenance of tools and
ordering supplies can be stressed as an important function of using industrial arts activities.

"Use the various techniques of evaluation as an integral part of daily teaching" (Chapter III, sixteenth implication). The professional area assumes the task of developing a concept of evaluation as an integral part of daily teaching, but the instructor in the technical area by using the techniques in his college teaching can give the college student practice in using them during manipulative work. In this way the evaluation techniques become an integral part of the work and not something suggested for application in the elementary school.

The technical work described above will need to be substituted for some part of the elementary teacher education program. The part omitted might be some general education because industrial arts studies develop general education concepts. Also the technical work has professional work integrated so some may be substituted for professional work. It does not seem to be advisable to cut into the elective hours to a great extent because these students have special needs that can be met by selection of electives.

The technical experiences described above are the major additions to the elementary teacher education program in addition to the suggestions for the professional area.

4. In Other Areas. The other areas listed by Troyer and Pace that apply here but are not covered by professional and technical experiences are selection, orientation and guidance, follow-up and student teaching. Each one is discussed as it applies to the program for preparing elementary classroom specialists in industrial arts.
The selection procedure used at the teacher's colleges was described in the section above regarding industrial arts consultants. The elementary education students who elect a specialization in industrial arts do not need to declare their intentions until the second year. This gives them an opportunity to test their abilities in industrial arts activities by taking the regular industrial arts course for elementary teachers in their first year. If they find they do poorly it would seem to be inadvisable to continue with a specialization in industrial arts activities. This course then acts as one basis for selection along with other experiences such as industrial arts work in high school, hobby work at home, or craft work in recreation programs. The elementary education students need as many of these experiences as possible to determine their abilities to be leaders among elementary teachers in the use of industrial arts activities, before they start a series of special courses.

The orientation and guidance functions are very similar to the ones for industrial arts consultants. The elementary classroom specialists need a faculty advisor who is particularly aware of the contribution industrial arts can make to the elementary program. Then he can help the college student with the selection of work and activities beyond the prescribed courses that will tend to develop this specialization.

The follow-up program may offer an opportunity for the faculty advisor to keep in touch with the current school developments in industrial arts as well as offer further help to the new teacher.

The student teaching experiences in one of the nine-week centers may be devoted to the practice of industrial arts activities in several classrooms. By placing the elementary classroom specialist in a school
under a consultant the student teacher may have an opportunity to work in several classrooms that are undertaking industrial arts activities. The industrial arts consultant can offer his assistance and provide the tools and materials for the student teacher to work with children in several classrooms. In this way a student teaching program that emphasizes industrial arts activities may give the college student many classroom experiences in favor of working entirely in one classroom. The other nine weeks of student teaching may be in a classroom with a regular classroom teacher as a regular elementary student teacher. The student teacher may be required to gather curriculum materials and ideas for classroom work centers during the student teaching period.

EVALUATION OF RECOMMENDED EXPERIENCES

The basic pattern for recommended experiences for preparing specialists was established by quoting and discussing a study made by members of the National Society of College Teachers of Education. The eight characteristics of teacher education believed essential in a program that will develop competencies in instruction and curriculum (61, p. 8) are again quoted with the explanation under each showing how the recommended experiences adapt to the characteristics. The importance of and reasons for each of the characteristics were discussed earlier in the chapter where they were first quoted.

The organization of the teacher education program will be characterized by a longer block of time daily during which a group of about thirty students work under a coordinator who uses all the resources at hand in the institution and locality: people, courses, services, organizations, schools.

The experiences recommended in the professional area of the program are not extensive enough to call for a large block of time. The advisor
could be assigned as instructor in the professional area to coordinate at least the guidance function and the professional area. The technical area could work towards a daily block of time, which is characteristic of work in that area because of the nature of the work. Because of the subject centered curriculum at the colleges it seems difficult to cut across department lines and combine the professional and technical, but this would be closer to the organization suggested. It would be a feasible combination because it has been pointed out that the technical area already has elements of the professional work.

The variety of resources can be utilized even in a subject centered curriculum. For example, in a manufacturing unit a social studies instructor can explain reasons for the move of textile industries from New York State and a buyer from the dry goods store can describe the practices in distribution of manufactured textiles. The courses that pertain to development of the specialization can be recommended up to twenty hours of credit or more. The colleges provide audio-visual services and resources of the broad technical program. Organizations on the campus such as the Industrial Arts Club and Future Teachers are very cooperative while organizations such as the Young Men's Christian Association and the Salvation Army operate local hobby programs that offer opportunity to work with children. The local schools are willing to have college students visit and also participate in the classroom work of the elementary grades. Aside from the handicap of the subject centered curriculum the program is able to meet this characteristic.

During the early years of college, the center of interest for such a core group will be general education, with interest in professional aspects stressed in later years.
The work in the technical area begins in the first year, but to meet this characteristic the general education phase can be stressed. The emphasis can be centered around technological studies with very little professional work brought into it. As the professional sequence develops in the second year the technical area can then bring in such matters as selection of activities according to abilities of school children and the operation of laboratory facilities. The climax is the semester of student teaching and the last semester on campus when the professional area receives most of the attention and the technical area has only a small portion of general education. Viewing the total program the general education area takes the major portion of time in the first year or two with the professional area taking an increasing share until the student teaching climax is reached.

A first-hand study of children and adolescents; of communities, their organizations and people; and of schools will be prominent throughout the period of college education.

The introduction to this study comes in the form of child development studies in the first or second year. Then as the professional work increases it includes actual participation in school and community activities. The technical sequence uses the economic life of the community as its primary objective, utilizing many field trips to observe practices in production, consumption and recreation. Then the technical area includes working with children in the school and community environment as soon as the professional sequence develops.

The work in these groups will be organized around significant problems with subject matter drawn from various areas.

The subject centered curriculums at the colleges prevent the full accomplishment of this pattern but the program is in transition. The
significant problems of child study, community life and school work
studied in the areas of general education, professional education and
technical education. The experiences to be added to the existing
curriculum fall chiefly into professional and technical areas. A list
of the content for industrial arts teacher education follows:

1. Professional Area
   a. A scientific study of children
   b. Organization of the elementary school
   c. Initiation of classroom activities
   d. Enrichment of classroom activities
   e. Development of industrial arts essentials
   f. Student teaching under a consultant

2. Technical Area
   a. Typical activities in six units of the curriculum
   b. Introduction to guidance of children's activities
   c. Development of industrial arts in the community
   d. Financial factors in a program
   e. Laboratory and classroom settings

A list of the content recommended for elementary classroom
specialists includes:

1. Professional Area
   a. Definition of industrial arts
   b. Student teaching under a consultant

2. Technical Area
   a. Typical activities in six units of the curriculum
   b. Introduction to guidance of children's activities
   c. Development of industrial arts in the community
   d. The classroom setting

This content could be combined into one list for a core group if
the curriculum is organized in that fashion. The above separation of
the content into professional and technical seems to be necessary under
the present plan of organization.

The future teacher will live for a period of time in a
school and community away from campus, preferably for at
least a semester; will plan with the coordinator many types
of experiences with pupil and teachers; and will study and
work with a community.
This is accomplished very well within the eighteen weeks of student teaching. Each industrial arts and elementary education student spends nine weeks under an industrial arts consultant in an elementary school. The college coordinator presents plans and directions before the period starts, makes two or more visits to the school and conducts post-teaching seminars. During the student teaching period the student participates in all the activities of a regular teacher.

The coordinator will follow a group for a longer period of time than a quarter, semester or year in order to get to know his students well, a factor considered an essential part of good instruction. The guidance function will rest with this coordinator.

The closest connection a separate subject curriculum offers is for the faculty advisor who performs the guidance function to act as an instructor in the professional or technical sequence. In this way the advisor may be able to develop some of the advantages of working with his students over a longer period than one semester. The advisor may continue for four years if the student elects the elementary industrial arts specialization from the beginning of his college work. The important advantage is accomplished: a faculty advisor who is familiar with elementary school industrial arts while the student pursues this specialization.

The instructor who is to help students gain competencies in the area of instruction and curriculum will be selected for his skill as a teacher who puts into effect the principles and practices that characterize these competencies.

Classes in the professional and technical area can be organized to meet this characteristic. For example, the emphasis in the program is the enrichment of elementary classroom activities, so the technical work can be arranged into units of study which follow the methods used in the
elementary school. The professional work is so closely tied in with
observation and participation in an elementary school that there is no
difficulty in relating to principles and practices.

All people involved in the instruction of future teachers
will consider teacher education as their function, and consider
it a particular responsibility to be acquainted with schools
and their needs.

The instructors in the professional and technical areas have constant
contact with elementary schools as a part of their teaching programs.
The problem of instructors in the general education area may be solved
through follow-up of graduates. It was suggested that each advisor
visit his advisees.

The review of the eight characteristics of teacher education
believed to be essential to develop competencies in instruction and
curriculum concludes the evaluation of recommended experiences for
preparing specialists. The latter were drawn from implications of
derivation of industrial arts education and development of curriculum
elements. These were checked in New York State elementary schools
through a survey of New York State need for specialists and an analysis
of the work of the specialists in the elementary schools of the state.
The conclusions and recommendations of the study are made in the chapter
that follows.
Chapter VII

CONCLUSIONS AND RECOMMENDATIONS

In the study described in the preceding chapters the writer has attempted to develop experiences for an Industrial Arts Teacher Education Program for Elementary Schools. It was designed for the State Teachers Colleges in New York and is directed toward the preparation of industrial arts consultants and elementary classroom specialists. The second and third chapters used a bibliographical study for the derivation of industrial arts education and the development of curriculum elements. The next two chapters considered the application to New York State schools by making a survey of the need for specialists and an analysis of the work of the specialists through observation of school programs. This material was drawn together to provide recommended experiences for preparing specialists in Chapter VI and leads to the conclusions and recommendations listed in this chapter.

CONCLUSIONS

The bibliographical study of industrial arts education and the development of curriculum elements provides a basis for the following:

1. Industrial arts is an integral part of general education rather than a separate, unrelated subject.

2. Industrial arts education may be derived from a scientific study of the individual, the societal needs of education and the technological nature of the economy.
3. Industrial arts activities can make a contribution in the elementary school starting in the lower grades.

4. Industrial arts may be defined briefly as a study of production, consumption and recreation in a democratic, technological society.

5. The basic essentials of the industrial arts curriculum develop around units that stem from power and transportation, construction and manufacture, communications and management.

6. The "unit of study" method can be used to study the six units listed above.

7. Elementary school classrooms need an activity center or workroom to facilitate industrial arts experiences.

8. An industrial arts laboratory in the elementary school is used as a resource center to enrich classroom activities.

9. Evaluation is used in industrial arts as in other work.

The survey of opinions of elementary school administrators in New York State indicates that:

1. Industrial arts should be a part of the elementary school.

2. All elementary classroom teachers should have some preparation in industrial arts.

3. The use of an industrial arts consultant in each elementary school is preferable to the use of a classroom teacher specialist.

4. The cost of the industrial arts program is the strongest factor that impedes its growth. Lack of space, properly qualified teachers and time in the school program are the other factors given.

A check list analysis of sixteen elementary school situations and correspondence with administrators reveals the following:
1. The information derived from the bibliographical study is applicable to the schools in New York State.

2. Elementary school administrators and teachers are seeking help in developing the use of industrial arts.

3. There is a need for a classroom teacher specializing in industrial arts to teach in small schools where the consultant is available only part time.

4. Elementary school administrators are seeking advice about the development of elementary industrial arts that is not being answered by some industrial arts teachers.

Recommended experiences for preparing specialists deal with the industrial arts consultant and elementary classroom specialist. A program for preparation of consultants should include the following:

1. Professional Area
   a. A scientific study of children
   b. Organization of the elementary school
   c. Initiation of classroom activities
   d. Enrichment of classroom activities
   e. Development of industrial arts essentials
   f. Student teaching under a consultant

2. Technical Area
   a. Typical activities in the six units of the curriculum
   b. Introduction to the guidance of children's activities
   c. Development of industrial arts in the community
   d. Financial factors in a program
   e. Laboratory and classroom settings

The elementary teacher education program for the preparation of classroom teachers with a specialty in industrial arts should include the following content:

1. Professional Area
   a. Definition of industrial arts
   b. Student teaching under a consultant
2. Technical Area
   a. Typical activities in six units of the curriculum
   b. Introduction to the guidance of children's activities
   c. Development of industrial arts in the community
   d. The classroom setting

The content listed above was derived from implications drawn from the bibliographical study, the survey of New York State needs and the analysis of the work of the specialists. The following section considers the development and application of these conclusions.

RECOMMENDATIONS

Careful consideration of the above conclusions leads to a series of recommendations concerning elementary schools with implications for teacher education. Then problems for further research are suggested.

**Elementary Schools.** The following recommendations apply to the industrial arts program in elementary schools:

1. Use the basic essentials of an industrial arts curriculum discussed in Chapter III including units selected from power and transportation, construction and manufacture, communications and management to reflect the technological economy. The resource units necessary to implement these can be developed in the teacher education classes and distributed to elementary teachers and consultants who will make use of the material. Teachers may contribute to this development of materials through in-service workshops and graduate study.

2. Stress an integrated program of industrial arts rather than the traditional separate subject approach as explained in the methods of teaching in Chapter III. The analysis of school situations in Chapter V indicated this integrated program develops from an "on-call" system for using a consultant. This can be encouraged through the school contacts
of teacher educators and the programs of professional organizations. Teacher education can exemplify this type of program by integrating the general education, technical education and professional education.

3. Include an industrial arts laboratory as a resource center for all new elementary school buildings. The use of this room was described under the heads of physical setting in Chapter III and school situations in Chapter V. The State Education Department has contact with new building programs and can encourage this development. The teacher education programs for elementary education and industrial arts should use a laboratory similar to that suggested in Illustration XI on page 178 in order to familiarize college students with the advantages of a laboratory setting.

4. Include an industrial arts activity center in every classroom as described in Chapter III under physical setting. The value of this can be stressed in the industrial arts course required of all elementary teachers. In-service workshops for teachers can assist them in the preparation of a center in their own classroom. The State Education Department can encourage this in their assistance to communities planning new schools, their curriculum publications and the supervisory work of their personnel.

5. Use an industrial arts consultant for every 500 elementary school children. The administrator opinions quoted in Chapter IV indicated the schools are ready to use consultants. The industrial arts divisions at Buffalo and Oswego need to consider the content recommended in Chapter VI for preparing consultants.
6. Use a classroom teacher who specialized in industrial arts during college preparation to introduce industrial arts activities in the school. This technique was described in Chapter III under methods of teaching and the need was emphasized by statements of consultants in Chapter V. The ten teachers colleges in New York State that prepare elementary teachers need to consider the content suggested in Chapter VI for inclusion in a program to prepare elementary classroom specialists. Elementary school administrators do not favor the use of this person in preference to an industrial arts consultant, as indicated in their opinions surveyed in Chapter IV.

Further Research. The application of the recommendations made above require further research. Some of the problems to be considered are:

1. The application of this study in other states. The current program of teacher education in a state would need to be evaluated and then the experiences recommended for the preparation of specialists developed in coordination with the basic program.

2. The extent to which teacher education should use guided activities with children in the technical area. This study attached a value to college students working with children as part of their technical and professional preparation. Experiments need to be conducted as to the amount of work that is economical in view of the preparation needed.

3. An administrative guide for the promotion of elementary industrial arts. This includes suggestions for the inauguration and guidance of the program, touching upon basic essentials, methods of teaching, physical setting and evaluation.
4. A manual of instructions for using statistics from the magazine, *Survey of Current Business*. This publication describes the economy; and directions for interpreting the data and applying it to teaching situations are needed to assist the teacher.

5. Resource units for the six units of the curriculum to reflect technology. In order to guide children's activities in a unit a classroom teacher needs to know ways of introducing it to children, what materials are available for children to use as references, what activities are possible and what ways there are to culminate the experience. A resource unit suggests a wide variety of materials to use in each of the parts.

6. The elementary school industrial arts laboratory that can be used as a resource center for six units of the curriculum reflecting technology. The laboratory illustrated in this study is for a teacher education program. Correspondence with schools reported in Chapter V indicates administrators want assistance in planning a laboratory for an elementary school building. Specifications for equipment, tools and supplies and a layout for their installation are needed.

7. The contribution of industrial arts in the atypical program for elementary schools. The physically and mentally handicapped need special assistance to become adjusted. Study needs to be made of each type to determine how industrial arts activities can contribute to their development.
Chapter VIII
SUMMARY

This study develops teacher education experiences for preparation of special teachers who assist the classroom teacher in the development of industrial arts activities. A program of industrial arts for kindergarten through the sixth grade is derived through a bibliographical study, and considered for the schools of New York State by a questionnaire to administrators and by visits to sixteen schools using industrial arts consultants. Implications from each chapter form the basis for recommending teacher education experiences for industrial arts consultants and elementary education majors who elect to specialize in industrial arts.

FINDINGS OF THE BIBLIOGRAPHICAL STUDY

The literature reveals that industrial arts education as an integral part of general education may be derived and defined from a study of the child, society and economy. These sources indicate a curriculum that features the unit of study approach to organizing learning situations in power and transportation, construction and manufacture, communications and management. For these activities an elementary classroom needs a work center or a workroom with an industrial arts laboratory to use as a resource center for additional tools, equipment, materials and work space.

THE NEW YORK SURVEY AND ANALYSIS

The questionnaire survey with replies from three hundred selected elementary school administrators indicates that industrial arts is
accepted as a part of the elementary school program and that:

1. All classroom teachers should have some industrial arts activities as a part of teacher education.

2. They favor using an industrial arts consultant in each school in preference to a classroom teacher specializing in industrial arts.

3. The cost of the program is the strongest factor blocking its growth while lack of space, teacher supply and training, and time in the program are other deterrents.

The analysis of sixteen schools indicates that the program evolving from the bibliographical study conformed generally with school practices. Programs under the direction of a consultant are expanding and small schools need a classroom teacher specializing in industrial arts.

CONCLUSIONS

The conclusions indicate that the following content needs to be included in the basic industrial arts program to prepare a consultant:

1. A scientific study of children, the organization of elementary schools, and methods of initiating and enriching classroom activities.

2. Work in the six units of the curriculum and development of laboratory and classroom physical settings.

3. Full time student teaching under a consultant.

Problems to be included in the elementary education program to prepare industrial arts specialists are:

1. Derivation and definition of industrial arts.

2. Work in the six units of the curriculum and development of classroom physical settings.

3. Full time student teaching under an industrial arts consultant.
RECOMMENDATIONS

**Elementary Schools.** An industrial arts consultant or classroom specialist should be used in each school to enrich the curriculum with industrial arts experiences by developing classroom and laboratory facilities, providing materials and tools and offering resources for the six curriculum units.

**Teacher Education.** Colleges preparing industrial arts teachers should consider the inclusion of the problems mentioned above in a program to prepare consultants. Colleges preparing elementary teachers should consider the ones that help prepare classroom specialists.

**Further Research.** Resource units are needed to implement activities in the six units of the curriculum. An evaluation needs to be made of a teacher education program that has used the problems mentioned above to prepare specialists. The contributions of industrial arts to an atypical program needs to be studied.
Appendix 1

ELEMENTARY INDUSTRIAL ARTS AT OSWEGO

Special Sequence in Elementary Industrial Arts

for Industrial Arts Majors (88, p. 67)

To meet the frequent requests for industrial arts teachers to serve as consultants and specialists in the elementary schools, a special sequence of courses is offered. Any industrial arts major may elect to take this sequence as a part of his regular program of preparation. Those interested should plan to elect the following:

1. **Child Development.** This course is chiefly concerned with problems relating to the development of the individual in childhood and adolescence. Topics studied include the relation of school experiences to individual development; physical growth and its effects upon behavior; and factors affecting the development of interests and attitudes. Other topics are individual differences in ability and mental tests; learning; memory; preparation of case studies; and the mental hygiene of teachers. Class discussions are coordinated with observation in the Campus School.

2. **The Elementary School Curriculum.** A course concerned with modern trends and developments in the major curricular areas. Specialists in each field are utilized to summarize present status and lead discussion concerning problems.

3. **Industrial Arts in the Elementary School.** The course is planned for those industrial arts majors who are considering the elementary school level as a possible career. The course presupposes no fixed formula for teaching industrial arts on the elementary school levels. A careful study is made of the school, the child, and the role of the teacher, followed by a proposed program which contributes to the growth and development of all elementary school children.

4. **Elementary School Industrial Arts Laboratory.** The function of an industrial arts specialist in the elementary school is considered by studying and illustrating children's needs for individual and group constructional activities.

The courses to be included in this special sequence, with the exception of Elementary School Industrial Arts Laboratory, are to be scheduled from the student's twenty three hours of free electives.

This laboratory takes the place of one of the regular industrial arts shops and should be scheduled prior to student teaching.

It is recommended that these courses be taken in the order listed to provide the background for better understanding young children and to

206
culminate with nine weeks of industrial arts student teaching in an elementary school. This sequence should start in the sophomore year.

Curriculum for Elementary Teachers with Elementary Industrial Arts Minor (68, p. 58)

The purpose of this curriculum is to provide teachers for New York State schools qualified to teach as regular elementary classroom teachers. In addition they will be equipped with a basic knowledge of elementary industrial arts required for guiding the development of industrial arts.

The program provides the college student with a sound cultural education, an excellent background in child development and elementary curriculum including direct experiences with children, and a knowledge of elementary industrial arts for enriching the elementary curriculum through creative experiences.

The following courses are required of elementary industrial arts minors but not the regular elementary education students. They replace eighteen hours of general education requirements:

1. Expression with Materials and Techniques I. An introduction to industrial arts materials and techniques. Opportunities are offered for the student to investigate the basic techniques in the various materials, such as wood, metal, clay, plastics and leather.

2. Expression with Materials and Techniques II. A study of the needs of children for group constructional activities. Children's typical group activities are illustrated. Accepted procedures for introducing and implementing classroom activities of a group nature are given.

3. Drawing. The purpose is to develop the ability to illustrate constructional details. Methods and techniques used in sketching and drawing are illustrated. Emphasis is placed on sketching and understanding working drawings. Drawings of students are constructively criticized in light of the needs of elementary school industrial arts.

4. Expression with Materials and Techniques III. A study of children's needs for individual construction activities. The possibilities of expression in simple, low cost materials are investigated. The procuring of materials and tools needed in an elementary school are studied.

5. Student Teaching. Nine weeks of the student teaching period is in a center under the guidance of an industrial arts consultant.

6. Expression with Materials and Techniques IV. It provides an opportunity to further investigate and develop satisfactory command of the many materials. Research, reading, visitation, discussion and experimentation are utilized.
Appendix 2

COMPREHENSIVE EXAMINATION

Prepared as an Experimental Test for College Seniors

Part I. Identification of Tools
Value - 50 points

Place the number of the tool in the blank next to the name of the tool.

- ball pein hammer
- auger bit
- block plane
- countersink
- framing square
- smoothing plane
- claw hammer
- straight shank twist drill
- try square
- hand drill
- nail set
- wooden mallet
- brace
- round nose turning tool
- hand screw
- rip saw teeth
- C clamp
- wood chisel
- crosscut saw teeth
- adjustable crescent wrench
- coping saw
- hand saw
- bar clamp
- hack saw
- back saw
round or rat tail file
combination pliers
revolving punch
side cutting pliers
half round file
file card
center punch
thonging chisel
Vee block
flat file
aviation snips
cold chisel
hollow punch
tin snips
chasing tool
screw driver
rivet set
linoleum carving tool
plaster bat
skiving knife
bench whirler
fettling knife
putty knife
brayer
sloyd knife
PART II. UNDERSTANDING OF CRAFT TECHNIQUES
Value - 100 points

If the statement is more nearly true circle the T. If the statement is more nearly false circle the F.

T. F. 1. When adding moisture to clay work on a plaster bat.
T. F. 2. Fettling is done when the clay is leather hard.
T. F. 3. To make clay pliable for modeling, add water to powdered clay.
T. F. 4. Moist clay has some water mixed with it but usually needs to have water added for slab packing.
T. F. 5. Wedging clay makes it lumpy and puts air bubbles into it.
T. F. 6. The clay commonly used for school ceramic work needs to be fired to about 1800 degrees Fahrenheit to harden it.
T. F. 7. Glazes may be applied by spraying, dipping or brushing.
T. F. 8. Glazes need to be fired to about 1800 degrees Fahrenheit to harden and fuse to the clay.
T. F. 9. The spraying of glazes should be done in a well ventilated place because the fumes of some glazes are poisonous.
T. F. 10. Textile paints are actually dyes that color the fibres of cloth.
T. F. 11. If textile paints are too thin and "run" under the stencil, add more extender.
T. F. 12. After textile paints are applied they must be washed before they are ironed.
T. F. 13. A metal that is comparatively hard to saw and file is copper.
T. F. 14. Fusion solder has a flux to keep the metal clean while hot.
T. F. 15. When soldering is completed the joint should be washed with soap and water to remove any acid left from the flux.
T. F. 16. When copper is polished it will not tarnish or discolor.
T. F. 17. Linoleum is used for block printing because it cuts easily and will transfer ink to paper for printing.
T. F. 18. If minor cuts or accidents are reported to the instructor it may help others to avoid serious injury.
T. F. 19. A number 12 auger bit is three-fourths of an inch in diameter.
T. F. 20. A calf skin is heavier than a cow hide.
T. F. 21. Pig skin is good to use for tooling or surface decoration.
T. F. 22. Goat skin is used for lacing because it is strong.
T. F. 23. Plastic lacing is more expensive than leather lacing.
T. F. 24. Paste wax is used to preserve the surface of leather goods.
T. F. 25. When punching holes, cutting out leather, or using a thonging chisel, place the leather on a marble slab.
T. F. 26. Household cement is a good adhesive for glueing leather.
T. F. 27. Leather is tooled when moist to make permanent decorations.
T. F. 28. When changing a jig saw blade unplug the machine so it will not accidentally start while being adjusted.
T. F. 29. After a jig saw blade is changed, turn the machine over by hand to make a final check before starting it.
T. F. 30. When sanding wood use a coarse sandpaper to remove deep scratches and then fine for a smooth finish.
T. F. 31. When sanding wood always move the sandpaper back and forth across the grain for a smooth finish.
T. F. 32. Calfskin leather for lacing is much stronger than goatskin lacing and will not break as easily.
T. F. 33. A finishing nail has a big head to set below the surface.
T. F. 34. Brads are specified by a number to indicate their diameter, and by a fraction to tell their length.
T. F. 35. As a general rule nails should be driven from thin wood into the thicker piece of wood.
T. F. 36. Wood screws are found with round or flat heads.
T. F. 37. Round head wood screws have a blue finish to retard rust.
T. F. 38. Wood screws are classified by the type of head, diameter (number), length and type of metal.
T. F. 39. When fastening with wood screws drill the first hole large enough for the screw to slip freely through.
T. F. 40. The second hole for a wood screw keeps the wood from splitting and makes the screw easier to tighten.
T. F. 41. "Liver of sulphur" will color brass, aluminum or copper.

T. F. 42. The Fire Underwriters Association manufactures lamp cord.

T. F. 43. A linoleum carving tool cannot be used to cut wood.

T. F. 44. A claw hammer should not be used on metal other than nails.

T. F. 45. A fettling knife can be bent and straightened without breaking.

T. F. 46. A crescent wrench is adjustable for different size nuts.

T. F. 47. A monkey wrench is heavier and tougher than a crescent.

T. F. 48. A wooden mallet should be used to drive a wood chisel.

T. F. 49. A rivet set is used to make a hole for a rivet.

T. F. 50. The circle shears may be used to cut discs or parallel strips.

T. F. 51. The nibbler is like a tin snips operated by a motor.

T. F. 52. For a simple experience in hammering a dish from soft sheet metal, a hardwood die may be used.

T. F. 53. Ball bearings are used in machines to reduce friction.

T. F. 54. The jig saw was designed from the hand coping saw.

T. F. 55. Stepped pulleys are used to make a quick speed change.

T. F. 56. Although plastic resin glue is mixed with water, the dried joint is water-proof.

T. F. 57. Fish glue comes ready mixed, but it is not water-proof when the joint hardens.

T. F. 58. Slip molds should be allowed to dry between uses so they will absorb moisture from the slip.

T. F. 59. Remove mold marks from slip castings when clay is leather hard.

T. F. 60. It is not necessary to pour slip from a plate mold – the shrinkage leaves a foot on the bottom of the plate.

T. F. 61. Nu-film for silk screen is the porous material on the frame.

T. F. 62. NuMedia paints are mixed with turpentine.

T. F. 63. NuMedia paints are good to screen a design on a table cloth.
T. F. 64. Silk screen printing is preferable to stenciling because places like the center of the letter 0 will not fall out.

T. F. 65. Skotch fasteners make a quick, strong corner joint.

T. F. 66. When loading a kiln for bisque firing the pieces must be carefully separated so they do not touch.

T. F. 67. It is advisable to have an indicating pyrometer on a ceramic kiln to facilitate checking the temperature.

T. F. 68. If a ceramic kiln is overheated the elements will likely burn out and need to be replaced.

T. F. 69. Air hardening clay is available (at a higher cost) for schools that do not have a kiln to fire ceramic ware.

T. F. 70. Flashlight batteries are connected to the bulb without wires.

T. F. 71. The larger the diameter copper wire, the more voltage it will take to force through a constant amount of current.

T. F. 72. Nichrome wire is used for heating elements because it has a high resistance to the flow of electricity.

T. F. 73. The longer the wire, the more voltage it takes to force a current through it.

T. F. 74. A six volt dry cell battery is made up of two 1½ volt batteries.

T. F. 75. Two amperes is enough current to operate a small telegraph set.

T. F. 76. In winding a coil it is necessary to keep one row of wire from making an electrical contact with the next row.

T. F. 77. Enamel and cotton are insulating materials for magnet wire.

T. F. 78. Aluminum is a good material for making a permanent magnet.

T. F. 79. An electro magnet loses its strength when the current is cut.

T. F. 80. Twelve point Remington Typewriter type is easy to compose because all the characters are exactly the same width.

T. F. 81. Pica measure is used to determine the size of printing materials.

T. F. 82. A composing stick is used to hold type while it is being set.

T. F. 83. Justifying type means making it fit the exact length of a line.

T. F. 84. Furniture and quoins are used to hold type in a chase.
T. F. 85. The printing press is inked after the chase with type is placed in the press.

T. F. 86. A backsaw has ripsaw teeth.

T. F. 87. A french polish is a good finish for a salad bowl.

T. F. 88. When turning in a wood lathe, keep the tool rest as close as possible to the work.

T. F. 89. For faceplate turning a gouge may be used for roughing.

T. F. 90. For faceplate turning a round nose tool, a diamond point tool or a chisel may be used.

T. F. 91. It is necessary to wear safety glasses for wood turning because of the flying chips.

T. F. 92. When several identical objects are cut from sheetmetal it saves time to make a metal pattern and trace each one.

T. F. 93. For sheetmetal layout a pencil makes a finer, more accurate line than a scratch awl.

T. F. 94. A hem smooths the edges of sheetmetal objects.

T. F. 95. A single hem on sheetmetal is stronger than a double hem.

T. F. 96. A sheetmetal brake makes bends at corners and makes hems.

T. F. 97. When grinding tools a water quench is used to increase the temperature of the tool being ground.

T. F. 98. A Huntington dresser is used to sharpen a grinding wheel.

T. F. 99. After paint remover soaks old paint for five minutes, a putty knife can then be used to scrape off the paint.

T. F. 100. If old paint is too thick, it is necessary to use two applications of paint remover to take it off.

PART III. ACTIVITIES IN UNITS OF STUDY
Value - 55 points

1. A third grade class is scheduled for a transportation unit. The teacher plans to use models made from kits to introduce it. The local hobby shop has agreed to loan the teacher different types of finished models relating to transportation. Name ten different types of model kits relating to transportation that are commonly available in hobby shops.
2. A fourth grade class is planning a unit in communications. Name six different industrial arts activities they might consider using to explore the possibilities of different types of communications.

3. A sixth grade class planned a unit on sources of power. They are doing research on natural and electrical sources. For each of the sources listed below, name a demonstration, experiment or activity to inspire the children to carry out research: sun, wind, water and food.

4. The second grade has been working on a construction unit emphasizing frame houses. They planned and completed research activities including movies on lumbering, a visit to a sawmill, a visit to a home under construction and several picture stories about homes and carpenters. Name five culminating activities that involve industrial arts.

5. The fifth grade is completing a unit on manufacturing. As a culminating activity they organized a company to make wooden trucks. As a teacher you will need to stimulate evaluation. In addition to points proposed by children, name five points for them to use in evaluating the industrial arts activities.

6. An industrial arts specialist is considering grade placement of Indian basket weaving. Check one factor that is least important:

   __ previous industrial arts experiences of the children
   __ classroom studies at the time basket weaving is used
   __ at least a fifth or sixth grade class
   __ availability of tools and materials for the work
   __ ability of the children to work with tools and materials

7. Check one answer that completes the following statement in the most advisable manner. In units of study covered by a grade during a school year, industrial arts activities should:

   __ always be included in every unit
   __ be included where they can make a contribution to enrich
   __ not be considered at all
   __ be used only when a consultant is available for assistance
   __ be included only if the teacher likes activity work

8. Check one answer that completes the statement. Industrial arts activities in a unit of study should be planned by:

   __ the teacher
   __ the children
   __ the industrial arts consultant
   __ a conference of classroom teachers before school starts
   __ the teacher, the children and the industrial arts consultant in a planning conference
9. Check the one answer that completes the statement in the most advisable manner. Industrial arts activities relating to a unit of work should be carried on:

- entirely in the classroom
- entirely in the workroom
- entirely in the industrial arts laboratory
- wherever the children feel like working

PART IV. DEMONSTRATING ACTIVITIES
Value - 35 points

A written lesson plan helps a new teacher think through a lesson and makes the necessary preparation before it starts. The latter is particularly valuable when working with tools and materials in presenting industrial arts activities.

Indicate below a brief topical outline for applying enamel finishes, covering objectives (immediate and long range), preparation (tools, materials, teaching aids), presentation and a summary or review.

PART V. PHYSICAL SETTING FOR ACTIVITIES
Value - 35 points

If an elementary classroom is to carry on industrial arts activities a certain number of generally useful tools should be placed in a classroom workbench or tool cupboard. These tools can be supplemented for special activities by portable units.

List below fifteen tools that you would recommend for permanent location in each classroom.
Appendix 3

WORKERS IN THE FIVE UNITS OF THE CURRICULUM

Statistics from *Survey of Current Business* (95)

### Number of Workers Employed in Transportation

<table>
<thead>
<tr>
<th>Description</th>
<th>April 1952</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making transportation equipment</td>
<td>1,283,000</td>
</tr>
<tr>
<td>Aircraft and parts</td>
<td>662,000</td>
</tr>
<tr>
<td>Ship and boat building repairs</td>
<td>126,000</td>
</tr>
<tr>
<td>Railroad equipment</td>
<td>56,000</td>
</tr>
<tr>
<td>Making interstate railroads</td>
<td>1,404,000</td>
</tr>
<tr>
<td>Making local railway and bus lines</td>
<td>139,000</td>
</tr>
<tr>
<td>Making tires and inner tubes</td>
<td>94,000</td>
</tr>
<tr>
<td>Railway employees</td>
<td>1,264,000</td>
</tr>
<tr>
<td>Highway passenger transportation</td>
<td>227,000</td>
</tr>
<tr>
<td>Highway freight transportation and warehousing</td>
<td>796,000</td>
</tr>
<tr>
<td>Water transportation</td>
<td>142,000</td>
</tr>
<tr>
<td>Air transportation (common carriers)</td>
<td>85,000</td>
</tr>
<tr>
<td>Pipe line transportation</td>
<td>29,000</td>
</tr>
<tr>
<td>Services allied to transportation</td>
<td>184,000</td>
</tr>
<tr>
<td>Automotive and accessories dealers</td>
<td>811,000</td>
</tr>
</tbody>
</table>

### Number of Workers Employed in Manufacturing

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber and wood products (except furniture)</td>
<td>676,000</td>
</tr>
<tr>
<td>Sawmills and planing mills</td>
<td>406,000</td>
</tr>
<tr>
<td>Furniture and fixtures</td>
<td>291,000</td>
</tr>
<tr>
<td>Primary metal industries</td>
<td>1,146,000</td>
</tr>
<tr>
<td>Blast furnaces, steel workers, mills</td>
<td>560,000</td>
</tr>
<tr>
<td>Smelting and refining nonferrous metals</td>
<td>47,000</td>
</tr>
<tr>
<td>Fabricated metal products (except machinery)</td>
<td>692,000</td>
</tr>
<tr>
<td>Ordnance and accessories</td>
<td>57,000</td>
</tr>
<tr>
<td>Industry</td>
<td>April 1952</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Machinery (except electrical)</td>
<td>1,274,000</td>
</tr>
<tr>
<td>Nonmetallic mining and quarrying</td>
<td>105,000</td>
</tr>
<tr>
<td>Instruments and related products</td>
<td>235,000</td>
</tr>
<tr>
<td>Stone, clay and glass</td>
<td>451,000</td>
</tr>
<tr>
<td>Glass and glass products</td>
<td>123,000</td>
</tr>
<tr>
<td>Textile mill products</td>
<td>1,091,000</td>
</tr>
<tr>
<td>Broad-woven fabric mills</td>
<td>507,000</td>
</tr>
<tr>
<td>Knitting mills</td>
<td>209,000</td>
</tr>
<tr>
<td>Apparel and other finished textile products</td>
<td>993,000</td>
</tr>
<tr>
<td>Mens' and boys' suits and coats</td>
<td>120,000</td>
</tr>
<tr>
<td>Mens' and boys' furnishings, work clothes</td>
<td>259,000</td>
</tr>
<tr>
<td>Womens' outerwear</td>
<td>274,000</td>
</tr>
<tr>
<td>Chemicals and allied products</td>
<td>550,000</td>
</tr>
<tr>
<td>Rubber products (except tires and tubes)</td>
<td>119,000</td>
</tr>
<tr>
<td>Leather and leather products</td>
<td>335,000</td>
</tr>
<tr>
<td>Footwear (except rubber)</td>
<td>217,000</td>
</tr>
<tr>
<td>Agriculture, forestry and fisheries</td>
<td>6,488,000</td>
</tr>
<tr>
<td>Farms</td>
<td>261,000</td>
</tr>
<tr>
<td>Agriculture, similar service establishments</td>
<td>251,000</td>
</tr>
<tr>
<td>Forestry</td>
<td>24,000</td>
</tr>
<tr>
<td>Fisheries</td>
<td>76,000</td>
</tr>
<tr>
<td>Tobacco manufactures</td>
<td>77,000</td>
</tr>
<tr>
<td>Food and kindred products</td>
<td>1,057,000</td>
</tr>
<tr>
<td>Meat</td>
<td>235,000</td>
</tr>
<tr>
<td>Dairy products</td>
<td>101,000</td>
</tr>
<tr>
<td>Canning and preserving</td>
<td>113,000</td>
</tr>
<tr>
<td>Bakery</td>
<td>184,000</td>
</tr>
<tr>
<td>Beverages</td>
<td>137,000</td>
</tr>
</tbody>
</table>

**Number of Workers Employed in Communications**

<table>
<thead>
<tr>
<th>Industry</th>
<th>April 1952</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing, publishing and allied industries</td>
<td>508,000</td>
</tr>
<tr>
<td>Newspapers</td>
<td>152,000</td>
</tr>
<tr>
<td>Commercial printing</td>
<td>167,000</td>
</tr>
<tr>
<td>Paper and allied products</td>
<td>403,000</td>
</tr>
<tr>
<td>Pulp, paper and paperboard mills</td>
<td>210,000</td>
</tr>
<tr>
<td>Service</td>
<td>April 1952</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Telephone</td>
<td>655,000</td>
</tr>
<tr>
<td>Telegraph</td>
<td>47,000</td>
</tr>
<tr>
<td>Radio broadcast and television</td>
<td>58,000</td>
</tr>
</tbody>
</table>

**Number of Workers Employed in Construction**

<table>
<thead>
<tr>
<th>Category</th>
<th>Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal and state highways</td>
<td>265,785</td>
</tr>
<tr>
<td>Construction</td>
<td>92,142</td>
</tr>
<tr>
<td>State maintenance</td>
<td>118,411</td>
</tr>
<tr>
<td>Contract construction</td>
<td>2,416,000</td>
</tr>
</tbody>
</table>

**Number of Workers Employed in Power**

<table>
<thead>
<tr>
<th>Category</th>
<th>Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas and electric utilities</td>
<td>528,000</td>
</tr>
<tr>
<td>Heating apparatus and plumbers' supplies</td>
<td>115,000</td>
</tr>
<tr>
<td>Making electrical machinery</td>
<td>714,000</td>
</tr>
<tr>
<td>Products of petroleum and coal</td>
<td>197,000</td>
</tr>
<tr>
<td>Petroleum refining</td>
<td>155,000</td>
</tr>
<tr>
<td>Mining anthracite coal</td>
<td>61,000</td>
</tr>
<tr>
<td>Mining crude petroleum and natural gas</td>
<td>269,000</td>
</tr>
<tr>
<td>Local utilities and public services, n.e.c.</td>
<td>27,000</td>
</tr>
</tbody>
</table>
## Appendix 4

### DIRECTORY OF CONSULTANTS

From the State Education Department, Bureau of Industrial Arts

<table>
<thead>
<tr>
<th>School</th>
<th>Post Office Address</th>
<th>Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oyster Bay 21</td>
<td>Bethpage</td>
<td>Donald A. Kant</td>
</tr>
<tr>
<td>North Hempstead 11</td>
<td>Carle Place</td>
<td>J. Clifford Peterson</td>
</tr>
<tr>
<td>Oyster Bay 8</td>
<td>East Norwich</td>
<td>Henry Roy</td>
</tr>
<tr>
<td>North Side</td>
<td>East Williston</td>
<td>Herbert Beyea</td>
</tr>
<tr>
<td>North Hempstead</td>
<td>East Williston</td>
<td>Herbert Beyea</td>
</tr>
<tr>
<td>Washington Street</td>
<td>Franklin Square</td>
<td>Eugene F. Kuhn</td>
</tr>
<tr>
<td>Elementary Schools</td>
<td>Freeport</td>
<td>Charles F. Deubel</td>
</tr>
<tr>
<td>Garden City Park</td>
<td>Garden City Park</td>
<td>Lester Bernstein</td>
</tr>
<tr>
<td>Stewart Avenue</td>
<td>Garden City</td>
<td>Alfred Milano</td>
</tr>
<tr>
<td>Stratford Avenue</td>
<td>Garden City</td>
<td>John S. Powell</td>
</tr>
<tr>
<td>Glenwood Landing</td>
<td>Glenwood Landing</td>
<td>John Bakowski</td>
</tr>
<tr>
<td>Oyster Bay 1</td>
<td>Glenwood Landing</td>
<td>Nat Minion</td>
</tr>
<tr>
<td>Union Free School #1</td>
<td>Grahamsville</td>
<td>Joseph Murray</td>
</tr>
<tr>
<td>Central School</td>
<td>Grand Island</td>
<td>John L. Roberts</td>
</tr>
<tr>
<td>Saddle Rock</td>
<td>Great Neck</td>
<td>Robert Babcock</td>
</tr>
<tr>
<td>Kensington</td>
<td>Great Neck</td>
<td>Alfred Cavanaugh</td>
</tr>
<tr>
<td>Cumberland</td>
<td>Great Neck</td>
<td>Alfred Cavanaugh</td>
</tr>
<tr>
<td>Lakeville</td>
<td>Great Neck</td>
<td>William Hinman</td>
</tr>
<tr>
<td>Parkville</td>
<td>Great Neck</td>
<td>John L. Roberts</td>
</tr>
<tr>
<td>Elizabeth M. Baker</td>
<td>Great Neck</td>
<td>John L. Roberts</td>
</tr>
<tr>
<td>Clover Drive</td>
<td>Great Neck</td>
<td>John L. Roberts</td>
</tr>
<tr>
<td>Arrandale</td>
<td>Great Neck</td>
<td>Karl Seitz</td>
</tr>
<tr>
<td>Heatly High School</td>
<td>Great Neck</td>
<td>Howard Roda</td>
</tr>
<tr>
<td>Halstead Avenue</td>
<td>Harrison</td>
<td>John Metcalfe</td>
</tr>
<tr>
<td>Junior High</td>
<td>Hartsdale</td>
<td>Warren Casterlin</td>
</tr>
<tr>
<td>Hauppage 6</td>
<td>Hauppage</td>
<td>Robert J. Young</td>
</tr>
<tr>
<td>Northern Parkway</td>
<td>Hempstead</td>
<td>Ward F. Hughes</td>
</tr>
<tr>
<td>Jackson</td>
<td>Hempstead</td>
<td>Murray Weinblatt</td>
</tr>
<tr>
<td>Washington</td>
<td>Hempstead</td>
<td>Murray Weinblatt</td>
</tr>
<tr>
<td>Ludlum</td>
<td>Hempstead</td>
<td>Joseph Speigel</td>
</tr>
<tr>
<td>Fulton</td>
<td>Hempstead</td>
<td>Joseph Speigel</td>
</tr>
<tr>
<td>Franklin</td>
<td>Hempstead</td>
<td>Joseph Straka</td>
</tr>
<tr>
<td>Prospect</td>
<td>Hempstead</td>
<td>Don Smith</td>
</tr>
<tr>
<td>Oyster Bay 15</td>
<td>Jericho</td>
<td>Stephen Surdel</td>
</tr>
<tr>
<td>High School</td>
<td>Lackawanna</td>
<td>Steven Rose</td>
</tr>
<tr>
<td>School Name</td>
<td>Location</td>
<td>Principal</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Inwood School, 2</td>
<td>Lawrence</td>
<td>Everett B. LaMere</td>
</tr>
<tr>
<td>Cedarhurst School, 5</td>
<td>Lawrence</td>
<td>Everett B. LaMere</td>
</tr>
<tr>
<td>Lawrence, 1</td>
<td>Lawrence</td>
<td>Everett B. LaMere</td>
</tr>
<tr>
<td>Grade Schools</td>
<td>Locust Valley</td>
<td>Marian McCarthy</td>
</tr>
<tr>
<td>Atlantic Avenue</td>
<td>Lynbrook</td>
<td>George Weatherston</td>
</tr>
<tr>
<td>Plandome Road</td>
<td>Manhasset</td>
<td>Walter J. Calhoun</td>
</tr>
<tr>
<td>Merrick Avenue</td>
<td>Merrick</td>
<td>Joseph Geisel</td>
</tr>
<tr>
<td>Lakeside</td>
<td>Merrick</td>
<td>Joseph Geisel</td>
</tr>
<tr>
<td>Mineola</td>
<td>Mineola</td>
<td>Edwin P. Richardson</td>
</tr>
<tr>
<td>Mt. Vernon</td>
<td>Mt. Vernon</td>
<td>Salidiero</td>
</tr>
<tr>
<td>Herricks</td>
<td>New Hyde Park</td>
<td>Fred Kowalski</td>
</tr>
<tr>
<td>Manor Oaks</td>
<td>New Hyde Park</td>
<td>Howard Wick</td>
</tr>
<tr>
<td>Elementary Schools</td>
<td>Niagara Falls</td>
<td>Charles Chapman</td>
</tr>
<tr>
<td>Elementary Schools</td>
<td>Niagara Falls</td>
<td>Frederick Knapp</td>
</tr>
<tr>
<td>Newbridge Road</td>
<td>North Bellmore</td>
<td>Henry Taylor</td>
</tr>
<tr>
<td>Public School Number 69</td>
<td>North Merrick</td>
<td>James Wright</td>
</tr>
<tr>
<td>Oyster Bay High School</td>
<td>Oyster Bay</td>
<td>Marion Stock</td>
</tr>
<tr>
<td>Elementary School</td>
<td>Port Jefferson</td>
<td>Byron A. Berg</td>
</tr>
<tr>
<td>Port Washington</td>
<td>Port Washington</td>
<td>Charles Young</td>
</tr>
<tr>
<td>Port Washington</td>
<td>Poughkeepsie</td>
<td>Robert Rushford</td>
</tr>
<tr>
<td>School Number 37</td>
<td>Rochester</td>
<td>Mrs. Haley</td>
</tr>
<tr>
<td>School Number 49</td>
<td>Rochester</td>
<td>Catherine Morse</td>
</tr>
<tr>
<td>School Number 46</td>
<td>Rochester</td>
<td>Catherine Morse</td>
</tr>
<tr>
<td>School Number 41</td>
<td>Rochester</td>
<td>Robert Connal</td>
</tr>
<tr>
<td>School Number 43</td>
<td>Rochester</td>
<td>Norman Gurley</td>
</tr>
<tr>
<td>School Number 20</td>
<td>Rochester</td>
<td>Glenn Higgins</td>
</tr>
<tr>
<td>School Number 33</td>
<td>Rochester</td>
<td>Jack Kiriluk</td>
</tr>
<tr>
<td>School Number 5</td>
<td>Rochester</td>
<td>Dana Macafee</td>
</tr>
<tr>
<td>School Number 9</td>
<td>Rochester</td>
<td>Joseph Makiwisc</td>
</tr>
<tr>
<td>School Number 22</td>
<td>Rochester</td>
<td>Doris Tator</td>
</tr>
<tr>
<td>School Number 31</td>
<td>Rochester</td>
<td>James Toolan</td>
</tr>
<tr>
<td>Brighton 4</td>
<td>Rochester</td>
<td>Robert Tucker</td>
</tr>
<tr>
<td>Flower Hill</td>
<td>Rochester</td>
<td>Ruth Anderson</td>
</tr>
<tr>
<td>Roslyn Village Elementary</td>
<td>Roslyn Heights</td>
<td>Ruth Anderson</td>
</tr>
<tr>
<td>East Hills</td>
<td>Roslyn Heights</td>
<td>Damon K. Kroh</td>
</tr>
<tr>
<td>North Roslyn Elementary</td>
<td>Roslyn Heights</td>
<td>Arthur Kinke</td>
</tr>
<tr>
<td>Roslyn Heights Elementary</td>
<td>Roslyn Heights</td>
<td>Robert Hatcher</td>
</tr>
<tr>
<td>Roslyn Highlands Elem.</td>
<td>Roslyn Heights</td>
<td>Robert Hatcher</td>
</tr>
<tr>
<td>Edgemont Junior High</td>
<td>Scarsdale</td>
<td>Preston Taylor</td>
</tr>
<tr>
<td>John Bigsbee</td>
<td>Scarsdale</td>
<td>Robert Sturdevant</td>
</tr>
<tr>
<td>Woodmere Academy</td>
<td>Woodmere</td>
<td>Henry L. Hutter</td>
</tr>
</tbody>
</table>
Appendix 5
CHECK LIST FOR SCHOOLS WITH CONSULTANTS

School _______________________  Consultant _______________________

I. PROGRAM ORGANIZATION
   A. Planning with Teachers
      1. Regularly scheduled conferences
      2. On call for conferences
      3. Occasional visits for conferences
      4. Examples of industrial arts activities included in long range planning

   B. Laboratory Activities
      1. Classes scheduled in the laboratory
         Grade  Number of periods  Length of periods
      2. Individual activity work
         a. Periods of _____ minutes
         b. Number per week ______
         c. Permission by teacher __
            by consultant __
      3. Time for group projects
         a. Arrangement by conference ______
         b. Blocks of time left open ______
      4. Typical laboratory work at each grade level

   C. Classroom Assistant by a Consultant
      1. Regular daily schedule for work ______
      2. On call for demonstrations ______
      3. Provides tools for classroom use ______
      4. Provides materials for classroom use ______
      5. Typical classroom activities at each grade level involving the consultant

   D. Community Visits Made by Classes
      1. Annual visits to ______
      2. Special request to visit such places as ______
      3. Community arrangements made by
         a. Teachers ______________________
         b. Consultant ______________________

II. PHYSICAL SETTING
   A. Laboratory
      1. Size of room
         a. Length ______________________
         b. Width ______________________
         c. Auxiliary space ______________________
      2. Size of the equipment
         a. Bench height ______________________
b. Highest tool is _______ feet from the floor

c. Height of machine work table is _______

3. Portable tools for classroom use ________________

4. Portable machines for classroom use ________________

5. Area
   Hand tools
   Machines*
   Ceramics
   Crafts
   Electricity
   Graphic Arts
   Metal
   Planning
   Storage
   Textiles* circle the machines and
   Transportation tools that are for the
   Wood consultant's use only

B. Classrooms
   1. Facilities
      Number in rooms or grades
      Hand Tools
      Project Storage
      Supply Storage
      Wash Sink
      Work Bench

   2. List of typical individual classroom activities at
      each grade level

   3. List of classroom group activities for grades____

C. Workrooms
   1. Number and location ____________________________
   2. Facilities included ____________________________

III. EXTRA DUTIES OF THE CONSULTANT
   A. Teacher workshops ______________________________
   B. Community programs _____________________________
   C. Community displays ______________________________
   D. Dramatics ______________________________________
   E. Television programs ______________________________
   F. Assembly programs _______________________________
   G. Civic organizations and clubs _____________________
   H. Others _________________________________________

IV. PROFESSIONAL PREPARATION OF THE CONSULTANT
   A. Institutions and Degrees __________________________

   B. Brief Analysis of Preparation by Fields
      Technical Professional General Education

   C. Suggestions for Improving Undergraduate Education ______
SELECTED BIBLIOGRAPHY


18. Duncan, Glenn S. "Foundations of Training for Elementary Classroom Teachers in the Area of Practical Arts". The Industrial Arts Teacher, 10 Number 3 (February 1951), 1-6.


51. Mackintosh, Helen K. "Industrial Arts in Elementary Education". *School Life*, 25 (November 1939), 43-44.


53. MacMurry, Margaret D. "They Also Serve". *New York State Education*, 40 (December 1953), 224-225.


57. Mossman, Lois Coffey. "Project Method in Industrial and Household Arts". *Teachers College Record*, 22 Number 4 (September 1921), 322-328.


78. Rowand, LeRoy. "Mobile Tool Unit Brings Industrial Arts to Elementary School". Industrial Arts and Vocational Education, 43 (October 1955), 269-270.

79. Ruley, M. J. "Elementary Industrial Arts in the Public Schools of Tulsa, Oklahoma". Industrial Arts and Vocational Education, 41 (September 1951), 277.


83. Scobey, Mary-Margaret. "Industrial Arts for Elementary Schools". The Industrial Arts Teacher, 13 Number 3 (February 1954), 17-18.


87. Smith, Lester O. "Correlation and Integration of Industrial Arts with other Subjects". Elementary School Journal, 44 (December 1943), 208-214.


110. Wurzbacher, Frederick M. "Hobby Groups Introduce Industrial Arts". *New York State Education*, 39 Number 9 (June 1952), 684-685.
I, Harold G. Gilbert, was born in Buffalo, New York on May 20, 1921. I received my secondary schooling at Technical High School in that city. My undergraduate preparation was obtained at the New York State College for Teachers at Buffalo, from which I received the degree, Bachelor of Science in Industrial Arts Education, in June 1942. For a year and a half I taught a general industrial arts laboratory at Holley, New York. During three summer vacations I worked in different machine tool industries in Buffalo.

I entered the military service in January 1944 and received training in the Army Ordnance School. When the emphasis changed to the Pacific Theatre I was assigned to the Army Engineers and trained as a construction foreman. I saw duty as a master sergeant in the Pacific Islands and occupation duty in Korea. Upon return from service I worked as a school training officer for the Veteran's Administration for six months.

During my work for the Master's Degree at the Ohio State University I held the position of graduate assistant, receiving the Master of Arts Degree with a major in industrial arts education in August 1947. I started teaching in the State Teachers College at Oswego and continued work toward the doctorate at Ohio State during summer quarters. I served as instructor at Ohio State in industrial arts education during the 1950-51 year while I fulfilled the residence requirements for the doctorate.