RESOURCE UNIT: IN INDUSTRIAL ARTS TEACHER EDUCATION

With Special Reference to the Development and Use of a Graphic Arts Unit on Book Publishing for Junior High Schools

A DISSERTATION

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

by

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RESOURCE UNITS IN INDUSTRIAL ARTS TEACHER EDUCATION

With Special Reference to the Development and Use of a Graphic Arts Unit on Book Publishing for Junior High Schools
This dissertation concerns the complex problem of developing resource units in industrial arts teacher education programs that may be used in the junior high schools to reflect a rapidly evolving technology. A problem area has been identified in the Graphic Arts industry and a resource unit on Books, has been developed. Guiding principles have been named and criteria established to develop and evaluate such a unit. The implications appear to be enormous.

It is impossible to acknowledge my indebtedness to everyone who has contributed. Acknowledgement and thanks for their counsel are extended to my graduate advisory committee at The Ohio State University. These include: Drs. William E. Warner, Harold B. Alberty, Earl W. Anderson, Dan H. Eikenberry, and Harold P. Fawcett. My wife Mary Louise, has been of especial help throughout the study and well merits this final note of appreciation.

July 15, 1955

Dwight Wilson Nichols
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Chapter I
INTRODUCTION

This dissertation concerns an attempt to discover the intent of educators interested in the reorganization of the secondary school curriculum in terms of the concepts for industrial arts education held by John Dewey, Charles R. Richards, James E. Russell, Frederick G. Bonser, and their followers. A second concern is to implement the results for the benefit of junior high school industrial arts students and teachers. The study is intended to lead to several experimental curriculum research areas in industrial arts. These should stem from procedures employed in the inquiry and from the recommendations that result.

There are subsidiary interests, one of which is to derive a tentative plan for industrial arts teachers to use with adolescents. Another is to provide a frame of reference from the research dealing with the topic.

Background of the Problem. Historically, American shopwork and drawing were introduced by the acceptance of practices established in Europe, and in accord with ideas possessed by several American educators who did not conceive of a means for implementing their ideas until after the Centennial Exposition at Philadelphia.

in 1876. An exhibit of hand-tool exercises in wood from the Imperial Technical Institute of Moscow is credited with prompting Professor John H. Hinkle to include this type of training in the engineering program at the Massachusetts Institute of Technology, and with influencing Professor Calvin W. Woodward to revise an existing course in "applied mathematics" at Washington University in St. Louis and to sponsor a similar program of shop work for high school boys.

A program involving the use of hand tools was imported by Gustaf Larsson from the Hus Sloyd or home-craft movement of Sweden and established in 1889 in Boston, Massachusetts as "Sloyd." Charles A. Bennett and James P. Haney of New York City were instrumental in 1894 to promote a program of "Manual Arts" that originated in England under the leadership of Thomas Carlyle, John Ruskin, and William Morris.

Manual training students produced abstract exercises in wood. Sloyd students copied models. The "manual arts" era focused on skill, design, and utility. A combination of these elements may be found today in the industrial arts courses of most secondary schools in the United States.

Many refinements have evolved, however, since 1876, 1889, and 1894. One of these concerns a claim for the "general" value of "industrial" arts, or of a program to implement the expanding technology as contrasted with the "trade" or even the "vocational" values
which grew out of the efforts of the Committee for the Promotion of Industrial Education,\textsuperscript{2} and the passage of the vocational or Smith-Hughes Act of 1917. Many of the historic concepts held by the early teachers of Manual Training, Sloyd, Manual Arts, or Trade Training have been repudiated mainly because they have not kept pace. False precepts of formal discipline and faculty psychology which they favored have been discarded in favor of better established doctrines.

Industrial arts education is an American idea. It was first called to the attention of educators by Butler, Richards, Russell, and Bonser at Teachers College, Columbia University. Richards was a strong advocate for and a leader in the promotion of "industrial" types of education. He introduced the term of "industrial arts" in 1902 and was very sensitive to the educational implications of the industrial revolution, even in the face of the classical tradition. Dewey also sensed this and reaffirmed\textsuperscript{3} his early beliefs concerning shop work as follows:

When one bears in mind the social environment of the Greeks and the people of the Middle Ages, where such practical activities as could be successfully carried on were mostly of a routine and external sort and even servile in nature, one is not surprised that educators turned their backs upon them as unfitted to cultivate

\textsuperscript{2}The name was changed in 1917 to the Committee for the Promotion of Vocational Education.

intelligence. But now that even the occupations of the household, agriculture, and manufacturing as well as transportation are filled with applied science, the case stands otherwise. It is true that many of those who now engage in them are not aware of the intellectual content upon which their personal actions depend. But this fact only gives an added reason why schooling should use these pursuits to enable the coming generation to acquire a comprehension now too generally lacking, and thus enable persons to carry on their pursuits intelligently instead of blindly.

It is evident that Froebel influenced Butler, Dewey, and the others, as did Plato, Comenius, Locke, and Rousseau. The industrial subjects were the center of the curriculum in Dewey's "Chicago School."

Bonser caught the idea of the need for a broad pattern of learning activities which would guide or orient the student in the American way of life. Although it was several years before Bonser published the text of his concept of industrial arts, his direction in New York of the Speyer School, was influential in unifying the units of work in the elementary school.

Richard's student, Clyde A. Bowman, can be credited with promoting one of the early "exploratory shops." Industrial arts was considered to be an elementary school subject at this time and was

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4See also Harry G. Good. Education Through Work. Epsilon Pi Tau, Inc., Columbus, Ohio, 1943.


used as a teaching method, whereas manual training was thought of as a secondary school subject. The junior high school curriculum, developed after 1910, absorbed elements from both of these early concepts. Industrial arts was accepted, but very slowly, and not universally until well after World War I.

There have been many modifications in the techniques and practices followed by the early teachers. Object lessons, organic education, individualized instruction, projects, textbooks, recitations, exercises, experiments, jobs, units, and other terms identify the progress noted by a cursory survey of the changes in the curriculum.

Much progress can be identified in the history of education during the past half century, but rarely has a bold step been taken in making a new departure from accepted practices. Even so, industrial arts teachers are not consistent as regards their philosophy and practice. Some of the confusion stems from a lack of scholarship as well as an intermixing of theories of secondary education.

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with those of industrial arts, e.g. The "unit" vs the "composite shop," the "operation unit" vs "general study," the "general" vs the "bread and butter value," the "demonstration-imitation" vs "guided learning activities," etc.

One intent of this dissertation is to discover what changes in the organization of teacher resources will be required if industrial arts education is to make its full contribution to the junior high school curriculum. Another purpose is to propose a method for organizing materials that will assist industrial arts teachers to develop units that will reflect technology.

Limitations of the Study. Industrial arts in the elementary grades provides the experiences of the general program of child growth and development and is not considered to be a "separate" subject. Industrial arts in the secondary school, however, is a separate subject and taught by a specialist. Inasmuch as this is an initial study of the use of resource units, it appears advisable to confine the study to that school level where industrial arts is commonly identified, namely the junior high school.

It is outside the limits of this study to develop or suggest a complete program of industrial arts for the secondary school.

It is designed rather, to develop a pattern and an example for curriculum development that will be consistent with the intent of the resource unit concept. The study neither sneaks for all theories of industrial arts education, nor for all theories of secondary education. The study is further limited by the assumptions and the definition of selected terms which follow. In addition to these, the study is based on a frame of reference and is limited to one theory of secondary education.

Assumptions. Four basic assumptions are identified and were developed during the planning of this study as follows:

1. Need. Many problems\(^\text{11}\) have been selected by industrial arts graduate students, but the basic considerations of nature, direction, substance and organization have been neglected. These needs or issues must be faced, and especially those concerning a program that will reflect technology.

2. Philosophy. American public education favors the ideals of a democratic way of life. Teachers determine what, when, where, and how learning activities are to be sponsored, but it is fair to assume that they do not permit the latitude of democracy that

\(^{11}\text{American Vocational Association. } \text{Studies in Industrial Education. } 1010 \text{ Vermont Street, Washington, D. C., 1949.}\)
that they enjoy with a supervisor or administrator. This assumption is not to be interpreted as favoring "child-centered" schools, or is it a repudiation of a pre-conceived curriculum plan suggested by a specialist. Rather, research and cooperative interaction are suggested as representing and implementing "democracy," as an American ideal.

3. Value and Application. An important value of this study should be to assist teachers of industrial arts to find an answer to the problem of planning that will be consistent with: the purposes of general education, the needs of adolescents, and the concepts of industrial arts education. The study does not pretend to encompass all theories. Some modification is expected.

4. Method. Educational theory has gone far ahead of practice in the case of industrial arts education. A study related to the analysis of values and the projection of a program for industrial arts is largely philosophical. A better term is synthetic

research, or a study which synthesizes other research, and which modifies findings in terms of the problem. In this instance, the study becomes empirical in the best sense. The three research methods used are philosophical, synthetic, and empirical or deliberate. Each is valid and has been adapted to the needs of this dissertation.

Special Terms. Many words used in educational literature have different meanings from those generally understood by the layman. Unless specifically stated, the terms used in this study have been defined in the Dictionary of Education. The definitions have been derived in some instances from extensive study of an etymological nature.

1. Adolescent Needs. This concerns those elements which are required by adolescents for healthful growth, to maintain a psychological balance, to make an optimum contribution to society, and to enjoy their waking hours. These elements have reference to needs discovered by studying the adolescent in his environment and are of a biological, as well as of a social nature.

2. Curriculum. This refers to the program and units of learning provided by an agency of society, such as the home, church, school, and community. A curriculum in this case refers to all those educative activities that are sponsored by the school.

3. **Education.** This involves the process of continuous reconstruction of experience,\(^\text{14}\) which adds to the meaning of experience, and which increases a person's ability to direct and control experiences that result from later activities.

4. **Experience.** Synonymous with learning, "experience" is when a person's active and passive activities continue until the action and its consequences are joined in perception. Experience is the interaction of the person with his environment through activities which have relationship, and are more than mere activity of doing and undergoing. Experiences are of at least two types: direct and incidental.

5. **Industrial Arts.** This was defined by Bonser\(^\text{5}\) as follows:

   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.

6. **Learning Activities.** This refers to one or more acts that end in a perception of relationships, the degree of which is determined by maturity or background.

7. **Learning Unit.**\(^\text{15}\) An organization of meaningful activities or experiences planned, developed, and culminated to meet the needs of adolescents in some broad problem area of living.

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\(^\text{14}\) John Dewey. *Democracy and Education.* p. 89.

\(^\text{15}\) Adapted from Paul R. Klohr. *A Study of the Role of the Resource Unit in the Curriculum Reorganization of Selected Secondary Schools.* Graduate School, The Ohio State University, Columbus, Ohio, 1948.
8. **Problem Area.** A block of curriculum time assigned to some grade level and devoted to the needs and interests or wants of pupils in a technical society that is also a democracy.

9. **Resource Unit.** The definition of this term, first used in 1938, is now widely accepted, although frequently modified. A resource unit describes, "a survey, analysis, and organization of the possible resources which a teacher might utilize in planning, developing, and evaluating a learning unit."

10. **School.** This is the agency of society that assists in the guidance through experience of each new generation to understand and participate in the activities of effective living.

**Methods and Techniques.** Seven distinct phases are employed by this study: **First,** the nature of the inquiry was identified through professional reading and critical thinking. **Second,** an initial survey of educational literature was made to validate the tentative problem. **Third,** a bill of particulars and working bibliography were established. **Fourth,** a comprehensive search and interpretation of the literature were made concerning the problem. **Fifth,** a tentative plan and hypothesis of the study were established. **Sixth,** a number of guiding principles and criteria were established to

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develop a resource unit for industrial arts at the junior high school level, and then to develop a sample resource unit which would illustrate their application. Seventh, a resource unit was reported and evaluated.

The general nature of the study is philosophical, in that the results and proposals are theoretical and will require modification since in the realm of educational theorizing, completeness of investigations is seldom possible. Specifically, the study followed these research techniques:

1. Documentary, - to provide background information, to establish definitions of selected terms, to provide a framework for the study, to examine previous related research, and to derive criteria for developing resource units for industrial arts.

2. Analysis, - of selected state courses of study in industrial arts, of resource units prepared for other curriculum areas, of theories of secondary education, of theories of industrial arts education, of content studies of industrial arts, and of methods used to report proposed content of industrial arts courses.

3. Personal inquiry, - through visits to selected school programs, and in conference with professional associates at national, regional, state, and local conventions and conferences.

4. Pooled Opinion, - of graduate students in industrial arts at San Francisco State College, who have enrolled in seminars to discuss
the philosophy, development and use of resource units, and of
graduate students at The Ohio State University and The Stout In-
stitute.

5. **Application of Criteria.** - by evaluating the sample resource
unit.

6. **Reasoning.** - during the wide reading of literature bearing
on the several aspects of the problem and in reaching generaliza-
tions from particular cases where data had been provided by research.

7. **Synthesis.** - of previous research related to the frame of
reference, of proposals for a junior high school curriculum, and of
proposals for the role of an industrial arts program in the secondary
schools.

**Related Research.** One bulletin,\(^7\) has been published to "serve
as a basis for further study and development of resource units in
specific industrial arts areas, i.e. wood, metals, electrical, and
graphic arts." This was prepared to implement the planning of educa-
tion in Wisconsin. It was suggested by a previous bulletin.\(^8\) No
other research directly concerned with this problem has been reported,
and a comprehensive search indicated that none was under way.

**Plan of the Dissertation.** The first two chapters serve as an
introduction to the problem and as a working hypothesis. Chapter II

\(^7\) *Wisconsin Educational Planning Program. Curriculum Bulletin

\(^8\) *Wisconsin Educational Planning Program. Resource Units in
the Curriculum Program. Bulletin No. 5, Madison, October, 1945.*
is necessary in view of conflicting viewpoints regarding the basis for secondary education, and thus for industrial arts in the schools.

Chapter III deals with the junior high school, its origin and growth, its functions in secondary education, plans for curriculum content and organization, the adolescent as a junior high school student, emerging curriculum patterns, and is summarized with certain implications for an industrial arts program.

Chapter IV concerns industrial arts education in American schools. The origin of the curriculum area is identified from documentary sources and the growth and expansion period is discussed as background information for an interpretation of practices used in the selection and organization of units of work for industrial arts courses. The conditions suggesting a new departure in planning industrial arts units are outlined and the bases of an industrial arts program are stated as criteria for selecting learning activities.

Chapter V introduces a resource unit and establishes guiding principles as well as a check list for its development. These were based on the principles used for developing, the resource unit. A check list or evaluative instrument was prepared for use by teachers.

Chapter VI combines the data from previous chapters and develops a resource unit entitled, Books. It includes an especially rich
set of data identified in nine special appendices, and the procedures to be followed in implementing and evaluating a learning unit in the industrial arts program.

Chapter VII concerns the implications of the study for industrial arts teacher education and in-service programs. Additional research has been suggested by this initial study, and these problems are listed. The final chapter summarizes and concludes the dissertation, including a set of nine recommendations.
Chapter II

HYPOTHESIS OF THE PROBLEM

Civilization today is an accumulation of the heritages of the past plus the many advancements of science and industry. The school is an agency of and for society. Society has established a way of life and the school improves and perpetuates this way of life. Four questions appear:

1. What of the individual?
2. What of the social pattern?
3. What of the economy?
4. What of the school?

These questions must be answered before this study can be accomplished. Before educational literature and previous research could be used in this study, it appeared necessary to evaluate interpretations given to these questions by others.

Overview of the Hypothesis. History records that societies establish patterns and values of living. History also records that the mode of life is either democratic or authoritarian with variations. Society develops certain operational practices for maintaining itself. Some of these have included: means of exchange for goods and services, methods of production, methods of communication, systems of records and computation, systems of government, and provisions for education. It is the latter problem that concerns this study in a free society.
The responsibility for education has shifted from the primitive home, then the tribe, next the guilds, possibly the church and the state, to society itself. The role or function has changed from training for survival to education for citizenship and wholesome living in an involved technology of free people. In general, youth are or should be educated to maintain and improve such a society.

The following viewpoint is representative of a philosophy of secondary education but with modifications and interpretations necessary to the problem of this dissertation.

**Nature of the Individual.** The highest form of life is human. The human organism is living in interaction with its environment. As with all organisms, man has needs in order to live and grow, and must satisfy them. Man and his environment are dynamic. Man's problems are, therefore, centered in society and this is man's most severe test. This is true because living means mastering and improving one's self and one's environment.

The individual has intelligence represented by an ability to think reflectively and to solve problems. The degree of intelligence is variable, but it may be improved by education. Society

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1Joseph Justman. *Theories of Secondary Education in the United States*. Four theories are described: **Humanism** (p. 55), based on the writings of Butler, Foerster, and Kandel; **Social Evolutionism** (p. 5), compiled from Bagley, Judd and Morrison; **Social Evolutionism** (p. 33), based on the writings of Briggs, H. R. Douglass, and Spaulding; and **Experimentalism** (p. 44), derived from Childs, Hopkins, Dewey, and Bode.
expects the individual to use his potentialities to solve problems and to learn the objective method of science. Living implies that man is in continuous activity.

The individual should be self-directive. Intrinsically established goals provide a motivation for satisfying interests, wants, needs, and ideals. Human behavior is purposeful. The individual is a constantly changing and growing organism seeking to live with a dynamic environment. Formal schooling in theory, is the flux which enables the individual to weld his experiences together. The individual is successful to the extent that the consequences which are achieved through the management of his own experiences are favorable. By continuous formulation and realization of purposes or goals, the individual changes his behavior. A narrowly conceived goal tends to limit the possible meaning that can come from experience, and may limit its future realization in consequence.

Experiencing is learning. It takes place through active and passive participation in a significant unit, or according to Albery, 2 "the physical, intellectual, and emotional aspects of behavior are inseparable." The objective is to guide the individual to develop better methods of learning from his experiences. Learning is governed by the meanings which have been established from

2Albery, op. cit., p. 53.
relationships growing out of past experience. Certain activities are of a non-learning nature, but become experience at a later time if a relationship between present and past activity takes on meaning.

Learning is a process in changing a behavior pattern by individuals seeking to adjust to disturbances which have upset their equilibrium. This process of interaction between man and his environment is experience and both gain from it. The environment is improved according to Leonard\(^3\) and the organism regains its equilibrium for the continued experiencing, adjusting, and changing.

It is held in this study that a basic concept of learning involves integration. Consequently schools cannot plan any type of an "integrated curriculum." However, the learning purposes may be articulated with the problems of living, and such plans should provide for the integration of learning or experiencing. In view of this interpretation, it is increasingly clear that goals motivated by command, compulsion, or compromise, do not contribute to effective learning. Rather, intrinsically motivated interests, living needs or problems, and social issues or problems are readily accepted and provide for effective learning through experience and reflective thinking.

**Social Elements.** Persons of all ages seek to achieve the good life. The American people have established a republican form

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of government and promoted a democratic way of life to bring about a balance of harmonious relationships between the individual, the social order, and environment. Democracy in this sense means the social condition which provides individuals of diverse capacities with a full opportunity for self-development. This means recognition of the individuality of each member of the group, but it does not relieve the individual from rethinking and reestablishing his way of life for the benefit of himself and the orbit in which his actions and the environment are in harmony.

Democracy is a human value and not a requirement for existence. It is an elective process for individuals to live with each other in a socio-physical setting. As such, it is a process of social action and consequence. The process can contribute most to the good life when it includes: determining purposes, formulating plans, devising means of development, evaluating results, and selecting new purposes based upon relationships which come through experience. This makes for normal and continuous change in the way individuals live, for better or worse, as determined by intelligence acting to satisfy needs and problems through experience. 4

Democracy provides freedom and encourages improvement which will bring about better living for the members of society. Some

would use the schools to indoctrinate pupils to a socialized rather than to an individualized society, and to a collective rather than to a personalized society. Democratic living relies on the method of science to establish change, but democracy is a political ideal and scientific experiment will not necessarily establish its validity. Democracy is practical, and many gains can be cited from the fields of economic, civic, and human relations to foster it. However, life values which stem from race, cultural, religious, and moral codes, limit as well as contribute to the democratic way of life.

Nature of the Economy. Such things as the above are constants. The challenging aspect of the hypothesis of this study, therefore, concerns the ever changing environment or economy. Man had to work from dawn to dusk only a few generations ago in order to survive. But society today has become mechanized and man is enjoying the fruits of technology to the extent that even the average citizen is "richer" in both life and substance that the greatest kings of old.

Dewhurst and many others have supplied the data that describe this progress. For example, only one hundred years ago, the muscles of man and domestic animals together supplied some 94 percent of the

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energy produced, whereas today the situation is reversed and they are actually estimated to be producing only some 4 percent of the total as per the following excerpt or quotation:

<table>
<thead>
<tr>
<th>Dates</th>
<th>% Human</th>
<th>% Animal</th>
<th>% Technol.</th>
<th>Billion EPH</th>
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<tbody>
<tr>
<td>1850</td>
<td>15.4</td>
<td>78.8</td>
<td>5.8</td>
<td>1.0</td>
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<tr>
<td>1900</td>
<td>10.5</td>
<td>51.7</td>
<td>37.5</td>
<td>31.3</td>
</tr>
<tr>
<td>1920</td>
<td>5.7</td>
<td>20.8</td>
<td>73.5</td>
<td>145.0</td>
</tr>
<tr>
<td>1960</td>
<td>2.4</td>
<td>1.3</td>
<td>96.3</td>
<td>471.6</td>
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With the advent of atomic energy, the above extremes will become even greater and man's role both as a beneficiary as well as a manager of his destiny, may be all that he and the school can comprehend, let alone master. Even so, his opportunities are far greater, his pay higher, his work shorter, and his leisure greater.

Of the more than 63 million job holders in the United States, by far the largest single group is that comprising 17 million industrial workers. This represents more than one-fourth of the total number of job holders.

One very great industry in the United States is responsible for many of the achievements of the technology, namely the graphic arts or printing industry. Some facts regarding this industry are important in this dissertation since Chapter VI is illustrative of the use of these in the modern junior high school curriculum.

Printing employees make up one of the largest occupational groups of the United States. It ranks third in the number of plants and fifth in the size of its annual payroll. There are approximately
35 thousand printing establishments in the United States with nearly 800 thousand employees. In addition there are many thousands of graphic arts employees in state and federal offices, in other industries, in business and the professions. It is hard to imagine what life would be like today without the graphic arts. There would be no books, no art reproductions, no newspapers, and countless other printed items which are now considered absolutely necessary. It can be said that "printing affects everyone from the cradle to the grave." Yet this industry, which has been called "the art preservative of all the arts," is often taken for granted, and even ignored by the schools.

Role of the School. The school is a part of an organized system of public education. It is sponsored by society to supplement incidental learning opportunities provided by the environment. But, society in general has a meager or immature background of experiences in the area of educational relationships and must depend upon specialists or teachers and administrators to represent its educational plans.

Non-specialists in education have failed to recognize the diverse needs and capacities of individuals. Normal schools, teachers colleges, and universities have been seeking to improve the preparation of school personnel through the process of interaction. Some
would have the schools make man what they would have him to be and would seldom attempt to make man what he is capable of being. Others would make society what has been best, not what society can best become. Another group desires to teach what they want taught, not what society needs, wants, or requires to solve its problems.

With this preface of hypotheses, it is possible to present the role of the secondary school in a representative republic, which is at the same time a technological economy, somewhat as follows:

1. The school concerns the continuous reconstruction of pupil experiences in a dynamic technological environment.

2. The school contributes to the improvement of society by helping students to derive meaning from vicarious activities outside the school.

3. The school implements the ideals of the culture pattern in its administration, curriculum, methods, and extra-curricular program.

4. The school transmits the experiences represented by human knowledges, skills, values, and ideas, to students as their maturities permit.

5. The school helps the pupil to distinguish truth from propaganda, regardless of origin.

6. The school has faith in the individual to solve his problems of life regardless of intelligence and economic factors. It must
guide individuals toward their best possible role in life, and transmit this faith to others.

7. The school uses the objective methods of science by indicating the nature of truth.

8. The school assists students to discover and extend their interests and abilities, to meet their special needs as adolescents and future adults striving to improve their way of life.

9. The school teaches pupils to become intelligently self-directing persons orientated to their civilization in such a way that all may participate effectively as intelligent and social human beings.

10. The school should sponsor organismic learning activities and units.

These roles for the school are in terms of an interpretation of the nature of the individual, the meaning of the social order, and the nature of the economy. Certainly, the role of the school cannot be stated in this manner by the Humanists who contend for an aristocratic and classical society, or by the Social Evolutionists and Social Realists, who emphasise the importance of society more than the individual. It would also be stated differently by persons who propose that the role of education is indoctrination.

7Justman. p. 401
and that knowledge is settled and permanent only to be passed on to succeeding generations by "subjects." The true purpose of education according to Spears, will perhaps never be found if the schools serve society honestly, because the goals shift constantly with the shifting economy.

The United States is now emerging into a vital era where the real challenge is to produce the fruits of the machine so cheaply and efficiently that they move almost automatically into the hands of the ultimate beneficiary, to support universal secondary as well as elementary education, and to profit by the fruits of research. This era: Machine,- Electronic,- Atomic,- Push-button,- or Air Age,- envisages the making of a greater volume of goods than has been produced before in the history of mankind. It calls for a system of production, distribution, consumption, and recreation which will enable all individuals to consume an equitable part of the output. Such a pattern for the "good life" requires the education of individuals for the purpose of the placing of the results of science and technology into general practice so that all may benefit.

Role of Industrial Arts. An adequate program of industrial arts should be developed that will provide learning activities which stem from the economy and which result in the good life. Such a

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procedure of planning by the rank and file of industrial arts
teachers has failed to mature. Research has provided the basis
for discovering the diverse capacities of pupils in schools and
the methods for guiding learning. Teachers are responsible for
the curriculum and one valid device to achieve this is called a
resource, as well as a major teaching unit. Such is the concern
of this dissertation.
Chapter III

THE JUNIOR HIGH SCHOOL MOVEMENT

The territorial expansion, population growth, and resulting social changes in the United States during the last half of the nineteenth century and now especially during the first half of the twentieth century, have created many educational problems concerning the growth of children in a rapidly evolving technological society. Many experiments were attempted during this time to provide better educational opportunities. Wide variations with respect to curriculum, financial support, qualification of teachers, and administrative plans resulted for implementing the elementary and secondary school program.

The National Council on Education in 1892 recommended that some high school subjects could begin in the elementary school, and that six years of elementary school might accomplish the same results as an eight year school. This proposal was approved in 1899 by the Committee on College Entrance Requirements of the National Education Association. Other reports by subject specialists recommending the reorganization of schools had influence and created new problems in articulating elementary, secondary, and higher education.

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According to the findings of Strayer, Thorndike, and Ayers between 1900 and 1910, many high school students quit school before graduation because it was inadequate to meet the needs of students other than of those few who were preparing for college. The school population continued to increase beyond the capacity of the buildings. Superintendent Bunker of Berkeley, California proposed a plan for redistributing pupils within a six year elementary school, a three year "introductory" high school, and a three year senior high school. A "Junior" High School was established in Columbus, Ohio in 1910.

Development of the Junior High School. The number of these schools established in the United States after World War I was phenomenal. The increase was caused by a need for more school buildings to house an increasing school population. This generalization is drawn from the number of junior high schools created. There seems to be a difference in opinion as to the reason for the increased holding power of the schools. The intentions of early educators supporting the junior or "introductory" high school were expressed in three functions: (1) to provide a wider range of orientational subjects, (2) to hold children in school for a longer period of time, and (3) to save time in education.

As teachers and administrators experimented with the junior high school, its possibilities and value increased. Also, important were the number of problems created, such as: how to promote
students, and how to combine general and special content for those who must drop out of school. There were many contributing factors to the new functions for junior high schools during the period from 1910 to 1925 such as: *The Junior High School* by Briggs in 1920, Brewer's guidance formula, the passage of the Smith-Hughes Act, publication of the "Cardinal Principles of Education," Dewey's *Democracy and Education*, the advancement of the "project" as a method for organizing and presenting content, experimental schools, the "IQ" testing program, World War I and many other factors.

No one reason has been singled out for the rapid adoption of the junior high school movement. There have been pronounced changes in the total educational pattern since it appeared in 1910. Among some of the more important changes are the increasingly large number of children staying in school longer, the decreasing emphasis upon vocational specialization before high school graduation, the changing or evolving curriculum patterns of the senior high school, social-economic conditions, modification of college entrance requirements, and the attempts to use sociological and psychological studies as a basis for reorganizing the secondary school.

**Functions of the Junior High School.** These have been clarified largely by Briggs, Koos, Smith, and the Commission on the Curriculum of the American Association of School Administrators. Many of the functions named in contemporary literature are
modifications of earlier pronouncements. Still others have been added and assumed by teachers during forty years of experience with the junior high school movement.

It is not proposed to list all of the factors and events of the period between 1925 and 1950 which have affected the junior high school, because many of these are included in a recent statement by Gruhn and Douglass as follows:

**Integration**

To provide learning activities in which pupils may use the skills, attitudes, interests, ideals, and understandings previously acquired in such a way that these will become coordinated and integrated into effective and wholesome pupil behavior.

To provide all pupils with a broad, general or common education in the basic knowledges and skills, which will lead to wholesome well integrated behavior, attitudes, interests, ideals, and understandings.

**Orientation**

To lead pupils to discover and explore their interests, aptitudes, and abilities, as a basis for decisions regarding occupational opportunities.

To lead pupils to discover their specialized interests, aptitudes, and abilities as a basis for present and future occupational decisions.

To stimulate pupils and provide opportunities to develop a continually widening range of cultural, social, civic, and recreational interests.

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GUIDANCE

To assist pupils to make intelligent decisions regarding educational opportunities and to prepare them to make educational decisions.

To assist pupils to make intelligent decisions regarding occupational opportunities and to prepare them to make wise decisions.

To assist pupils to make satisfactory mental, emotional, and social adjustments in their development of well-adjusted personalities.

To stimulate and prepare pupils to participate as effectively as possible in learning activities so they may reach the maximum development of their potentialities.

DIFFERENTIATION

To provide educational facilities and opportunities, suited to varying backgrounds, interests, aptitudes, abilities, personalities, and needs of pupils so that each may realize the aims of education most economically and completely.

SPECIALIZATION

To provide increasingly for learning activities designed to prepare pupils for effective and satisfying participation in the complex social order.

To provide increasingly for learning activities designed to prepare pupils to adjust themselves and contribute to future developments and changes in the social order.

These statements comprise the functions for any level of public education in terms of the viewpoints expressed in Chapter II.

At most, these functions are points from which teachers,
administrators, and students may depart in developing the learning units found in and out of the schools.

A curriculum which results from the interpretation, sponsorship, and modification of such functions will produce a pattern of trends. Grubb and Douglas, among others, list ten trends that appear significant:

1. Correlation between subjects.
2. Fusion of related subjects.
3. Integrated or correlated courses.
4. Pupil participation in curriculum planning.
5. Organization of courses of study into larger units.
6. Relation of the curriculum to real life activities.
7. Preparation for effective home living, including intelligent consumption.
8. Preparation for intelligent citizenship.
9. Postponement of both college preparatory and vocational studies.
10. Depart from a number of differentiated curriculums and courses.

Note in the list above that the trends are in terms of curriculum change, i.e. changes in the pattern of the activities that provide an experience program. The sequence, scope, and administration of the junior high school curriculum influences the implementing of these functions. The responsibility of providing
learning activities that will satisfactorily meet function and
trend has been delegated to the teachers concerned.

Implications for Adolescents. The curriculum movement which
began in the early 1930's created a demand for more detailed in-
formation on adolescent needs than was available. This demand
became more critical as teachers and curriculum specialists attempted to correlate the published lists of "adolescent needs"
with a subject-centered curriculum. "Schools have always claimed
they met the needs of youth . . .," yet the expression "needs of youth," was vague and meaningless until a statement was made con­cerning how these needs could be determined. Several procedures
have been tried. Leonard identified these as: (1) study adoles­cent growth to determine the factors and forces involved in the
process, (2) analyze the culture by empirical reasoning or sub­jective analysis, and (3) interview youth in school. 

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3Leonard, op. cit., p. 205.

4See also: H. S. Dimock, Rediscovering Adolescents: A Study

H. A. Murray, Exploration in Personality. London, Oxford
Press, 1938.

National Education Association, Education Policies Association.
Education for All American Youth. Washington, D. C., 1941.

L. A. Menefee and M. M. Chambers. American Youth. Washing­ton D.C., American Youth Commission, 1938 for an annotated review
of about 2500 youth studies.
Alberty, in discussing the procedures involved, includes four: philosophical, case study, check list or questionnaire, and the interview. The student of psychology and education should be aware of the limitations of research techniques by which specifications for "student need" curriculums have been devised. Noticeable too is the ambiguity of many plans which have failed to clarify the frame of reference by which certain substitutes appear to have been validated.

Many persons have attempted to give direction to the high school curriculum by studying adolescents. Examples are, needs for functioning as an individual, for psychological completeness, for other personal-social relations, and for understanding the world. Or, for those that determine motives, means, qualities of experience essential for behavior.

5Alberty, op. cit., p. 62.
6Ross Mooney. Problem Check List. Columbus, Bureau of Educational Research, The Ohio State University, 1940.


Studies of adolescent needs have been made and procedures established to guide teacher groups desiring to make a detailed study of adolescent behavior in their communities. More than one writer has concluded that data obtained by a particular study may be changed when the same techniques are employed to study a group of adolescents in another community. Such statements appear to add strength to earlier proposals for meeting needs of individuals and revealing the false guides which sponsored the "standardization" movement. Such data substantiate the ideas of Dewey which led him to define "an experience" and to explain that two students might engage in identical activities, with each having an unrelated experience because of their differences in experience and maturity.

There are many trends which characterize growth patterns of children. These are valuable to teachers and serve as a point of departure to study students in a community. Literally hundreds of suggestions have been made to reorganize the structure of the curriculum of departmentalized subjects and extra-curricular activities.

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10 See Albery, *op. cit.*, p. 71. Also, *How Children Develop*. A report of the Faculty of the University School, Columbus, The Ohio State University, 1946.
Emerging Curriculum Patterns. Traditional fields of knowledge serve to illustrate curriculum patterns. These have been derived from the classics, the arts and the sciences. New subjects have emerged as they were analyzed. In some instances two or more subjects of the curriculum have been combined to make time available for these new subjects. Others have been dropped. The formation of clubs and interest groups has been another major factor. Time has been provided even during the school day for such groups to meet.\footnote{Over 400 hundred clubs were found to exist in 210 junior high schools. The number in any one school ranged from fifty to less than eight. See Gruhn and Douglass, op. cit., p. 35.} Certain of these activities, for example, the school newspaper, have emerged finally as a recognized school subject.

Research and experimentation with the secondary school curriculum have produced certain new content studies some of which, such as in the practical arts, have been drawn from the ever expanding technological economy.

The subject-centered curriculum is probably less desirable than one which is experience-centered, even though arguments against newer arrangements of activities possess validity. What appears to be lacking is adequate provision for an organization
of learning activities. An arrangement of time allocation during the school day has been suggested in order to strengthen the arguments for an experience-centered curriculum. This plan for a secondary school curriculum is adapted from a time distribution plan found satisfactory in the elementary school where the day is divided into blocks of time to serve general and special needs of pupils with ample provision for some of the newer subjects. The problem of suggesting learning activities to carry out the functions of education appears crucial as this plan of time allocation or curriculum organization grows.

Bonser recognized the needs of adolescents even before 1915. He visualized the need to plan learning units in terms of a common learning program. His suggestions were based on a thirty-hour school week, each being equal to one unit. Bonser suggested 18 common units and 12 special units. In other words, 12 hours a week would be provided for five groups of elective courses: academic, industrial, commercial, agricultural, or household. One should note, however, that during the previous six years of school

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all of the experiences were supposedly centered in the studying of industries. This plan was in keeping with prevailing functions of the school and in terms of the popular development of curricula to be followed by homogeneous groups. The "experience-centered" curriculum was highly regarded by Bonser. The content he suggested was based on cultural recapitulation which centered in needs of man for seven kinds of services: food, clothing, shelter, tools and machines, records, and utensils. His concept\textsuperscript{14} for a balance of direct and vicarious experiences was well stated in 1923 by the following:

\begin{quote}
Whatever there is of genuine value in any plan for industrial arts may be included under the organization upon the basis of usage. That emphasis which is most important in realizing the purposes of the study should be most prominent in determining the organization. It has been stated that the only justification for industrial arts lies in the desirable changes in behavior which it will bring about in one's selection, use, and enjoyment of the products of industry; in one's participation in the securing of just and fair treatment for producers in industry and for consumers of products; and in one's taking an intelligent interest in the processes, products, and workers in industry as changes in these result from the use of new materials and methods.

Whatever will contribute toward bringing about desirable results in behavior along these lines is to be regarded as worthwhile. We do not hesitate to take any good features from any organization proposed, even if most of the features of such an organization are fundamentally inadequate or poor. The weakness of most of the organizations for the study of the industries has been in their overemphasis of some relatively unimportant phase and their neglect of other more important phases.
\end{quote}

\textsuperscript{14}Bonser and Mossman, \textit{op. cit.}, p. 28.
It is only since about 1910 that there has been any definite attempt to study the industries in schools. One might become quite proficient in the use of hand tools and be able to make creditable pieces of furniture without learning anything of the ways in which furniture is made in factories. The old forms of work represented a subject without a subject matter other than hand technique. It was a system of manipulative activities for the development of either skill or self-expression, and it had no body of thought or appreciative content.

As the study is here conceived and presented, industrial arts includes a body of ideas and meanings, and of interpretative and expressive activities, attitudes, and habits. The outcomes of the study are found in the operation of these experiences in the control of one's conduct whenever conduct relates to the use and enjoyment of industrial products, to the regulative problems of industry, or to the interpretation of new methods of production.

Seldom has a contemporary writer included this statement in a discussion of the industrial arts program. Yet, Bonser provides the true basis for industrial arts for adolescents. Adolescent rather than adult needs received consideration during this period. Only rarely, however, did the industrial arts program reflect this frame of reference. Rather, many leaders of this area expressed negative comments toward the evolving curriculum. It is possible, because English and the social studies formed the so-called "core"

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15 The writer made a documentary survey of the professional articles appearing from 1930 to 1940. The industrial arts profession was most concerned during these years with the standardization of the program, with the problem of how many "areas" a teacher could teach at one time, with how to get more of the student's time, and so on.
in some of the early attempts at curriculum reorganization, that
the above attitude should prevail as Douglass\textsuperscript{16} points out:

There is no apparent basis for concluding that
general training depends so heavily upon English and the
social studies. There is little evidence to support the
assumption that improvement in expression, in silent read-
ing, or in the taste for good literature is in direct
proportion to the time spent upon these activities.
There is, moreover, a growing tendency to question the
assumption that the social studies constitute the only
vehicle, or indeed the chief vehicle, by which the goal
of citizenship may be reached.

But subject teachers, including those in industrial arts, have not
grasped the concept enunciated here which was to group all socially
significant and potentially desirable learning activities into
a common core. Only incidentally has it been observed that required
courses, i.e. requiring outside preparation, have emphasized special
rather than general learning activities. That the "newer\textsuperscript{17} subjects
contribute to the general education of adolescents, has been held

\textsuperscript{16}Aubrey A. Douglass. Programs of the Cooperating Secondary
State Department of Education.

\textsuperscript{17}See Gruhn and Douglass, \textit{op. cit.}, Chapter I, p. 155, who
list home economics, industrial arts, business, art, physical and
health education.
lightly or with reservations. It is evident from a comprehensive study of the literature that curriculum and secondary school specialists are without data concerning how industrial arts can contribute to the emerging pattern of the junior high school.

Content and Organization. The junior high school curriculum has developed from elements of the elementary and high school curriculum, and from elements of the classics and the arts. Fields of knowledge have been grouped into preparatory and vocational patterns. The establishment of junior high schools and their expanding role in education has complicated existing problems

[18] Seldom have writers on secondary education referred to industrial arts. In the case of The High School Curriculum, edited by H. R. Douglass, Chapter 28, written by Walter H. Magill, industrial arts is allied with industrial education and includes on page 573, the following confused statement.

The term "industrial arts" apparently came in with the availability of subsidy for industrial education. The term commonly used before that time for school shop work was "manual training." The term "industrial arts" is unfortunate because it suggests that the content of instruction should be drawn from industry and tends to distract the attention of curriculum constructors from the extensive and highly important general education objectives, quite unrelated to industry, which the work can serve.

This statement is then followed on page 576, with the following contradictions:

The specific objectives of instruction in industrial arts should be derived from an analysis of the jobs or operations in the respective fields. The subsequent formulation of the course of instruction should follow the procedure already described for vocational courses.
of curriculum organization, content, and procedure. It seems impractical to reiterate from the voluminous primary and secondary sources the "why and how" of contemporary curriculum practices. It is important to state that existing conditions have resulted from experimenting with the curriculum in order to derive plans which appeared to lessen the problem of articulating the curriculum of the elementary and secondary school.

Leonard\(^1\) points out that neither statistics of subject enrollment, changes in course offerings, nor changes of course outlines, are sufficient to describe the evolution and reorganization of the secondary school curriculum. These additional factors need to be included: local and state boards of education, financial support, clarification of purposes, selective admission and retention policies, static curricula, increased enrollments, the co-educational system, compulsory attendance laws, cloistered ideas regarding the schools, application of scientific management practices. Other factors are a changing economy dependent upon the production and application of mechanical, chemical, and atomic energy, an increasing need by society for a technically sophisticated population and the resulting demands on the educational system.

\(^{19}\)Leonard, *op. cit.* p. 54.
Briggs observed\textsuperscript{20} that the junior high school curriculum might become one of habit and tradition unless teachers, the program of studies, and courses of study were carefully examined in terms of the changing purposes of education. He also believed that neither revolutionary change was necessary nor that existing subjects needed to be discarded.

\textbf{Implications for Industrial Arts.} In previous sections of this chapter and in terms of the philosophy presented in Chapter II, there are several implications for the subject field known as industrial arts. This section amplifies these briefly for the purpose of tying together this dissertation, which concerns the preparation of industrial arts teachers for the junior high school.

1. Public schools are operated by society and should be representative of the culture involved. Since this is democratic and technological, the industrial arts activities should reflect these items and not just the village trades as in the past.

2. The orientation function of industrial arts has had a tendency to mean only limited exploration. Teachers have failed to recognize the greater value of exploring the many ramifications of technology. And in terms of how people spend their waking hours, it may be more important to have a worthy hobby than to "explore" a very few occupations.

3. The previous functions emphasize the pupil. It is highly probable that the industrial arts program has erred in trying to fit students to the program rather than to develop a program for the pupils. Industrial arts has tended to exclude girls, even though they live in and use the technology too.

4. As new content is established in industrial arts, so also is new content in the other subjects and vice versa. It should be obvious that the school day and number of years in school have not been increased in proportion to the teachable content and more new content can be included only by reorganizing the time allocated to learning units which are most desirable.

5. Social changes in the United States during the past half century have created an environment quite different from the one in which boys were expected to master the elements of some trade or occupation before they graduated from high school. Educators with vision have now outlined a greater potential for the industrial arts program than many of these teachers have realized.

6. Adolescent needs cannot be determined by adults in committee meetings, or out of context with the environment of the adolescent. Individual instruction which industrial arts teachers claim to use, should mean more than "individual re-teaching" after group demonstrations. It means establishing and guiding learning that is purposefully established for individual growth.
7. A subject which a school may require does not make this subject fit the category of general education, as currently defined. Nor are subjects, which have been added to the school offerings during the past half century, to be classed as special areas of the curriculum, as currently defined.

8. The emerging curriculum provides an opportunity for industrial arts leaders to develop their ideas. The statements of teachers concerning the amount of content involving other subjects included in industrial arts will be useful in developing learning units.

In brief form, and somewhat empirically, a basis has been suggested for industrial arts activities in the emerging junior high school curriculum. These observations are valuable in pointing out that the junior high school is a level of education which draws its support from society and that the needs, problems, and interests of adolescents living within a democratic and technological environment provide a sound basis for the curriculum.
Chapter IV

NATURE OF INDUSTRIAL ARTS EDUCATION

Industrial arts education is an American idea. The origin of it stems from a rich but confusing heritage, but its program is now found from kindergarten through the university as having both immediate and deferred values. As is probably true of all school subjects, the time is here when a more effective program is required.

Phases in the Evolution of Industrial Arts. Several types of "handwork," "shopwork," and "drawing" became well established in all levels of public education in the United States during the last quarter of the nineteenth century.

There appear to be four origins. First, was the "Manual Training" program which expanded rapidly in the high schools between 1880-1910. Second, was the use of seatwork activities in the elementary schools with the subsequent adoption of the ideas of Froebel. Third, was the "Sloyd" and then the "Manual Arts" era, which intended to improve the first phase by combining skill, utility, and beauty. Fourth, was the "Industrial Arts" movement fostered by Charles H. Richards and Frederick G. Bonser at the

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turn of the century which called for the program to reflect in-

Dewey said of the Chicago school, which he directed from 1876
to 1903, that constructive activities were used for the following
reasons:

We must conceive of work in wood and metal, in
weaving, sewing, and cooking, as methods of living and
learning, not as distinct studies.

We must conceive of them in their social signifi-
cance, as types of processes by which society keeps
itself going, as agencies for bringing some of the primal
necessities of community life home to the child, and as
ways in which these needs have been met by the growing
insight and ingenuity of man, . . .

Charles H. Richards of Teachers College, Columbia University,
had this to say in 1901:

The problem of the elementary school today is, I
conceive, to make the life of the school more real;
more an epitome of the kind of thinking, feeling, and
doing that obtains in real life; more a reflection of
the actual life outside of school walls. . . .

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2 Vaughn and Mays. Content and Methods of the Industrial Arts.
p. 32. These authors refer to the Russian or abstract stage, the
Swedish Sloyd Stage, the Arts and Crafts Stage, and the industrial
stage, all as manual training. This is not correct since each of
the stages named had a different function and result, were centered
in a different theory of education, and used widely different
methods. Also each was well established in other countries before
being introduced in America.

3 John Dewey. The School and Society. University of Chicago
Press, 1899, p. 11.

4 Charles R. Richards. Taken from Bennett, op. cit., p. 452.
On the side of the pupil, handwork is a medium of expression in terms of form, color, and material. In its relation to life, it is essentially a means of interpreting art and industry.

In this Richards pointed the way for an articulated elementary school program. Dewey's viewpoints regarding the social aspects of education and a critical attitude toward formal discipline in the common school are noticeable in a later statement by Richards when he suggested a new name for the curriculum area.

It is evident that during the last few years a fundamental change in our attitude toward the proper content and aim of constructive work has developed, and the question now faces us with new meaning and redoubled force. Not only have we now far greater need for a new designation, but the nature of the point of view into which we are growing would seem to present a thoroughly national basis from which to derive a term of real significance. The gist of this change of view is the fact that we are rapidly leaving behind the purely disciplinary thought of manual training. As long as this idea formed the cornerstone of our creed, as long as constructive work represented in our minds simply an instrument to train the mental powers through the hand, manual training constituted at least a workable and fairly suggestive title.

We realize now that our old attitude toward the disciplinary values of constructive work was psychologically indefensible, and that there is no such thing as the training of general powers through special exercises, but at the same time we are beginning to perceive the immense content meaning of our field, and the whole question assumes a different aspect. We are beginning to see that the scope of our work is nothing short of the elements of the industries that are fundamental to modern civilisation.

We are facing the question as to whether we shall continue to devote our attention to miscellaneous and more or less meaningless projects, or whether we shall seek to develop an insight into the basic industries of our time and a knowledge of some of the steps through which these have reached their present form.
This editorial is quoted to support the opening statement of this chapter that industrial arts education is an American idea, even though certain aspects, such as Russian tool instruction, Swedish project forms, English arts and crafts, the German methods of Froebel and Herbart, and Pestalozzi's object lessons in Switzerland, are all of foreign origin. "Handicraft" is apparently more representative of what has developed in American schools as one type (i.e. the recreational) of Industrial Arts, but which is too limited when compared to the concepts held by Richards and Bonser at Teachers College.

Expansion of the Program. There appeared to be a growing demand that creative and artistic elements be included in industrial studies when Richards published his historic editorial in 1904. This idea was reflected by Bennett in the naming of a new building at Teachers College in 1894 called The Macy Manual Arts Building. Several teacher education programs were getting under way at this time in normal schools, in private schools and universities throughout the United States. The demand for teachers far exceeded the supply and indicated a rapid growth of what was then "the Manual Arts Movement."

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6 For an account of this development see Bennett, op. cit., Chapter 22, "Teacher Training and Associations of Teachers."
The Influence of Bonser and Others. Frederick G. Bonser was appointed to the faculty of Teachers College, Columbia University in 1910. He brought with him a rich background of experience in preparing teachers at normal schools in Washington and Illinois. He had spent a year at Teacher's College during 1905-6 and knew Professor Richards and Dean James K. Russell. Bonser was a student of Dewey, and although not an industrial arts teacher, regarded this subject as a valuable one for boys and girls.

Bonser was influential in changing "manual arts" from a more or less mechanical or "doing" activity into a content area for learning and as a method for teaching. With Dean Russell in 1909-1911, he established the industrial-social theory which was implemented at the Speyer Demonstration School of Teachers College, Columbia University, where emphasis was placed on the educational and guidance values of industrial studies rather than on the earlier disciplines of the hand, head, and eye, or as the making of "useful" articles. Industrial arts was justified by Bonser on the same basis as other subjects. His methods of procedure in teaching were to establish problematic situations involving subject matter content from all fields of knowledge. Bonser's teaching at Teachers

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College and the Speyer School attracted an international audience but little information of general concern to the hundreds of shop and drawing teachers employed by local schools became available until 1923.⁸

There is evidence that Bonser felt the impact of the organised efforts of the National Society for the Promotion of Industrial Education and the passage of federal legislation to aid vocational education. Of this he wrote: "There are two kinds of studies of the industrial arts, each having its own purpose,—vocational and general." The general purpose for the studying of industrial arts is from the point of view of the problems, opportunities, and obligations of the consumer and the citizen. It concerns itself with such common daily needs of life as the selection and use of food, clothing, utensils, household furnishings, and other products of industry; and to such problems of citizenship as call upon us to share in the regulation of industry so that all employees, employers, and citizens may receive just and fair treatment." Accordingly industrial arts was defined by the following widely quoted definition:⁸

The industrial arts are those occupations by which changes are made in the forms of materials to increase their values for human usage. As a subject

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

An earlier definition of industrial arts by Bonser was "the distilled experience of man in his adaptation of natural materials to his needs for creature comfort to the end that he may more richly live his spiritual life." Naturally, there were various types of physical facilities made available for this new subject as well as different methods of shop organization.

The application of the Russell-Bonser plan for a series of general contacts with industrial materials in a composite laboratory at the high school level for general education purposes was slow to emerge.

Warner appears to express a valid reason for the lack of interest displayed in the philosophy by Bonser at the Speyer School from 1913 to 1923. It was his conclusion that:

With the subsidies of the Smith-Hughes Act in 1917 there developed a tremendous impetus for vocational education. While this subsidy paved the way for vocational programs, it did not correct the malpractices and whimsical assumptions of manual training and work of this

9These variations are recorded in various issues of the Manual Training Magazine, The Industrial Arts Magazine, and early issues of Industrial Education, which serve as the only available history of content, facilities and methods of the early period of growth and expansion.

sort that had gained momentum on every hand. Furthermore, some of the more promising men who had been working in these older fields were suddenly transferred to new positions made possible by the Act.

It was inevitable that industrial arts as such should experience an age of professional darkness that persisted until the post depression awakening. It simply had no sponsorship, and there was a general let down on the part of the leadership in general education as a result of the subsidy. People forgot that there was a whole program of general education which could not and did not need to be subsidized. The result was that many programs simply coasted along and many are still doing so.

The most tragic incident of the period was in the depths of the depression, when all of the "manual training" as such, in the public schools of Chicago was summarily abolished in the spring of 1933. While this was done in order to make way for a much more valid type of work, the incident was but one of many in the interim from 1917 to 1933 that help define it as a period of darkness for showwork of the types belonging in the program of general education.

Over two hundred college programs for preparing industrial arts teachers have emerged from the Association formed in New York City in April 1884. Almost 2,500,000 students are enrolled in courses taught by 30,000 specially prepared teachers, and although recent research points out many weaknesses of the industrial arts program, more expansion may be expected when these are corrected.

The junior high school movement had only slight influence on the emerging industrial arts program, except to add

11Bruner, op. cit., p. 190. See also Callan, op. cit.
to the complexities of the existing confusion. In general, teachers were able to establish that the program was well adapted to the functions of the junior high school and to the Cardinal Principles of Education. This seemed to justify a continued expansion of the standardization of content, methods, and tests which originated before 1918, and is still considered important by conservative, if not lagging elements of the profession.

Organization of Learning Units. There were at least four distinct practices for selecting and organizing industrial arts curriculum units for the schools in 1915. The series of abstract exercises mostly in wood, remained from the manual training era, although this practice was slowly extending into metal work, mechanical drawing, and even printing. From the Sloyd system remained the making of graduated useful articles involving simple tools and teacher made models. From the manual arts and the arts and crafts movements evolved construction work and the making of somewhat bulky items of Mission and other types of furniture. With the innovation of the "farm-project" in 1908

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13 Material drawn from these sources: Manual Training Magazine, Industrial Education, Industrial Arts Teacher, Industrial Arts and Vocational Education, and Vocational Education.
came the false assumption that city children needed to have a comparable opportunity to repair things. Almost anything from the home or the school was repaired and of this work Bonser apparently visualized that the philosophy he and Dean Russell had expressed earlier was being misinterpreted and wrote of this practice as follows:

While the plan of using repair work holds to the idea of learning by doing, there is much doing with very little learning in many of the problems. The values of the school as an institution lie in the organisation of the acquired experience of the race so that its contributions may be gotten altogether more quickly than by the slow process of learning only by doing.

As motivation and means of approach to principles, conditions, problems, and values, practical repair work has a real place. For illustrating principles in application, and clarifying and objectifying ideas, it has value. It is not that the work is not worthwhile and exceedingly important, but that it is so limited to problems which, in themselves, are so relatively unimportant. In that repair work omits a consideration of principles, offers little opportunity for organizing ideas, makes nothing of the very important relationships... it would seem but a partial and inadequate solution to a problem so rich in possibilities. The work should be connected with the large and important body of thought and experience in the fields of industrial design, industrial science, industrial geography and history, and industrial practices as found in the world of large industrial production of the present time...

One may easily infer that the philosophy of repair work is that it does not matter what boys do in these eight or ten hours a week just so they are busy at manipulative work.

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The professional literature for industrial arts teachers includes many statements by the critics of Bonser and of others accepting his philosophy. Yet, his definition is widely quoted. Bawden said of them:

The attitude toward vocational education by Bonser and Dean Russell of a constructive attempt to establish a sound educational basis for industrial arts is in striking contrast to the attitude toward industrial arts assumed by contemporary leaders of the newly evolving (Smith-Hughes) vocational program. These latter were outspoken in their disparagement of everything advocated by those who were endeavouring to promote industrial arts in general education. Using the then (1920-25) current term, manual training, as a substantial synonym for educational oxymoron, the appointed apostles of the new 'honest-to-God' vocational education ridiculed and derided manual training, in all its forms and all its works. . . . In their ignorance, they sought to eradicate manual training from the schools, naively supposing that this consummation was indispensable to and would assure their own success.

A survey of literature of this period indicates that Bawden's statement was weak. Furthermore, teachers whose speciality centered in the industrial aspects of living have appeared to be at odds regarding the general and special areas of "industrial" education, and much discussion has appeared for the purpose of pointing out differences and similarities. Yet, to date there has been little progress in differentiation of the curriculum content, methods, and evaluation.

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In contrast with the analysis of trades and occupations, Warner has directed a series of content or resource studies. These have been modified to meet changing conditions but follow the guide lines suggested by Bonser.

A revival of Bonser's ideals appeared in two publications of the 1930's. The first in 1934 by Warner and others, was widely circulated. The second in 1937, also by Warner and others, was circulated to all parts of the world and has been reprinted several times. However, it is fair to state that the philosophy of education and of industrial arts education expressed therein have been passed over lightly. The "activity-movement" had lasting effects.

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16For an exceptionally outstanding content study see Milo T. Oakland. A Study of Graphic Arts Content. M.A. thesis, The Ohio State University, Columbus, Ohio, 1935.


development of the industrial arts program found in junior high schools, a series of principles can be identified to serve as bases for a junior high school program.

**First Principle.** The industrial arts program should contribute to the role of the school for developing a wholesome personality.

Learning takes place by the whole person interacting with the whole environment. The experiencing which results cannot be singled out as autonomous behavior changes sometimes identified by the psychological factors of attitudes, habits and skills, or by such social traits as honesty and cooperation or as knowledge and understandings. These are included in a pattern of wholesome development which stem from the direct and vicarious experiences planned by the teacher and student, in terms of valid objectives.

**Second Principle.** The learning activities in the industrial arts laboratory should reflect the technological economy, production and executive management, and the material heritages of the culture, and should encourage pupils to become increasingly adaptable in profiting from an industrial society.

The hand economy of a century ago required a vastly different variety of learning activities than is possible in today's environment which is characterized by such titles as the "machine," "atomic," or "transistor" age. Statistics from the industry producing electronic equipment show how the frontier of a new and unbelievable world is being expended, as the total production expanded from $300 millions of dollars in 1939 to a possible $7,000 millions in 1955.
The necessity for learning activities which will assist students to understand and cope with such a changing environment appears as a major role of education at each level. Teachers in some areas of the school are well equipped to guide learning activities which will implement objectives designed for this purpose, and industrial arts could be one of these if teachers would create the environment and the learning activities which are more representative of the present and future than the past.

Third Principle. Learning activities should reflect society as it is found outside the school, namely a technology that is also a republic.

The industrial arts program has seldom reflected these characteristics, largely because the early industrial arts program based on faculty psychology, formal discipline, and training for manual occupations. Teachers in the vanguard of a movement for implementing this principle have had two tasks: (1) to examine and demonstrate new possibilities, and (2) to improve on the status quo.

Fourth Principle. The material advances identified by the artifacts of man, from the most primitive to the technological, should be represented in the learning activities of an industrial arts program, especially as the advances in technology have made for better living.

Industrial arts is a cultural subject in the broadest sense. Technology has been responsible for the economy and many phases of the good life. Through advances in photographic techniques, television, radio, transportation, as well as an increasing
interest in the potentialities of men, society has a greater interest in the artifacts of the past. In a similar way, the mechanical appliances in the home and the community have created a need for greater appreciation and understanding of the material culture. The need is universal because all ages and both sexes are affected by the objectives and problems which result. Industrial arts, under such conditions, becomes most important. Living in such an environment increasingly demands learning activities designed to expand technical sophistication and improve consumer literacy. It would be false to assume that incidental learning or vicarious experiences will either suffice or provide the opportunities for growth now required of the schools.

**Fifth Principle.** The industrial arts program must not lag in the professional nature and extent of its offerings, but should express the historic procedures which man has followed in reaching his present pinnacle of progress.

The forging of iron was an important economic activity when the horse worked for man. All communities were dependent upon the skills of the village blacksmith to maintain and improve living. But as society profits by the advancing technology, the schools must follow suit. It is necessary for the industrial arts teacher to understand the purposes and especially the conditions which caused certain of the historic procedures in the development of industrial arts. There are many indications that teachers fail to plan learning units which express the historic development
of technical work, emphasizing instead the operations required. Such a narrow point of view is but an indication of professional lag and should be expanded to include activities that will materially assist students to gain better control over their present and future environment.

**A New Departure in Planning Units.** Rarely has the literature revealed the beginnings of a program for junior high school boys and girls that is in harmony with the framework of this study. Segmented courses such as woodworking have passed as industrial arts. Learning has been focused too narrowly on the development of psychological elements. Predicated needs of technical performance have been emphasized with little regard for social needs, each out of context with adolescent needs. The dualism of vocational and general education have been needlessly confused by those seeking to include industrial arts in the term, industrial education. Courses of study have been generally conceived as though all teachers and students had identical backgrounds.

In summary, the following practices may be helpful in pointing out the historic trends noted in the literature examined:

1. Historically, industrial arts courses have been based on either the analysis of a trade or of an occupation.

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\[21\text{Vide, Chapter II.}\]
2. Pupils have been trained in groups with individual attention only as required to safeguard a technical operation.

3. Emphasis has been placed on pupil progress by charting the range and frequency of operations performed.

4. Students have been supplied and have worked from drawings furnished by the teacher.

5. Accuracy of technical performance has been the key if not the sole factor in evaluating student progress.

6. Students have made a standard set of projects in rotation.

7. Emphasis has been on making articles for personal use.

8. The technical skills of a teacher have been more important sometimes than his teaching skills.

9. The concept of formal discipline and transfer of training still prevail.

10. The aims of general education include the aims of industrial arts without being explicit about either.

11. Working from the simple to the complex has been emphasized without regard for other variables.

12. Out-of-class student preparation has been kept to a minimum and to a fault.

13. Handwork has been held in exalted esteem as developing skill and dexterity.

14. "Applied" design has been fostered but too frequently not in harmony with esthetic principles, and has depended upon expediency and teacher ability to a fault.
15. The project method has developed into a modified unit of work for the planning of industrial arts courses.
16. Consumer values have been talked but seldom achieved.
17. The commonly stated aims of industrial arts are largely hypothetical.
18. Wide sampling of incidental industrial work in a school shop environment has been considered valid orientation of a world at work.
19. Evaluation of the student has been in terms of technical skills and narrowly specific knowledges as compared to growth factors.
20. Teachers have assumed responsibility for providing learning opportunities with too little regard for community resources.

Only incidentally are studies of American industry included in industrial arts programs, as was the intent of Richards and Bonser. Rather the program has become highly specialized in terms of narrowly specific values. Industrial arts teachers have failed frequently to develop units of work which embrace adolescent needs and the philosophy of general education. It is common practice to refer to "industrial arts as general education" because the industrial environment concerns everyone.22

**Implementing the Departure.** The junior high school industrial arts program has been thwarted by the failure of colleges to exemplify the physical facilities and professional courses required by this program.\(^{23}\) The domination of woodwork and mechanical drawing is evidence that industrial arts activities have failed to keep pace with a soaring technology.\(^{24}\) It represents activities involving production, distribution, consumption, and recreation. "Technology is the way people do things."\(^{25}\)

Immediately after the Second World War, a group of graduate students at The Ohio State University, under the direction of William K. Warner, proposed "an industrial arts curriculum to reflect technology." This involved a staggering analysis of content because the entire technology had to be examined as a basis

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\(^{23}\) Louis John Callan. *Industrial Arts Teacher Education Program.* Dissertation, Ohio State University, Columbus, Ohio, 1952, p. 240.


\(^{25}\) Lynn White, Jr. "Technology and Invention in the Middle Ages," Reprinted from *Speculum.* Vol. XV, 1940 in *Readings for Contemporary Civilization.* Department of Social Science, North Carolina State College, Raleigh, 1950, p. 9, Unit II.
for the program desired. The concept was featured at the American Industrial Arts Association convention at Columbus in 1947 and planning groups in Philadelphia, in Florida, and elsewhere used the material. There has been too little use of this proposal, probably because of the status quo.

Units of work centering in aspects or "divisions" of the technology, such as power, transportation, communication, construction, and manufacture are already used in the elementary industrial arts classes where the learning units are integrated with the immediate and wider environment of the child. Many leaders in the industrial arts movement neglect to champion a philosophy that industrial arts activities must first enrich the total curriculum; second, orient children to their environment; and third, include discrete subjects of an industrial nature. Some leaders have contended that the subject-centered teaching units of industrial arts which come from the analysis of a trade, or from adult need, compare favorably with this philosophy, but this is not true.

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Baltimore Department of Education. *The Effect of Technological Development Upon Society.* Commission on Curriculum Revision, Baltimore, Maryland, 1940.

Wilber proposed a modification in current practices when he suggested this possibility:

When a group decides to study a given topic, the importance of such a study from the standpoint of objectives is first established. The class and the teacher then plan the method and means by which the study is to be made. As the study progresses, additional planning and evaluation facilitate the progress of, or point new directions for, the investigation. The whole unit thus becomes a cooperative effort in experimental learning.

But his book offered the industrial arts profession few proposals for breaking with tradition, in fact, this book promotes the continuation of many prevailing practices.

On the basis of the present inquiry it is possible to identify certain proposals. These are identified under three heads: (1) adolescent needs, problems, and interests, (2) a program to reflect the environment, and (3) the guidance of learning. From these should evolve a suggestive procedure for use by industrial arts teachers in implementing a balanced program reflecting the hypothesis of this dissertation. These are discussed in the following paragraphs.

1. Adolescent Needs, Problems, and Interests. These vary as individuals are studied in their environment and in consideration of their maturing experiences. Stated differently, there is

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evidence that a program based on "adolescent needs" which are determined by adults without a composite case history of each pupil is little advanced over a subject-centered curriculum.

The learning activities of adolescents should parallel desirable behavior changes. The following are typical:

a. Family and Community Life. Problems relating to its structure and functioning and to the role of the individual in using and improving family and community living.

b. Contemporary Cultures. Understanding various world cultures and their contributions.

c. Conflicting Social and Economic Ideologies. Problems of orienting the individual to cope with conflicting ideologies on the local, national and world scene.

d. Communication. Problems relating to the various modes of communication, their influence upon human welfare, developing skill in communication.

e. Resource Development, Conservation, and Use. Problems pertaining to the conservation and use of natural and human resources in relation to the enhancement of human personality at all levels.

f. Planning. Problems relating to the need for planning on the part of the individual, community, and state.

g. Science and Technology. Problems bearing upon the use of science and technology in promoting or destroying civilization:
the lag between technological "know-how," and its application to
the solution of human problems.

h. Interests and Hobbies. Problems pertaining to the role of
hobbies and other interests, developing occupational skills and
many appreciations of a cultural nature.

1. Public Opinion. Problems relating to the influence of
various factors upon the molding of public opinion, propaganda
analysis, and the role of emotion.

j. Education. Problems pertaining to the role of education,
securing an education: the maintenance, extension and improvement
of educational agencies at all levels.

2. A Program to Reflect the Environment. Several factors are
involved in the present environment: historic, economic, geographic,
institutional, and esthetic. These suggest positive proposals, if
three questions are answered: First, how did the environment come
about? Second, what is its nature and substance? Third, what
should be done about it?

3. The Guidance of Learning. Wilber's plan represents one
proposal for teachers interested in meeting the needs of adolescents,
and enriching and extending their interests. Such a procedure is a
departure from the inso facto authority implied in state courses of
study for industrial arts programs and textbooks on teaching indus-
trial arts.
Implementing the Proposals. A major purpose of this dissertation has been to gather data supporting a thesis that industrial arts teachers should develop resource units for use in comprehensive curriculum units of the junior high school. The development of resource units is considered to be a technique for curriculum planning, since such a reservoir of suggestions assists the teacher in making positive proposals to students. Resource units are deemed essential in eliminating "inspiration of the moment" assignments and untoward activity. A group of suggested problem areas for titles of possible resource units is listed below. This is far from complete and is included for the purpose of indicating the range of possibilities.

GENERAL ORIENTATION

The Industrial Arts Program
We Learn How to Plan Learning Units
Democracy in Our Industrial Arts Laboratory

HOME AND FAMILY LIFE

Planning a Home Workshop
Family Homecrafts
Making Presents at Home
Home Repairs
Home Workshop Dates Can be Fun
How Americans Are Housed
The Foods Industry
SCIENCE AND TECHNOLOGY

Precision: A Measure of Progress
Transportation Progress
Handicraft vs. Manufacturing
Technology and Invention in Retrospect
Life in the Electronic Age
Man and Techniques
Technological Problems for the Future

VOCATIONAL ORIENTATION

People and Their Jobs
What are My Natural Gifts and Abilities?
A World at My Doorstep

HOBBIES AND INTERESTS

Let's Have a Hobby Fair
Merit Badges Can be Earned
Crafts are Profitable Hobbies
Modelmaking is Fun
Model Railroading

COMMUNITY LIFE

A Community Industrial Survey
The Triangle of Plenty: Men, Money and Machines
New Industries for Our Town
Markets for the Products of Our Town
Since Our Town Was Incorporated

CONTEMPORARY CULTURES

Handicrafts of the World
A Feast Without Food
New World Horizons by Jet Propulsion

CONTEMPORARY U.S.A.

Industrial Materials from Abroad
Trade and Industrial Missions Spread Goodwill
Junior Achievement, U.S.A.
Trade Fairs Around the World
COMPARING SOCIAL AND ECONOMIC IDEOLOGIES

Comparing Democratic and Totalitarian Social Plans
The American Free Enterprise System

PERSONAL VALUE SYSTEMS

Industrial Personnel Organization
Public or Private Ownership of Utilities
Inventors and Their Environment
Since Hammurabi: Codes to Live By
It Takes All Kinds of Workmen

COMMUNICATIONS

Books and Mankind
Tom Tom to Electrons
We Tell the World Our News
Communications in Business and Industry
Magazines from 'Round the World
Drafting: A Universal Language
The Printed Word
Advertising: Its Mechanical Reproduction

RESOURCE DEVELOPMENT

Rendering Nature More Amenable to Human Use
Promoting the Economy of Human Energy
The New World of Synthetics
Are We Sophisticated Consumers?
From Mines to Metals
Forest Products

PHYSICAL AND MENTAL HEALTH

Crafts are Therapeutic
Hobbies for Sick Days

PLANNING

What Do We Gain by Planning?
Standards: What are They?
Learning to Plan for Ourselves and Others
PUBLIC OPINION

Electricity and the News
Let's Publish a Newspaper
Does the Public Accept New Ideas?

EDUCATION

Why Schools?
The Education of Famous Inventors
What Schools are Like in Other Lands
Where Can We Find an Answer?
Work as Education

An extensive number of learning units might be derived from these topics, depending upon their purposes and scope. These would draw from the content studies which have been made and from the analysis of industrial technology. Social, personal, economic, and industrial problems would be identified in the various units. And in general, more content would be drawn from such topics as the above than would be possible in the present curriculum.
Chapter V
DEVELOPING AND EVALUATING A RESOURCE UNIT

The search has been constant for determining the most effective method of teaching. Dewey used various occupations to develop the curriculum at the University of Chicago Laboratory School. His idea was to study man's fundamental relations to the economic world and the curriculum required both manual and intellectual activities.

Francis W. Parker, of the private school which bears his name in Chicago, early proposed a core of natural sciences to be supported by arithmetic, grammar, reading, spelling, and writing. Bonser's idea was for the curriculum to reflect industry and the wise use of its products. These proposals were in use when Collins developed the "project" method, when Bonser was evolving the industrial-social theory, and when junior high schools were first established.

While each leader and method has contributed to curriculum progress, there is further need to study the learning process, adolescent growth, social-economic trends, and the activities of out of school youth. Industrial arts has been influenced by most of these techniques including the textbook, individualized instruction, the "Morrison" unit (with its many ramifications), workbooks, homogeneous groupings, "projects" and the like.
The project approach paralleled the emphasis on trade and job or activity analysis and the standardization movement and spread with the early offerings in woodwork, mechanical drawing, electricity, printing, metal working, auto mechanics, handicrafts, and finishing to plans for a general shop, but there is little evidence that formal criteria were used to guide teachers in the selection and teaching of projects. "Boy appeal" was and still is the chief control.

Wilber explained the status of the industrial arts project in the following summary:

Projects are the material objects around which industrial arts activities are built. Their use has been a gradual development, but they are now an accepted vehicle for industrial arts teaching. They may be used in any one of three ways: assigned, individual or group choice. A combination of these methods is also possible.

A "good" project will meet most of the following criteria: it contributes to achieving the objectives of the program and course, it has interest, it is within the student's ability, it presents a challenge, it is well designed, it can be completed within a reasonable time, it is economical of materials, it illustrates one or more basic industrial or craft processes new to the learner, and it may allow students to work on a common problem.

This places the responsibility for learning on the selection and making of objects in a school shop. But, rarely has the mere

1Wilber, op. cit., p. 152.
doing of an industrial arts project stimulated the forces of self-
realization, or provoked the discovery of unsuspected gifts of
students to devise, create, invent, and plan. Grouping projects
or curriculum units in terms of materials is also deceiving as
regards the achievement of established junior high school functions.

Generally, in state courses of study for industrial arts,
woodwork, mechanical drawing, metalwork, and electricity are con-
sidered to be basic to the industrial arts curriculum. An ap-
parent justification is on the basis of defining "general" education
as comprising all those subjects which are not federally subsidised.
This meaning is all too obvious in courses of study which include
long lists of trade operations. The suggestions for vertical and
horizontal articulation of learning activities meeting the needs,
interests, and problems of adolescents in a free and technological
society are vague.

A common plan for organizing learning activities has been the
teaching unit. Here the emphasis is on the teacher imparting know-
ledge and skills, a sort of "pouring in" process. Yet there were
industrial arts leaders,\(^2\) who visualised units which provided for
closer articulation of learning activities than any found in the

\(^2\)William E. Warner and Others. *A Prospectus for Industrial
Arts in Ohio*. Ohio Education Association and the State Department
of Education, 1934.
the textbooks or teaching guides. By 1922, Warner had demonstrated
the possibility of meeting a variety of student needs in a single
class. The plan also provided the necessary physical setting for
a wide range of activities beyond those commonly found in the
traditional unit shops. A college dean publically championed the
theme that industrial arts should become the center of the evolving
core curriculum. This movement in industrial arts suggested the
need for a new device other than the teaching unit for assisting
teachers to gain the feeling of security as they were trained for
their role as teachers.

Origin of Resource Units. The expression, "resource unit" was
first used by teachers attending a summer workshop in 1938. They
found it desirable to add the prefix "re" to the recently innovated
source unit. The term was revived and has been emphasized since
1945. Resource units have been valuable to teachers in "core"
curriculum units.

Resource units originated with a small group of teachers con­
cerned with the reorganization of the high school curriculum to meet
the needs of adolescents. The development and use of resource units
has been accepted slowly. They are recognized as an accepted

3Harry S. Ganders. "Industrial Arts Must Lead," Industrial
Arts and Vocational Education. Vol. 18, No. 7, July 1934, p. 221.

Resource units were developed for the purpose of assisting teachers to plan for a variety of learning units which included activities foreign to subject-matter teachers. Industrial arts teachers faced a problem when the Laboratory of Industries concept gained recognition. They were confronted with the problem of teaching a conventional subject program without the necessary resources and preparation. In order to develop such a program, industrial arts teachers have found it expedient to select projects typical of specialized shop instruction and to rotate students in the areas available. Teachers resorting to studies of the industries have been accused of becoming academic because tool and machine skills appeared to receive less emphasis.

Historically, industrial arts was developed during the years of experimentation in the thirties and future refinements through research may reveal that a few imaginative teachers developed "resource units" naturally as they planned programs with their
students. However, it is unlikely that the steps required were visualised or employed.

**Basis of Resource Units.** The philosophy of the *activity school* appears in the concept of developing resource units. This movement in education gave preference to the time-honored subject-centered curriculum. The plans that are required to guide learning in an experience-centered curriculum differ from those used in teaching subject-centered units.

Teachers assigned to Laboratory of Industries programs, and problem-centered core curriculums which originated in the early 1930's, were among the first to note the need for a revision of popularized lesson plans, courses of study and teaching units.

Industrial arts teachers questioned during this study seem to lack comprehension of the possibilities for an experience-centered curriculum. Yet, these teachers are fully aware of the false assumptions which give strength to the continuation of the subject-centered industrial arts program. On the other hand, industrial arts teachers with few exceptions, are unwilling to develop an industrial arts program where their traditional subjects (mechanical drawing,

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5See the booklet prepared by industrial arts teachers in Wisconsin which *(ide, p. 18)* emphasizes the use of resource units in developing subject-centered programs.
woodwork, etc.) lose identity, or when a "pet-project" is eliminated from the course of study in preference to a learning unit emphasizing orientation to a technological environment. Neither do industrial arts teachers, generally, appear to respect the concept made popular by Hughes Mearns, that "every child has a gift," nor do they have any confidence in guiding learning activities outside of their own speciality. In contrast, there are hundreds of industrial arts teachers in rural areas throughout the United States who handle elaborate technical facilities in which the units are experience-centered regardless of state provisions.

A recent statement by Alberty of purposes for a resource unit, closely parallels the expressed purposes of courses of study for industrial arts teachers. These are to:

1. Furnish suggestions for materials, methods, activities, teaching aids, and evaluative procedures for building a learning unit.

2. Provide a means of helping the teacher organise materials so he can depart from the traditional use of the textbook as a guide in curriculum development.

3. Provide suggestions for the teacher to translate an educational philosophy into practice.

4. Serve as a guide in helping the teacher to include certain important values in the learning unit basic to education in a democracy.

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5. Sensitize the teacher to all of the significant problems and issues that have a bearing on an area of living.

6. Utilize the personnel resources of the school appropriate to the planning of a particular unit.

7. Conserve the time of the teacher.

8. Make it possible to have teaching materials available when needed.

The conflict between the "general education" aspects and the "special interest" aspects of the emerging curriculum is evidence that the industrial arts program of the schools can become involved in another "dualism" in public education.  

Characteristics of Resource Units. Recent books discuss the topic of developing and using resource units. The development of the topic leaves much to the imagination of an industrial arts teacher. It presents a challenge to professors of industrial arts in colleges where teachers are prepared. These units need to have a workable outline of specifications. This need increases as the industrial arts program makes its contribution to the general and special needs, problems, and interests of students.

Resource units have no common pattern. They are simply a reservoir of suggestions for teachers. However, they should be

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organised and should be functional. Most units are organised by
sections. The following titles of sections appear to be inclusive
of those recommended:

1. **Preliminaries.** The accepted practices of authorship
should be followed. These include: title page, preface, and table
of contents.

2. **Introduction.** A simple, but direct validation of the
relation of the unit to the curriculum. Emphasis should be placed
on the role of industrial arts and the unit to the general and
special interest areas of the curriculum.

3. **Philosophy and Objectives.** This section should establish
the principles for the sections which follow. They should amplify
the functions and outcomes of industrial arts education. The philo-
osophy of the school should be present. This frame of reference
should establish consistency in the unit. It can be used in a
series of units. Specific objectives for a particular unit can be
stated differently. Statements indicating the behavior changes
desired of students in understandings, attitudes, appreciations,
interests, habits, skills, and abilities are fitting.

4. **Content Study Outline.** Industrial arts teachers are sub-
ject-matter minded. It appears logical that a content study should
be included. In addition, an analysis of the various aspects of the
unit as implied by the title, should be included. Questions which students are expected to ask can be listed. Expository statements may assist teachers outside the field of industrial arts to vision and reflect the scope of the unit.

5. **Professional Bibliography.** References related to the scope of the units should be listed and annotated. Materials related to curriculum planning, the functions of industrial arts, procurement, housekeeping, industrial trends, personnel management, processes and techniques, factors of economics, and elements of design can be included.

6. **Suggested Learning Activities.** This is the most important section of the resource unit. Many variations now exist as this section is developed by teachers, but guidance has been provided. The suggested learning activities should be: organized, comprehensive, diversified, and accompanied by sufficient suggestions for action.

7. **Bibliography and Teaching Aids.** Include a complete listing of all teaching aids and references with procurement data and annotations.

8. **Suggestions for Evaluation.** Include a variety of techniques. This section should be consistent with sections 3, 4, and 6.

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9. *Lead-On* Suggestions. The industrial arts program which has evolved with the expanding technology offers unlimited possibilities for learning. Each resource unit should suggest many new areas or units for exploration and study. New units will be identified and this section can recommend and indicate possibilities of lead-on studies.

10. *Suggestions for Using the Unit.* By definition a resource unit is a reservoir of ideas or suggestions to teachers for the development of learning units with students. This section should indicate how this can be done. Special reference should be made to the problem of limited and meager instructional facilities.

An illustration of the application of these criteria for the development of a resource unit for studying the graphic arts industries of the technology follows in Chapter VI, and is titled, *Books.*

*Development of An Evaluating Instrument.* Criteria used in the development of resource units may be used to evaluate units.\(^9\) Those which were developed for industrial arts units are now repeated as criteria for evaluating resource units in industrial arts programs. Resource units are generally organized in sections. Each should be evaluated in terms of the consistency of one section with

another. This means that the evaluation is more philosophical than functional except that factors of consistency precede function. On the basis of these statements an instrument should be developed and is herewith presented to evaluate each section of the resource unit in sequence and in terms of three variables regarding the degree to which each criterion has been covered.

**Check List for Evaluating an Industrial Arts Resource Unit**

Check Column 1 if the Item is *Adequate*  
Check Column 2 if the Item is *Inadequate*  
Check Column 3 if the Item is *Undesirable*

1. Accepted practice of authorship is followed  
2. Reader is oriented to the unit  
3. Principles for the unit are established  
4. Unit outline is comprehensive  
5. References for teachers are included  
6. Organized, diversified, and comprehensive suggestions for learning are included  
7. Organized listing of teaching aids is present  
8. Evaluation techniques are included  
9. "Lead-on" studies are proposed and explained  
10. Suggestions for using the unit are explicit

This list is purposely simple and brief. At least three others were developed, then discarded. The first consisted of sixty-nine statements which were extracted from available sources. One example
reads: "A resource unit should be organized in such a way that it can be used easily by teachers." Another example: "The statement of scope of a resource unit should define the limits of the area of experience with which the unit deals, making clear the elements of opportunity." This type of criterion was too verbose.

A second instrument listed over one hundred points for the evaluator to check. It included such items as: "This section includes: Annotated list of books for student use, Annotated list of books for teacher use, Special reference books, handbooks, and catalogs, . . . ." The complex nature of this instrument, together with its detail of criteria, did not produce results when used as a guide.

A third approach was the listing of sixty characteristics of industrial arts units. These were placed under five headings: Format, Principles, Subject Matter, Use of the Unit, and Teaching aids. This instrument did not follow the sequence of the unit; however, it gave technical direction. These items should be used with the present check list because they amplify the general criteria and are in keeping with principles already established for the industrial arts program.

The check list and sixty points which follow are expected to provide all the data required by the evaluation and to encourage the improvement of resource units so appraised.


Subject Matter. Scope, Clarity, Sequence, Variety, Practice, Style, Construction, Finish, Use, Levels, References, Other Resources such as Films.


Additional points can be added to this listing. Such a practice will enable an industrial arts professor to summarize the content for a wide variety of resource units in industrial arts teacher education.
Chapter VI

BOOKS. A RESOURCE UNIT

The primary purpose of this chapter is to illustrate the use of the principles presented in Chapter V for the development of resource units in junior high school industrial arts programs. The example chosen is considered to be representative. It concerns, Books.

A second purpose is to demonstrate how the criteria presented in Chapter V may be used to project and evaluate such a unit, because the developmental process is considered to be a two-way affair: namely, formulating as well as judging the outcome of such a unit.

While the present example has been designed for the use of industrial arts teachers, it should be of value to other areas of a core-type curriculum because many of the general as well as the special interests of adolescent boys and girls are included. For example, the unit not only embraces the narrower or traditional role of printing per se in a junior high school, but many related personal, social, and economic problems in the larger context of graphic arts in which the industrial arts profession is or should be operating.
BOOKS
A Resource Unit for Industrial Arts Teachers
in Junior High Schools

DWIGHT W. NICHOLS

Of all the things which men can do or make here below,
far the most momentous, wonderful, and worthy
are the things we call books.

THOMAS CARLYLE

STATE COLLEGE
San Francisco, California
1955
CONTENTS OF THE RESOURCE UNIT

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A. NATURE OF THE UNIT

B. BASIC PHILOSOPHY
   The Individual
   The Social Pattern
   The Economy
   The School
   Industrial Arts

C. PURPOSES OF THE UNIT

D. BACKGROUND OF THE UNIT

E. GRAPHIC ARTS CONTENT (Check List)

F. SUGGESTED LEARNING ACTIVITIES
   Manipulative
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   Community Activities
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G. DEVELOPING A LEARNING UNIT

H. PUPIL-TEACHER EVALUATION

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J. APPENDICES OF SELECTED RESOURCES
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Section A

NATURE OF THE UNIT

This is a resource unit. It has been prepared especially for industrial arts teachers who employ the philosophy expressed in Section B which follows. The unit also contains many suggestions which will be useful for teachers in other fields. A resource unit is neither a course of study, nor an instructional unit. It is rather a reservoir of suggestions on which students and teachers may draw in planning learning units.

It is conceivable that when industrial arts is viewed narrowly as manipulative, home workshop magazines are full of suggested learning activities which could be listed or used as resource units. However, detailed observation indicates this concept or practice to be only partly true, and there needs to be some assurance that a project provides a maximum return in the form of student learning and growth before such ideas can be used. Furthermore, the making of an article is but one aspect of experience and learning, and although a skill may be developed, there are countless other outcomes possible if it is well planned and executed.

So long as the industrial arts program of the 1890's was secure in the mastery of skills and in the theory of formal discipline, neither the teacher nor the adolescent had any difficulty, or so they thought. All of the conditions for understanding were
assumed to be present in the child and the exercise involved. Repetitive manipulative activity led a pupil to become progressively more competent in trade types of skills. But, as the industrial arts program became enriched through emphasis on the social dynamics of the industrial environment, teachers found that students required experience in other relationships before industrial arts could be fully expressed and evaluated. Such is the perspective of the present resource unit on Books.

Section F identifies twelve types of activity and includes 33 specific suggestions for the development of the unit. The nine appendices contain an exceptionally rich variety of resource materials, all of which have been reviewed and selected for this purpose even including one set of items from foreign sources.
Section B

BASIC PHILOSOPHY

A resource unit always involves an individual, a social order, an economy, a school, and a program, so these are presented as postulates in the formulation of a basic philosophy.

The Individual. Personality and growth are considered to be the center of any educational situation. These include a variety of factors such as: interests, attitudes, habits, attitudes, skills, and certainly intelligence, that involve both the resource and the ultimate product of the school. Each of these variables must be identified and clearly understood as they evolve.

The individual's tendency to manipulate together with his curiosity concerning what things are and how they operate, provides a strong motive and means for learning, that must not be lost on the industrial arts teacher. There is a natural tendency on the part of every individual through life to investigate and to manipulate tools and materials and to perform in certain ways or patterns. Orientation to the environment and the economy involves such things. Learning through this type of interaction, in an ever-widening arena, is an obligation and an opportunity for the school, and especially so in an increasingly complex technological environment.
The Social Order. Man has tried many types of social or culture patterns of which a free society is generally believed to have produced the finest results for the individual. This in a nutshell is the outstanding point to be faced by the school in a republic such as America, because it is an institution that was created to foster the freedom intended.

This is of concern to industrial arts which flourishes in a free society and contributes richly to the culture pattern as defined by man's mastery of his material environment. As he advances, man should have experiences that will enable him to enjoy an ever finer status.

The individual who has learned to know style or design in books, buildings, rugs, pottery, furniture, dress and other similar things in common use, is prepared to make selections that an integrated or cultured taste tells him can supply life-long satisfactions.

Likewise, the individual who knows the various social forces, racial, political, historic, human, scientific and material, that have entered into the making of everyday things and into the creation of his social order, is stimulated to an ever fuller enjoyment of life.

The Economy. This concerns the result of free men's efforts and in this case is a vast technology which has resulted from inventiveness in the midst of great resources. Herein lies the
subject matter of industrial arts because technology involves the development, harnessing and exploitation of power. It has resulted in vast patterns of construction and manufacture, in phenomenal patterns of communication and transportation, and in countless services. Some 500 billion horse-power hours of energy are now produced annually in contrast to only one billion a short century ago.

Industrial arts is concerned with the production, consumption, and recreational factors involved in this vast new phenomenon in the world's evolution. An interesting and all embracing facet of this evolving situation concerns the graphic arts industry and its most significant produce, books, which is the concern of this resource study.

The School. This involves one of the greatest institutions of a free society. Its importance grows with the complexity of the social-economic order and its programs must reflect the society which it serves. Its curriculum will provide for individual differences on the one hand and a goodly measure of basic preparation for life in a free society on the other. It is considered that the school should:

1. Extend the process of guiding individuals through continuous reconstruction of their experiences while living within a dynamically evolving environment.
2. Contribute to the improvement of society by helping pupils to derive meaning from organized as well as vicariously achieved experiences.

3. Provide experiences, knowledges, skills, values, and ideals that are commensurate with the maturity of the pupils concerned.

4. Assist pupils to analyze human and social issues by examining conflicting practices objectively.

5. Demonstrate the methods of science in problem solving in order to avoid the vagaries and dissipation of whimsy, bias, propaganda, or emotionalism.

What of Industrial Arts? This can be best expressed in the development of a resource unit by quoting Bonser's famous definition of 1923 and Warner's comprehensive interpretation before the American Industrial Arts Association convention in 1947 on the occasion of his presentation of an industrial arts curriculum to reflect technology.

Bonser said that, "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.

Warner stated his position as follows:

1. 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.
2. **In Scope**, the emphasis at childhood levels is in providing the means for an integrated activity program, at early adolescent levels in providing an orientation program concerning technology, at later adolescent levels in providing technical programs and a sound basis for industrial-vocational education, 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, consumer and producer activities for all.

3. **Content** stems from the technology via socio-economic analyses and not by job or trade analysis of the commoner village trades of a century ago. Now, the subject matter classifications are conceived of as including: (a) power (tidal, solar, atomic, electrical, muscular, hydraulic, combustion); (b) construction (housing, public works, industrial, national defense, . . . (c) transportation (land, sea and air); (d) communication (mechanical, electrical, and electronic); (e) manufacturing, which includes the basic industrial methods of changing raw materials into finished products such as foods, textiles, graphic arts, ceramics, metals, woods, plastics, and leathers, similarly but broader in concept and application than has been developed in the so-called "general" shop of a generation ago.

4. **Methods** involve a full gamut including: work experience only as a means to an end, field study, planning, personnel organization, illustrative aids, conferences, creative expression, . . .

5. **Physical settings** as regards equipment and facilities must echo the principal elements of the technology; its development and uses of power, its transportation, its construction, including housing and home furnishings; its communication even including the use of such specialised techniques as radar; its basic types of manufacture, and the resulting services.

6. **Historically**, Industrial Arts is as old as parental training for survival among the primitives, but is intrinsically general as educational rather than vocational,
because it is a core subject and not necessarily directed at employment, any more than the general study of English composition is expected to result in journalism. Many other subjects such as mathematics, science, art, language, and certainly the social sciences, have long found Industrial Arts to be a valuable ally.

These conclusions or definitions are also based on the postulates identified and interpreted above, and constitute the basic philosophy of the program which involves the accompanying resource unit on, Books.
Section C

PURPOSES OF THE UNIT

There are several purposes concerning this unit on Books, which can now be listed. These are based on the contents of Chapters III, IV, and V and will be reflected in Section F. These purposes are to lead the student to:

1. Learn how books are published and distributed.

2. Understand the role played by books in a free society.

3. Appreciate the quantity and variety of human and natural resources used by the book industry.

4. Learn how to establish oneself as a contributing member of society.

5. Appreciate the heritages which have resulted from book publishing.

6. Recognise the need for a technically sophisticated population.

7. Feel a need for exploring graphic arts and other industries in the local environment.

8. Learn how this unit can provide wholesome recreational interests and hobbies.

9. Learn more about the tools, materials, processes, machines, and personnel required by the book industry.
10. Respect those persons of the past who contributed to the
development of the book industry, and those of the present genera-
tion who are developing new possibilities.

11. Develop habits and skills that are traits of a capable
printer.

12. Compare methods of printing and binding books.

13. Appreciate the role of printing in the development of
new frontiers.

14. Find interests related to the book industry in its widest
meaning.

15. Learn to appreciate the esthetic values of fine printing.

16. Discover new words and the role they play in the world
of ideas.

17. Eliminate faulty habits in using and storing books.

18. Learn to value accuracy in written communication.


20. Become aware of personal capacities and abilities.

21. Use facts from the history of printing to form conclusions
concerning the progress of civilization.

22. Understand the role of the printed book as a dynamic force
in the economic and social advancement of mankind.

23. Develop an understanding of factors to be considered when
books are purchased, and be guided by critical judgment.

24. Obtain career or occupational insight.
Section D

BACKGROUND OF THE UNIT

In the spread of education in Europe which was one of the principal characteristics of the Renaissance, the development of free discussion was greatly stimulated by the printing of books. While Gutenberg and also Coster are given credit for the invention of printing, it must be recognised that the introduction of paper from the Orient, and the use of boiled linseed oil in the manufacture of inks for printing, contributed richly also to the invention of printing from movable type.

Gutenberg was an imitator. He was interested in making money from the demand for copies of the Bible. Since it was tedious and expensive to hand-letter books, only the wealthy could afford the hand-lettered and illuminated Bibles produced by the scribes.

Printing helped to standardise language, and the influence of local dialects began to disappear. Definite rules were established for speaking and writing, and languages became expressions of nationalism.

The printing and binding of books changed very little during the first four hundred years after Gutenberg operated in Mainz. Hand composition characterized all printing. Then a series of inventions and discoveries transformed almost as if by a miracle,
the role to be served by books in the life of man. Machine com-
position, continuous paper making machinery, quick drying inks,
photography, color photography, lithography, rotary presses, mech-
anical folders, electronic controls, public libraries, book sellers,
publishing houses, and pocket editions are among the revolutionary
changes affecting this medium of mass communication. The era of
technological development was spurred by man's ability to com-
municate with a large and receptive audience.

It is possible in a similar manner to explain new improvements
to a large group and to expect more people to become interested in
solving technical problems. For example, the problem of distributing
enough ink on "office-type" offset presses has been solved by chang-
ing the size of the ink roll to the same diameter of the blanket
roll because many persons were made aware of the problem and hun-
dreds of inventive persons worked on the problem. The solving of
this problem will create others, but the answers should improve
living as well as the graphic arts industries.

The unit on Books, is directed to junior high school industrial
arts teachers. Their facilities will or should provide an opportu-
tunity for developing learning units concerning the book industry.
No less does the industrial arts laboratory provide the environment
to carry on suggested activities which deal with the historic develop-
ment of permanent records such as clay tablets, scrolls, illuminated
manuscripts, block prints, and the like. An interest in books
suggests a study of papermaking through the ages, or inventions related to books, or authors of books, or famous printers, or ink-making, or color and design, or illustration, or bookbinding, or photography, or book care, or even books for the blind. The book industry is inclusive and provides many leads to studying the graphic arts industry.

Paper, ink, words, illustrations, facts, interpretations, movable type, copy, proofs, printing presses, advertising, distributors, printers, publishers, artists, layout, salesmen, merchants, office workers,—all provide books, but they require money and management too. The list of raw materials, inventions and people required to produce "books," cannot be visualised unless it is experienced.

The scope of the unit on Books, has no subject boundary lines. The industrial arts laboratory should provide the facilities for guiding the development of such a unit as indicated by the content study check list of the graphic arts industries which now follows.
What now follows is a check list outline of the content of Graphic Arts. It is in twenty-three parts and should be used as a ready reference when reviewing the rich list of resource data identified in the nine appendices of the resource unit on Books.

A. BINDERY

1. Backing
2. Bookbinding
3. Boards
4. Covers
5. Collating
6. Cutting
7. Die Cutting
8. Edging
9. Embossing
10. Equipment
11. Estimating
12. Eyeletting
13. Finishing
14. Folding
15. Gumming
16. Indexing
17. Inserting
18. Inspection
19. Laminating
20. Loose Leaf
21. Mechanical
22. Mountings
23. Padding
24. Pamphlets
25. Perforating
26. Punching
27. Research
28. Ruling
29. Sewing
30. Stamping
31. Stapling
32. Supplies
33. Tipping
34. Trimming

B. COMPOSITION

1. Assembly, Make-up
2. Commercial
3. Equipment
4. Hand Composition
    a. Rules
    b. Mitering
    c. Mortising
    d. Spacing
5. Imposition and Lockup
6. Keyboard Linecasting
    a. Linotype
    b. Intertype
    c. Teletypesetter
    d. Maintenance
8. Metal, Type
9. Proofing
10. Monotype
    a. Caster
    b. Giant Caster
    c. Keyboard
11. Supplies
12. Trade Composition
13. Trade Customs
C. EDUCATION, SCHOOLS

1. Apprentice
2. Associations
3. Bibliography
4. College
5. Composition
6. Courses
7. Equipment
8. Guidance
9. Junior High
10. Lithography
11. Machine Composition
12. Objectives
13. Presswork
14. Production
15. Projects
16. Promotion
17. Research
18. Senior High
19. Standards
20. Teachers
21. Testing
22. Trade Extension

D. ELECTROTYPING

1. Estimating
2. Forms
3. Mounting
4. Ordering
5. Plastic Plates
6. Plating
7. Process
8. Research
9. Supplies
10. Wax Engraving

E. GRAVURE

1. Die Printing
2. Equipment
3. Ink
4. Negative Making
5. Platemaking
6. Presswork
   a. Sheet fed
   b. Roll fed
7. Research Statistics

F. HISTORY

1. America
2. Asia
3. Associations
4. Bindery
5. Canada
6. Books, Bibles
7. Colophons, Imprints
8. Composition, Type
9. Education
10. Individuals
11. Ink and Color
12. Intaglio
13. Lithography
14. Inventions
15. Letterpress
16. Miscellaneous
17. Newspapers
18. Paper
   a. America
   b. Europe
   c. Asia
19. Plants, Publications
20. Screen Process
21. South America
22. Terms
23. Type Casters
24. Zerography
G. INK
1. Driers, Drying
2. Color
3. Equipment
4. Estimating
5. History of Color
6. Kinds and Types
   a. Analine
   b. Fluorescent
   c. Gloss
   d. Gravure
   e. Litho
   f. Metallic
   g. News
7. Mixing, Doping
8. Powdering
9. Problems
10. Reducers
11. Removers
12. Research
13. Supplies
14. Testing

H. LETTERPRESS PRESSWORK
1. Carbonizing
2. Color Work
3. Equipment
4. Halftones
5. Ink
6. Makeready
7. Maintenance
8. Mottling
9. Non-offset Guns
10. Number machines
11. Offset
12. Overlays
13. Perforating
14. Overprinting
15. Picking
16. Plate Repairs
17. Presses
   a. Cylinder
   b. Platen
   c. Proof
   d. Rotary
18. Processes
19. Register
20. Research
21. Rollers
22. Running, Back-up
23. Scoring, Creasing
24. Slurs, Blurs
25. Static
26. Streaks, Ghosting
27. Supplies
28. Varnishing
29. Work-ups
30. Wrinkles

I. MANAGEMENT, EXECUTIVE
1. Associations
2. Cost Finding
3. Copyrights
4. Estimating
5. Finance
   a. Depreciation
   b. Profits
6. Regulations
7. Industrial Relations
   a. Wages
   b. Salaries
   c. Bonuses
   d. Unions
8. Industries
9. Insurance
10. Legal
11. Layout
12. Purchasing
13. Research
14. Standards
15. Trade Customs
### J. MANAGEMENT, PRODUCTION

1. Air Conditioning
2. Bindery
3. Composing Room
4. Controls
5. Equipment
6. Foremanship
7. Layout
8. Lighting
9. Maintenance
10. Personnel
11. Pressroom

### 12. Processes
- a. Analine
- b. Decalcomania
- c. Duplicators
- d. Collotype
- e. Facsimile
- f. Gravure
- g. Litho
- h. Screen Process

### 13. Plate Making

### 14. Shipping

### K. NEWSPAPER AND PUBLISHING

1. Advertising
2. Book Publishing
3. Censorship
4. Color

### 5. Editorial
6. Illustration
7. Research

### L. PLANOGRAPHY

1. Art Work
2. Color
3. Lettering
4. Deep Etch
5. Dry Offset
6. Photo Composing
7. Negative Making

### 8. Plates
- a. Paper
- b. Metal
- c. Lithure

### 9. Presswork
10. Research
11. Supplies

### M. PAPER

1. Sizes and Standards
2. Classification
3. Customs
4. Difficulties
5. Envelopes
6. Equipment
7. Cutting
8. Grain
9. Handling
10. Humidity
11. Manufacturing
   - a. Hand
   - b. Machine

### 12. Selecting
13. Characteristics
14. Pulp
   - a. Bag
   - b. Wood
   - c. Others

### 15. Raw Materials
16. Research
17. Terms
18. Watermarks
19. Waste
N. PHOTOGRAPHY
1. Paper
2. Chemicals
3. Equipment
4. Stencils
5. Reflex Prints
6. Screens
7. Color Separations
8. Retouching
9. Negatives
10. Positives

O. PHOTOENGRAVING
1. Color
2. Customs
3. Equipment
4. Color Scanner
5. Estimating
6. Mounting
7. Ordering Copy
8. Processes
9. Research
10. Scan-O-Graver
11. Ben-Day-Overlays
12. Supplies

P. PLATES, COMPOSITION
1. Rubber
2. Plastic
3. Linoleum
4. Molding
5. Mounting
6. Ink
7. Presswork
8. Research

Q. PROOFREADING
1. Abbreviations
2. Alterations
3. Caps, small caps
4. Bold Face
5. Figures
6. Italic
7. Copy Preparation
8. Word Division
9. Equipment, Supplies
10. Foreign Language
11. Grammar
12. Indexing
13. Procedures, Marks
14. Proofreading
15. Punctuation
16. Spelling
17. Terms
18. Word Study

R. SCREEN PROCESS
1. Ink
   a. Oil base
   b. Water base
2. Press
   a. Hand
   b. Mechanical
3. Stencils
   a. Lacquer
   b. Photo
   c. Tissue
4. Vehicles
5. Wash-up

S. STEREOTYPING
1. Casting
2. Equipment
3. Magnesium
4. Matrix Making
5. Mounting
6. Research Reports
7. Supplies
### T. TYPE AND ORNAMENTS
1. Design
2. Hand Lettering
3. Rule
4. Legibility
5. Brass
6. Wood
7. Tint Blocks
8. Flating
9. Specimens

### U. TYPOGRAPHY, LAYOUT, DESIGN
1. Advertising
2. Art Work
3. Book Work
4. Catalogs
5. Color
6. Commercial
7. Copyfitting
   a. Display
   b. Text
8. Design
   a. Contemporary
   b. Principles
   c. Procedures
   d. Initials
   e. Spacing
9. Dummies
10. Packages
11. Research Reports

### V. XEROGRAPHY
1. Principles
2. Application
3. Research

### W. PICTURES
1. Historic
2. Schools
3. Industrial
4. People

### X. BIOGRAPHY
Section V
SUGGESTED LEARNING ACTIVITIES

A number of the suggested activities which follow may be developed parallel to or as a part of the graphic arts program. There are countless sources for ideas that can be printed as brochures or booklets. Typical or traditional projects are not included intentionally.

The activities are organized according to type in preference to their relationship with a specific purpose of behavior change. Eleven of these activities are included: Regular Laboratory Work, Lectures, Films, Exhibits, Discussions, Dramatics, Demonstrations, Readings, Group Activity, Expression, and Community. The list of terms following these suggestions will identify other learning activities.

REGULAR LABORATORY WORK

1. Printing Education Week. Benjamin Franklin's birthday is on January 17 and that week is always designated as "Printing Education Week," in order to honor one of America's greatest leaders who also happened to be a printer. Many schools have Junior Benjamin Franklin Clubs or Societies which will be interested in celebrating his birthday. The Franklin Museum in Philadelphia will supply schools with materials and suggestions. This celebration provides a splendid opportunity for students to become better
acquainted with their community printers because they also celebrate "National Printing Week." Several printing plants hold open house so that all may see commercial printing being done with semi-automatic and automatic machinery.

2. **Hand Made Paper.** Paper supply houses will loan samples and someone will usually assist in demonstrating tests that are made on paper. Some students will probably raise the question, "Can we make paper?" The F. C. Huyck and Company will loan their color film (see Appendix 4, item 31) so one may observe the techniques used by the early Chinese papermakers. This film is the most authentic ever produced on this subject because the script was written by Dr. Dard Hunter, international authority on paper-making. The film is called "Paper: Pace Maker of Progress." It runs for about 30 minutes.

Kits for making paper by hand from cleansing tissue and sundry items are available from the Hammermill Paper Company at 25 cents each. The paper which students make can be used in printing invitations to attend the Book Week Exhibits. The deckle and mold are made from wood and the necessary screen is part of the kit.

3. **Proof Reading.** An important position in any publishing plant is that of proofreader. A local printer may be willing to provide proofs for the purpose of learning to use proofreader's marks. If the proofs are from a newspaper, the edition in question
can be examined to see if the errors that the class found had been corrected. An opaque projector can be used to make the comparison.

4. **Printer's Inks.** When a group begins to print on paper they will find it necessary to study and select the appropriate ink. They will want to see the film "Rainbows To Order" or other references of this sort that show the making of ink. The section on ink testing should stimulate their using the appropriate ink rather than just anything that is available. They may also want to make ink from linseed oil and carbon.

5. **Marbling.** Their interests will be attracted by a demonstration of marbling paper. Students can be introduced to color in this simple process of flowing ink on paper through a water bath. This paper is for the end sheets of books. A series of folders from the General Printing Ink Corporation contain the colors to be used. For example, "What do certain colors mean? Why is red such a popular color? Do colors influence or reflect moods?"

6. **Silk Screen.** This process is becoming very popular and practical. Stencils can be prepared for a number of tints or colors. It is not beyond the ability of junior high school students to make and use screen stencils made of mimeograph stencils or by the photographic stencil process. These print on cloth, as for example on a pennant, or T-shirt, as well as on paper.
7. **Bookplates.** Each student should design his own bookplate and print it from type and/or from a zinc plate. Designs can be carved also in wood, linoleum, or rubber "Ti Pi" (i.e. "Type High"). They should be printed on label paper. Many interesting designs have been created with ornaments, borders, and individual type characters. A few samples should be all that is necessary to introduce this activity.

8. **Bindings.** Students will want to make their own sewing frames and boards. Ideas for this type of equipment are readily available in the books on the subject.

9. **Anthologies.** Quite a few poems have been written about paper, printer, and books. An anthology of these could be compiled and mimeographed or multilithed, then bound with a plastic binding. The material could be hand lettered on tracing paper for use in a blueprint, ozalid or dry print machine. If these machines are not available, frames to hold diazo paper can be made from wood, and the sun will expose the print. Chemical development is then quite easy.

10. **Related Mathematics.** Printing on paper requires a background of elementary mathematics. Students will be interested in the special system of measurement which printers use. A micrometer should be employed to measure the thickness of paper. A type-high gauge, weight tables, paper sizes, material costs, the line gauge, composition, discounts and sales all involve mathematics.
11. **Watermarks.** Papermakers and printers have long identified their work by watermarks and these have been a topic of lasting interest and research. Students will find this study to be an interesting hobby and will want to start a collection of watermarks. If they make paper, they can create their own watermarks.

12. **Caring for Books.** A wide variety of books should be in constant use in the learning unit. Several methods are used to bind books. The school librarian may loan a display of books that require new bindings. A listing of practices which tend to destroy the bindings may cause a drive to, "Care for Books Properly."

Students can compare methods of sewing as well as various cover materials as a means of becoming better consumers. If they become interested in bookbinding, they should be encouraged to bind a book. This may also lead to an interesting as well as a lucrative hobby.

13. **Photographs.** A student photographer should be used to keep a documentary history of the activities in the learning unit. The class may have their story published in the newspaper. If this happens it should be possible to borrow the type and print copies of the story for distribution. Photographs can be "tipped-in" to eliminate the cost of photo-engravings.

14. **The Mailing of Printed Matter.** Legislation should be reviewed which promoted the spread of knowledge through the use of
books by establishing a special postage rate for them. This activity could be carried out in determining postage rates, and comparing the cost of sending books by mail, express, and air mail. Students should also learn how to prepare packages for mailing.

LECTURES

1. Local Publishing. A class may be introduced to books by having a representative from the local chapter of the International Association of Printing House Craftsmen talk about the books collected and/or printed in the community.

2. Manufacturing Processes. It will be possible frequently to examine books in the process of manufacture. Notes should be made of the questions asked during the discussions, since these can be used to stimulate further inquiry as the learning unit is planned and developed.

FILMS

1. Publishing. Good films on the printing of a book are very limited. However, books and magazines are produced by the same printing process, so a class will enjoy visiting the Curtis Publishing Company by means of their color film, "Magazine Magic." Scenes in this 30 minute film move quickly and it can be shown a second time or after students have had an opportunity to discuss the first showing. Following such a discussion period, students may want to
form a "publishing company" of their own for the purpose of producing a book, such as "Our Class History" or "This is Our Life." Learning from this introductory activity could lead in many directions: organizing a corporation, skill in composition, expository writing, illustrating, and countless other ideas.

2. **Typography.** Students will enjoy the color film narrated by Ben Grauer and distributed by The American Type Founders Company of Elizabeth, New Jersey called, "Type Speaks." Here they can see the process of type making for the printing industry. When this film is shown, students should examine copies of type catalogs available from the type foundries. They will note the different designs in the letters. Some will want to learn more about type. A trip should be made to a local printer in order to see such machines as the Linotype, Monotype, Intertype, or Ludlow machine in operation. Students will observe that type faces are frequently named in honor of the designer and that some of these are very famous as well as beautiful, such as Goudy's "Forum Title Type." Students may follow such a lead into a comprehensive study of the biographies of famous designers, including Lucian Bernhard, William Caslon, William Morris, and Frederic W. Goudy. If there are would-be type designers in the class, they should read an article in the April 1942 issue of *Popular Mechanics* which illustrates the procedures which Goudy used in producing type.
EXHIBITS

1. Foreign Publishing. If some of the parents are foreign born, it will permit an "Overseas Exhibit" as a part of the celebration of National Book Week. The Library of Congress, The American Institute of Graphic Arts, local and state libraries, business firms, and collectors are sources of many valuable display items of this sort.

2. The Processes of Printing. Letterpress printing originated in the 15th century and has been improved by countless inventions. Other printing processes have been invented and four processes are now used. Relief printing means to print from a raised surface. Gravure printing such as may be found in the Sunday supplement This Week, means to print from a recessed plate. Offset printing means to print from a flat surface by application of the principle that water and grease will not mix. The newest process is called Xerography which is accomplished by attracting particles of graphite to an electrically charged paper surface. The first three processes are in common use. Specimens of each should be displayed so that students can learn to identify each process. A chart can be made that will explain each process and its most practical application.

DISCUSSIONS

1. Stimulating Interest. Adolescents usually take books for granted, just as they do so many other products of this industrial civilization. The teacher may create a setting that will stimulate
a number of activities by a display and discussion of the processes used in printing and binding books, or in making various kinds of papers, or showing how books are finished, or concerning color process printing, or the making of printing inks. The teacher should not provide all the answers to questions asked. He should raise questions which suggest activities to be carried on even in the community, such as the following: "How many persons in our community earn their living in the book and allied printing industries?" "Was a paper mill ever operated in this county?" "Where does our present supply of news print paper originate?"

**DRAMATICS**

1. **Historic Play.** Students in the class who are interested in the theater may delight in presenting an assembly program that tells the story of Johann Gutenberg and the spread of printing in Europe. The play, "Wings for Words," was written by the famous American printer, Douglas C. McMurtrie. Scripts are available from Chester A. Lyle, Timken High School, Canton, Ohio. This play should stimulate a wide interest in the historic background of the book industry.

2. **Contemporary Play.** A script could be written and pageant presented around the general theme, *Books*. This could be made very colorful. It could be arranged as a simulated radio narrator reporting the "Parade of Books." Each stage of progress might be
depicted as an individual float in the parade. If a pageant is staged, there is the possibility of including colored slides and sections of color film as a method for implementing certain scenes to give the show greater life.

DEMONSTRATIONS

1. **Techniques.** Books have been illustrated by wood blocks, color plates, photographs and etchings. A demonstration of these and other techniques should stimulate new or further interests. A class can be asked to help identify persons in the community who are specialists and would be willing to demonstrate their skills. By all means see a copy of the *Production Yearbook*, where one picture has been treated in over 100 different ways.

READINGS

1. **Marks or Imprints.** Printers’ marks or imprints provide an interesting study for those who are aware of their existence. It is important that students gain from a study of the markings, the pride of the craftsman who is willing to identify his skill for all the world to see. Books on printers’ marks are a source for much interesting reading for any one interested in this heritage.

2. **The Alphabet.** The development of the alphabet can be made the center of an interesting activity. Students should learn how letters have been adapted from early picture writing, the Greek
alphabet, and from the Romans. Such a study should include ex­
periments in calligraphy, and the designing of letters for linoleum
block printing that characterize type developed any time during the
past five hundred years. The book by Oscar Ogg, *Twenty-six Letters*,
may be difficult for junior high school students to read, but his
designs are authentic and beautiful. This activity can be related
to the theme "Communication: By Words or Pictures," in which case,
an article by Irving Geis, of the same title, in *Print*, Vol. II,
No. I, May-June, 1941, pages 11-26, should be examined for ideas.

GROUP ACTIVITY

1. **Selective Reading.** A class may be interested in time, to
formulate criteria for selecting the books they want to read. This
offers an opportunity to distinguish books written by "unknown"
writers, the use of book reviews, and selecting books on special
subjects. This activity also suggests the asking or listing of ques­
tions which will help to determine the background of the writer and
his motives in writing a book. This also is an opportunity to ac­
quaint students with the preliminary or prefatory section of a book
and how to interpret it.

2. **Style or Format.** Publishers are more concerned than ever
before that the books which bear their mark be designed for read­
ability and distinctive appearance, such as those by Simon and
Shuster of New York. Members of the group should be interested to
poll the opinion of the class regarding the design of certain books used in their classes. The results could be sent to the publishers for their reaction. This activity should include a comparison of textbooks published here and abroad in 1955, with those of 1925, 1900 and earlier.

TECHNICAL WRITING

1. *Creative Expression.* Students should develop skill in creative expression. Stories can be written which describe the life of a famous papermaker, printer, type designer, or publisher. Books should be reviewed and essays written on "The Role of Books in Civilization," or similar topics. Reports may be made on experiments attempted. Letters may be written to students in other schools or to printers for information such as that contained in catalogs, exhibits, or newspapers. Human interest stories may be written and published about school work.

COMMUNITY ACTIVITIES

1. *Occupational Orientation.* Students will want to learn how to print and even how to become a printer and an activity around this vocational interest should be planned. It will include visits with professional printers, or a study of the occupational opportunities in related fields. The entire class should be acquainted with the findings. No one should be deprived of seeing several films
poll the opinion of the class regarding the design of certain books used in their classes. The results could be sent to the publishers for their reaction. This activity should include a comparison of textbooks published here and abroad in 1955, with those of 1925, 1900 and earlier.

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showing the kinds of work done by the graphic arts industries.

2. **Library Procedures.** A visit to a school or public library should be made for acquainting students with the system of coding books for easy location. Students should see the complete workings of a library including the order desk, book catalog, cataloging department, reference departments, the system of library loan, and even the book repair shop. Such a visit should encourage students to find a method to catalog and keep personal books. This may require the planning and constructing of a book rack, a 3x5 card file, or a study table, but the activity is a very good one to encourage.

The collecting of books may be compared to the collecting of stamps. Some persons want first editions, others prefer miniatures, or books on a particular subject, books with unique bindings, or any of several classifications. Members of a class can be encouraged to assume the role of a book collector and present such hobby to the class. This may require a survey of the used book market. Here again there is usually a resource person in the school district who will assist.

**VOCABULARY**

Literally hundreds of terms appear in this unit in addition to the 70 or more which are now listed. Some are *technical,* e. g., *pi,* *em,* *font,* some are *proper* nouns or names, *Diamant, Bernhard, DeVinne,* others are *industrial,* *Bauer, Huebner, Marquardt.* The following
list has been included because it suggests the possibility of a "Spelling Bee" to facilitate their use:

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<td>acquainted</td>
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<td>Gutenberg</td>
<td>technique</td>
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<td>hieroglyphics</td>
<td>technological</td>
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<td>illuminated</td>
<td>thermoplastic</td>
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<td>illustration</td>
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What is the difference between a resource, a teaching, and a learning unit? Learning activities are selected from a resource unit. The description of what took place in the planning, development and culmination of a unit, means that it is a learning unit. A teaching unit places emphasis on a teacher imparting and following a predetermined outline of content without regard for the needs, interests, and problems of students. A learning unit focuses on the student as a learner in a specially created environment where the activities are planned and guided by a teacher. A teaching unit tends to be prescriptive. A resource unit suggests possibilities for developing a learning unit through student-teacher planning. A teacher plans learning activities in terms of criteria and specific limitations which should include one or more of the following: time, space, tool and machine resources, library facilities, community resources, tradition, school policy, personal goals, parent objectives, trends of adolescent growth and development, or normative ideas. Students accumulate certain criteria from previous experiences, maturity, peer-groups, and siblings. Most students suggest learning activities that elaborate on or modify the suggestions of the teacher.
The real value of a resource unit extends from the fact that a teacher can fulfill his responsibility by not limiting the opportunity to select or add to student proposals, as would be the case if teaching units were planned before there was an opportunity to meet the students. It is generally believed that jointly planned learning units exemplify democracy in action in the laboratory and that units planned in advance are apt to be subject-centered.

The reader may get the impression from this that the work of teacher is turned over to students, but this is not true. The teacher's role is most important because learning activities are so diversified. However, because students are engaged in motivated activities which they have selected by mutual agreement, the teacher's job is simplified and there is more time for individualized learning.

There are four rather distinct phases in the development of a learning unit. One cannot state with accuracy when a phase will end, and another get under way because learning activities usually overlap and are inter-related. Phases have a logical sequence. They are discussed in order and in terms of a school curriculum centered in the needs, interests and problems of adolescents. There should be little difference in the suggestions for another type of curriculum organization unless the philosophy of the school requires a planned or subject-centered program.
The first phase can be called the "teacher planning phase." This is the period when a teacher fulfills his responsibility by preparing in advance. For the teacher this means:

1. Understanding the philosophy of the school.
2. Studying the records of each student.
3. Finding out what problem areas have been explored.
4. Examining the resource units designed for this grade.
5. Becoming acquainted with community and school resources.
6. Adding suggestions to resource units for future consideration.
8. Ordering supplies.
10. Defining limits of possible learning units.
11. Preparing to meet the interests of the class.
14. Developing new resource units.

The second phase begins when the students and teacher first meet. After routine matters of organization have been taken care of the teacher can propose several units which appear to be appropriate in terms of the school philosophy and curriculum. The pros and cons of these should be discussed before deciding on a particular one. It is important that notes be kept for future reference. A
teacher should guard against a few students controlling the discussion by encouraging everyone to express his views. The main purposes of the planning are:

1. To establish an important unit of learning.
2. To define the criteria to be used in selecting a unit.
3. To explore the range of possibilities.
4. To help students identify problems and interests.
5. To establish the goals which should be attained.
6. To learn how to decide issues confronting a group.
7. To initiate planning.
8. To enumerate school and community resources.
9. To evaluate the past experiences of individuals by observation during the discussion periods, and by paper and pencil instruments, such as the Mooney Problem Check List, an autobiography, or an interest inventory.
10. To help a teacher to become sensitive to the viewpoints of a group as a basis for searching out additional learning activities, aids, and sources of information.

The planning phase ends when each member of the group has accepted a responsibility to participate in one or more learning activities. Some students can be expected to establish goals and purposes more quickly than others, and they should not be penalized by having to wait on the others. They should be encouraged to begin
their work as soon as possible after a unit has been selected. The section of a resource unit entitled, "Purposes of a Unit," will be helpful in defining purposes.

The learning activities section of a unit always contains many suggestions for initiating a unit such as, Books. A teacher and class can make selections from these or they can add other activities which seem necessary to accomplish their purposes. Films, field trips, and guest speakers will be valuable in introducing such a unit. Laboratory demonstrations and exhibits can be used too. Any activity can be used that will extend student interests or stimulate them to see the need for planning activities that will raise new problems. Teachers should not overlook an opportunity to schedule individual conferences as one method for establishing or improving desirable attitudes. Adequate records should be kept of the planning phase since this will be referred to throughout as a unit, and especially when it is being evaluated in terms of the purposes agreed upon at the outset.

The third phase of a unit starts when the students have established their purposes and begin the developmental activities required. This period will be operated by the students working individually or in groups and by the continuation of student-teacher planning. Some students will be capable of carrying out their responsibilities with dispatch, while others may require guidance.
The plans should include a combined personnel-time-progress management chart as a method to keep the class informed concerning "who is doing what and when." It is important that members of the class be kept informed concerning the learning activities under way at all times so a maximum of help can be provided by the teacher, as well as by some of the more mature members of the class.

A visit to the laboratory of industries during the developmental phase of the unit might be recorded as follows:

I was greeted by a young lady who introduced herself as Susie, who told me that her teacher was demonstrating the binding of books to a group of students and that she could guide me through the laboratory, or that I could be seated until the teacher was free. She beamed with pleasure when I told her that I would like her to show me what the students were doing. We first examined a chart on the wall. This contained the names of all the students and listed their responsibilities. Susie referred to the chart as our "organisation chart." Just as we turned to visit a group of students working at a printing cabinet, there was a flash of light and I realized that my picture had been taken. The girl taking the picture asked me to please sign a card which would identify her picture. I noticed that a space had been provided for me to check, if I wanted a copy of the picture. I marked the card, "Yes."

My guide told me that the boys and girls were setting type and that later it would be printed. I was startled when she said, "I cannot tell you any more about this, because printers do not give out information about the work they are doing."

Our next stop was at a table in the center of the room. Four boys and two girls were carving designs in linoleum blocks. A boy nearby was operating a silk screen printing frame with the assistance of a girl.

I had noticed on the class roster that twenty-five students should be present, but I counted only twenty students in the room. When I raised the question about this,
Susie took me to a progress chart and said, "Joe and Jim are in the dark room. Tom is making a deckle and mold for papermaking. Mary is in the library trying to find out how to make ink. Dave is with Miss Brooks, our English teacher. He is responsible for writing a thank you letter to Mr. Colton who talked to us yesterday about selecting paper for our book and how paper manufacturers distribute paper to the customers. There are a lot of paper manufacturers and each one has something very special to offer a particular customer."

Mr. White, the teacher came over to us, while we were talking. After an introduction, Susie said, "Tomorrow we are going to have a film called, Paper: Pacemaker of Progress, and you can come back if you like." Mr. White explained that the unit, Books, had been selected by the class after discussing several possibilities. He thought that a newspaper story of a fire in the library of a nearby town probably had more to do with the selection of this unit than anything else. Several of the students had seen the destruction and raised questions about replacing the books, and especially how damaged books could be repaired. He was confident that the group had become aware of the value of books.

A motor and machine started as we talked. It was a platen printing press. We walked toward it and I noticed one boy with a sign on his back, "Press Foreman," giving directions to another boy.

Mr. White pointed out that in all technical areas it was necessary to have someone who was capable of helping other students and that they were called "student foremen."

My face became red from embarrassment when the foreman handed me a small white card with my name printed on it. I had neglected to dot the i when I gave my name to the girl photographer and the card read, Mr. James Hell.

A different account might have been written about a visit on any other day, but this story is typical of how a learning unit is developed after the purposes of the unit are established and each student assumes his share of the responsibility. Student-teacher evaluations are continuous.
The fourth and final phase of the learning unit has been given several titles. Some refer to it as the "culminating" phase. Other titles include, "winding up the unit," "doing something about it," or "ending the unit." This period of time has two major purposes regardless of what title is used. The first is to summarize what has been learned in order to help students to reconstruct the direct and vicarious experiences of the unit. The second is to establish new problems, needs, and interests which the unit suggested, or as these are sometimes called, "lead-on-studies."

This period is marked by discussing the outcomes of the unit, by reviewing the introductory phase and its purposes, by performance tests, evaluation activities, reports of recommendations, by assembly programs, exhibiting student activities, and the like. Naturally, the type of activities followed in the developmental phase of the unit where the emphasis was on members of the group practicing, investigating, and exploring, will not serve the culminating phase of the unit.

A final evaluation can supplement the continuous evaluation during each phase of the unit, including an evaluation of the unit by the teacher for reference when it is used again.
Section H

PUPIL-TEACHER EVALUATION

Evaluation is an integral part of the unit because the process of gathering and weighing evidence focuses attention upon the goals of education and specifically on the purposes of the unit. Students appreciate constructive evaluations of their progress. They are less concerned with their score on a true-false test than with the values that the unit has for them in terms of their goals. Students will have only a faint idea of how much or how little they are learning so an evaluation should be directed towards supplying them with some profile of their growth, and especially with their strengths and weaknesses.

An evaluation should be directed toward answering such questions as these:

1. Can the objectives of the unit be achieved?
2. Are the teaching methods effective?
3. Are students actually learning by experience?
4. What have been the best features of the unit?
5. What progress is being made toward the objectives?

A variety of techniques can be employed such as:

1. Helping pupils, teachers, and others to clarify their objectives and analyze learning activities to check the goals toward which they are aiming.
2. Providing information basic to the educational and vocational guidance of pupils.

3. Providing security to pupils, faculty, and parents by revealing evidences of growth in all phases of school work.

4. Providing a broader basis for public relations.

When education is defined as meaning the process of changing and reinforcing patterns of behavior by the reconstruction of experiences, then it should not be confused with deportment. One example of changed behavior occurs as a student learns to use a book in terms of its physical characteristics, another as he discovers a new interest in books, paper, printing, or even in his own development.

Considerable attention is given evaluation in the more recent books on secondary education, especially those dealing with some type of core curriculum. Regardless of the perplexing nature of evaluation directed toward finding out whether or not students are developing into more competent persons, society expects to learn the outcomes of the activities sponsored by the school.

Several kinds of instruments may be developed for each unit, just as teachers have had to develop testing programs for subject-centered curriculums. The suggestions which follow are included to help create the evaluation instruments required and do not replace the suggestions which will be found in books dealing with evaluation.
Evaluating Attitudes. Scales may be constructed by asking students to write statements concerning the attitude to be measured. These may be edited in terms of: the statement being debatable, technically accurate, and reasonably full of the social, technical, and cultural outcomes desired.

A story may be arranged with no ending for students to tell their version of the conclusion. The "unfinished story" technique will provide additional insight into problems that concern students.

Another technique for appraising attitudes is by direct observation. These can be recorded as anecdotal records. The results will be valid if a systematic schedule of observation is made.

Character Traits. Rating scales can be prepared to determine work habits, skills, and social effectiveness. Some scales require students to make self-appraisals.

Another technique, called "guess who," asks students to identify those they believe best characterize certain traits. Other instruments have been prepared by creative teachers, including the asking of students to select personalities for an imaginary play.

Commercially prepared scales can be improved or modified. Some teachers have used various kinds of check lists. Others have relied on autobiographies, diaries, and sociograms.

Obviously the only method for determining changes in behavior is to determine if and to what extent change occurred. For
example, if students are expected to understand the importance of books, then the teacher will want to determine the attitude of the student, his ability to use the library, his knowledge of sources for locating information, his interests in books, authors, and modes of printing, and his skill in interpreting data related to his interests.

For another example, assume a student is to learn the meaning of such words as: case, 18 point, running title, end sheet, and lockup. A matching identification, or completion test, as well as observation of the use of these terms, will suffice. However, a pre-test covering the same material would provide a basis on which to compare the amount of learning resulting from a study of the unit.


Summary. Specific techniques to evaluate student progress are based upon the objectives of the school and of the learning unit. An opportunity to evaluate student progress can be identified in each suggested activity. Understandings, attitudes, behavior, and critical thinking may be evaluated both formally and informally. The following suggestions are presented in summary:
1. **Understanding.** Questions asked by students provide some evidence of understandings that result from learning activities. When John, after visiting a gray iron foundry, asks if there is enough "iron ore" in the United States to last a hundred years, one may assume that he understands the need for raw materials. Similarly, if Harry should report that automobile bodies are made from "iron," one may assume that he considers iron and steel to be the same material.

2. **Attitudes.** Students reveal attitudes by their statements, questions, and actions. It is important that these be consistent. Student attitudes are sometimes based on guesses or even prejudices. The complexities of life which adolescents face, serve to complicate their establishing consistent attitudes. The outlook displayed toward school, teacher, home, church, industry, and the future reveal much concerning their learning units. Inconsistency and other evidences of confusion are indications of the need for further analysis.

3. **Social Behavior and Skills.** These include skills of manipulation, observation, concentration, leadership, expression, care of property, cooperation, self-reliance, location of information, planning and many others. Observation will provide some evidence of the skills developed, but only in terms of the opportunity provided by the learning unit.

4. **Critical Thinking.** The questions asked are an indication of the depth of thinking. Some students may want to be told each
step or bit of information required by the problem. They will ask, "What shall I do next?" or "Where can I find X?" A positive statement followed by a question indicates that a student has been thinking of possibilities and is not depending upon a complete set of instructions. Also, when a student prefaces a question with two or more alternatives, one may assume that he has thought critically about the situation or problem. It is a common tendency for adolescents to draw conclusions or make generalizations without sufficient data. Evidence of such traits should be identified at once and steps taken by both teacher and pupil to correct them. The quality and quantity of critical thinking can be evaluated also by the suggestions that students make regarding the organization of interest groups, the arrangements and plans for an excursion, the activities for a unit of work, the objectives of a unit, the community resources available, and by the creativeness shown in reports, discussions, sourcebooks, projects, and the selection of reading materials.

One may also experiment with paper and pencil tests, analyze student work, keep a log or start anecdotal records. There are teachers who believe that the intangible elements of interest, thinking, attitudes, and understandings cannot be tested, but commercially prepared tests are available and can be used.

In terms of the philosophy of the resource unit, no positive recommendations are made for the evaluation of units of work developed. All evaluation should be based first upon the purposes of individual learning units.
Section I

LEADS TO OTHER UNITS

The unit on Books, can be adapted also to senior high school as well as to college classes. The unit also suggests a study of "Home and Family Life" through units centered in homemaking. Students will be interested also in the Boy Scout Merit Badge program or in entering printed articles, bound books, or photographs in the Ford Industrial Arts Awards program and in other types of hobby and special interest activities.

Because the graphic arts industries are both inclusive in the range of job opportunities and the abilities and aptitudes required, it would be natural for a learning unit to be centered in community life. No other mediums offer such natural opportunities to study contemporary culture as books, printing, the alphabet, and photography.

The demand for paper pulp from the Scandinavian countries, for oils, lead, zinc, copper, rubber, and ink pigments from other countries, as well as creative design and inventions from around the world, should encourage students to explore the economic (i.e. including conservation and trade) problems of America.

Schools should guide the learning of students in establishing life values that are sympathetic with American ideology and tradition. One means for meeting this obligation is suggested by a
study of the graphic arts industries which were first to champion a free press. Another means is suggested by an analysis of the economic patterns of ownership of printing establishments, the ease with which small print shops, photographic laboratories and supply houses can be launched in a free economy. Still another means for establishing life values, stems from those learning units which characterize the advancement of mankind through the technological advancements made in audio and visual communications.

The schools have helped to expand the concept of conservation and the development of resources during the last half-century, even though more emphasis has been placed on natural than human resources. America's greatest potential resource, the children, continue to be educated out of context with their immediate social-economic problems, interests and needs.

A study of resource development and conservation would include a personal inventory of the gifts or assets of the individual and his correctable liabilities. One unit might be developed concerning man and his environment as undeveloped resources. The film, Trees to Tribunes, is an example.

Modern methods of offset and letterpress printing in addition to mimeographing can be used by students interested in publishing. This activity when properly sponsored and administered provides many
opportunities for learning about public opinion. The point is, that through the greater use of educational resources and techniques like those referred to in the sections of this unit, the school will not only become a closer adjunct of the American culture pattern, but a far more effective institution than ever before.
ANOTATED BIBLIOGRAPHY


First portion summarizes the history of books from Gutenberg to Rogers. Latter portion concerned with the mechanics of bookmaking. Of especial value is the chapter on the history of book illustration.


Prose vignettes from the printing trade with foundations more in fiction than fact. Many appeared in trade magazines under the pseudonym of "Jack Edwards."


In an especially attractive format. It commemorates the company's one hundredth anniversary and is a "revision and elaboration of a book under the same title... by the late Carl Richard Greer ..." It is actually a simplification of the material on advertising production by Hymans and Stanley. Highly recommended for anyone seeking to review this subject.


This great bibliography is a source of information concerning any volume published prior to 1880.


A fascinating closeup of how early American craftsmen went about their work.


A bibliography of out-of-the-way information on authors, books, and libraries, including essays on the invention of printing, Scottish bookbinding, and early systems of shorthand.

An up-to-date, scholarly, and provocative monograph on the meaning and development of printing from movable types which Butler believes, "must have begun several decades before 1450 at the very latest." His critical bibliography of the origin of printing is valuable.


This is a revision of Miss Clark's popular Printing Trades and Their Workers (1932, 1939). It is focused at the needs of high school students who are considering employment in one of the printing trades.


Well illustrated student text on letterpress printing. Format follows the trade operations performed. Authoritative.


Story of the linotype. Issued to commemorate the fiftieth anniversary of the machine. A play entitled "Salute to the Modern Newspaper" is appended. This is by no means the full story of the linotype, the definitive history of which remains to be written.


A survey of the best designed books in eight countries from 1939 to 1950. This book is especially recommended as a reference for comparative design and publication of books in selected European countries.


The author resurrects the outstanding printer of mid-nineteenth century America, and gives insights into the business methods, cultural interests, standards, and behavior of craftsmen on the American scene during Munsell's lifetime, 1808-1880. For further information, see Munsell's Typographical Miscellany.

A basic book on every aspect of type and typesetting. Also included are the highlights of period typography from the fifteenth century to the present with a presentation of the master printers of each century and the types and type styles created by each.


The Annual is an institution and might be described as a unique blend of what constitutes the American Art Directors Annual and Graphic Arts Production Yearbook. Each is a monumental volume, lavishly illustrated and written by international authorities. The publication keeps the reader abreast of outstanding developments in the world of printing, books, and advertising relieved by refreshing vignettes of yesterday's craftsmen.


Chapter 34 of this book was written by Thomas Payne of the American Book Publishers Council. The author compares modern with historic methods of publishing books.


A rare document, filled with many informative facts and dates of printing in the world. The student of printing will find the explanations of events to be authoritative. This work is significant for understanding the meaning of man's ability to communicate ideas.


The author brings into clear focus the basic mechanical and technical elements of graphic reproduction, particularly as employed in platemaking and engraving processes for the three major methods.

Paper bound student manual following an operational analysis of the trade, including project suggestions.


An elementary text, explaining the basic operations of composing, press, and bindery departments.


This handy guide to reference materials, supplies an understanding of books in all their phases, from materials and processes of manufacture to collecting. A total of 247 items are included.


Sixteenth of the delightful books done for the Typophiles. The title explains Miss Harter's thesis that great printers have been interested in social and political happenings outside their shops.


A "Missouri River Pirate" remembers the days before composing machines ended the carefree camaraderie of the "tourist printers." A valuable work remains to be done on the epic of the tramp printer in America, and should it ever be done, these reminiscences of "Muskogee Red," "Oldstyle," "Senator Murry," et al., will be a valuable source.


Reference for students, teachers, production managers, superintendents, and proprietors. 637 cross references and answers to 334 everyday problems.

A series of essays on the aesthetics of books from a reader's point of view.


A well-illustrated text on the history and equipment of printing including chapters on composition, stonework, imposition, bookmaking and papermaking.


Exhaustive resource book on the graphic arts industry presented simply, logically, authoritatively. The editor has drawn upon some 350 authorities to contribute the 4000 and more subjects listed in the comprehensive index. This is a work book for the man who must plan printed pieces, select artwork and engravings, fit copy to type, specify type faces, paper, ink, processes, bindings, and the many other details of printing and publishing. If there is a "Bible" of American graphic arts, this is it. If the production man's problem is not answered here, it may well be unanswerable.


A detailed exposition of procedures in proofreading. Qualifications of the proofreader and copyholder, common errors in printed composition, and organization of proofing departments. The latter half of the book, specifically concerned with points of style, would be of value to shops needing to formulate style policies. Lasky's work remains the authoritative reference on the whole subject of proofreading.


Contributions by Herbert Bayer, Merle Armitage, John Begg, S. A. Jacobs and Ernst Reischl on the art of modern book design. Includes a collection of outstanding specimen pages.

Story of the book in America, from 1638 through 1950. It is exhaustively treated in this revision of the famous 1939 edition. Lawrence C. Wroth covers the Colonial period. The whole is a rare combination of informative and enjoyable reading.


A highly selective bibliography, with each title well annotated. If an attempt is ever made to list the "Hundred Great Books of the Graphic Arts," Dr. Lehmann-Haupt's book would make an admirable starting point.


Fourth of the "Printers' Valhalla" series, this biography considers Schoeffer as a calligrapher, designer, publisher, merchant, and citizen. Dr. Wieland's list of printed works by Schoeffer is included with facsimile reproductions of some of his outstanding pages.


A pictorial treasury of symbolic designs for everyone interested in graphic arts. Contains over 1350 of the leading signs, seals, and symbols developed since the dawn of time. A practical handbook and visual guide through the transformation of simple marks and signs into the complicated emblems of our time.


The best of the Goudy biographies, this adds information lacking in both the Orton and Beilenson volumes. Like Orton's biography, it dwells too much on the early years and too little on the years when Goudy was the strongest single force in American typography.

A manual of instruction in applied arithmetic for students.


Another of the several excellent texts available for the high school printer. As clearly as any, the text covers virtually every procedure of the printing industry. The composition section is condensed, though this is not necessarily a virtue in an elementary text.


The story of Johann Gutenberg presented in a fictional but factual manner. The book clarifies the controversial subjects of Gutenberg and the beginnings of printing in Europe. It has been written especially for teen-agers.


An analysis of trends in the trade-book industry and what may be expected in the future. Description of the relationship between publishers and libraries. Included are statistics of the book industry.


The contents of this bibliography justify its broad title. Not only are books and periodicals listed but also the libraries, schools, trade associations, and labor organizations from which information concerning graphic arts may be obtained.


Here is rich and scholarly fare, certain to be digested only by those interested in the development of the printed book and in the proposition that typography can reach artistic status. The extent of calligraphy's influence on typography particularly engrosses the author. The question is raised whether or not the first printers may have been more in debt to metal and stone workers than to the scribes.
40. Newkirk, Louis J. and Johnson, William. **Graphic Arts.** New

    Textbook containing suggestions and information concern-
    ing the graphic arts. Designed especially for use
    in the Chicago schools.

41. Ogg, Oscar. **The 26 Letters.** New York, Thomas Y. Crowell,
    1948. 254 p. Illustrated.

    This book covers the whole story of the alphabet from
    the beginning to the present. It is well illustrated and
    clearly written. A bibliography would add to its value.

42. Olsen, Lester. (Editor) **Advertising Told With Pictures.** New

    The first complete story of advertising in all its
    branches. It takes the reader on a pictorial trip, through
    all the major phases of advertising from preparing copy to
    printing.

43. Perry, Kenneth F. and Baab, C. T. **The Binding of Books.**

    Explains tools and supplies used in the binding of
    books. Illustrations in the sections on finishing and
    design are covered lightly.

44. Polk, Ralph. **The Practice of Printing.** Peoria, Illinois,

    Probably the best manual for high schools on composi-
    tion, including a few pages on presswork, inks, etc.

45. Ransom, Will. **Private Presses and Their Books.** New York,

    History of the private press movement with detailed
    check-lists of nearly 3000 titles issued by over 300 pri-
    vate presses by a man who played a fine role in the devel-
    opment of this movement in America. This book has been
    supplemented by Ransom's Check List of Private Presses
    issued in the form of pamphlets for the purpose of addi-
    tions and emendations, before publication in book form.

Instructions on preparing the design, cutting and multi-color printing. A glossary of terms is included. Written for college or advanced high school students.


The ninth chapter (p. 251-316), "Richardson's Printer's Ornaments," will be of much interest to those attempting to bring some order to the chaotic history of ornamentation. Included is a list of some 500 books printed by Richardson. Probably no eighteenth-century printer has been so well studied.


Second of the "Printers' Valhalla" series, this biography considers Thomas as a printer, patriot, and philanthropist.


Third volume in a series published to coincide with the opening of the Festival of Britain. It brings up to date the record of Britain's achievement in all branches of graphic and industrial design and contains 600 illustrations representing the cream of the work of some 7000 designers and organisations who submitted material. American designers have something to learn from this volume.


While there are other volumes on William Morris as a printer, Sparling's book is more than sufficient for the subject, all-important though he be. A complete list of the 53 books published at the Kelmscott Press under Morris is included with extended annotations.


Third of the "Printers' Valhalla" series, this biography links the New World to the Mother Country, and in doing so restores a long forgotten name to typographic annals.

Drawn from an enormous range of subjects, the nearly 7000 basic designs reproduced in this extraordinary volume comprise an unparalleled resource. They include almost every conceivable form and combination of forms.


A comprehensive book on Tschichold's principles and practical designs for bookmaking, typography, layout and printed matter in general, by this articulate master of Bauhaus-style to Renaissance-inspired recreation of the printed word.


This is an indispensable adjunct to the equipment of anyone who plans to do government printing. It compares with the *Chicago Manual of Style*.


A collection of 26 monograms from A to Z. Each is a rhythmic triumph of typographic skill. Designed by Kurt H. Volk, Incorporated, internationally known printers and typographers. It comes in a decorative box.


A concise biography of the typographic titans of the American twentieth century: Dwiggins, Goudy, Rogers, and Updike. The illustrations are well chosen, and range from Updike's earliest to his final work. One of the "Printers' Valhalla" series.


Intimate glimpses of the book trade and the phenomena of American literature in 1876, 1901, and 1926.

A collection of five essays dealing with the influence of English on American typography, printers' manuals from Moxon to De Vinne, Benjamin Franklin as a printer, and the earliest types cast in America. A brief is developed for the importance of Joseph Moxon in the improvement of typography for over 250 years after the publication of *Mechanick Exercises*. Another excellent volume from the Typophile.
APPENDIX 2 OF THE RESOURCE UNIT

PROFESSIONAL REFERENCES


4. Alberty, Harold B. (Editor) Science: Servant or Master. Columbus, The Ohio State University, 1946.


7. Baltimore, Board of Education. The Effect of Technological Development Upon Society. Commission on Curriculum Revision, 1940.


Appendix 3 of the Resource Unit

PERIODICALS

1. American Printer
   Published monthly, $3.00 per year. December issue contains directory and buyers guide.

2. El Arte Tipográfico
   National Paper and Type Company, 120 Wall Street, New York 5.
   Free to printers in Spanish speaking countries.

3. Bookbinding and Book Production
   34 North Crystal Street, East Stroudsburg, Pennsylvania.
   Published monthly, $3.00 per year.

4. Graphic Arts Monthly
   608 South Dearborn Street, Chicago 5.
   Covers the entire field of graphic arts.

5. Industrial Arts and Vocational Education
   Bruce Publishing Company, Milwaukee.
   Ten issues a year, $3.00 per year.

6. Inland Printer
   Monthly, $4.00 per year.

7. Pacific Printer, Publisher, Lithographer
   Pier 5, San Francisco.

8. Paper and Print
   Quarterly, ten shillings per year.

9. Printing
   Walden Sons and Mott, Incorporated, 41 Park Row, New York.
   Monthly, $3.00 per year.

10. The Paper Maker, Bronson B. Tufts, Editor
    Paper Makers Chemical Department, Hercules Powder Company,
    Wilmington 99, Delaware

11. Westvaco Inspirations
    West Virginia Pulp and Paper Company, 230 Park Avenue, New York.
    Free, published every two months. Designed to encourage fine illustration and design.

Illustrating to the buyers of printing how to get the most out of their advertising dollars. The film shows how lithography enables buyers to obtain perfect balance of all factors of printed salesmanship in their product folders, direct mail pieces, etc. No charge for film except return express. Write well in advance to Harris-Seybold Company, 4510 E. 71st St., Cleveland 5.

2. "A Clean-Out Proposition." 16mm in sound and color, 15 min.

Dramatizes the action of a Seybold power paper cutter, featuring the advantages of the cutter's "Z-Action," claimed to result in more profitable paper cutting. Available for group showing at no charge other than return express. Write well in advance to Harris-Seybold Company, 4510 E. 71st St., Cleveland 5.

3. "A Diehl Tie-Up." 16mm in sound, 20 min.

Most printers recognize string tying as a costly habit, but seem to feel nothing can be done about it. This film dramatizes the Diehl mechanical tie-up and shows how to eliminate wasteful tie-up practices. Starring Lew Lehr, American Type Founders Sales Corporation, Elizabeth, N. J., New Jersey.

4. "Another Man's Business." 16mm in sound and color, 25 min.

Manufacture of a printing press. Opening sequences show Victor Keppler photographing a New York model, then the picture being printed on an advertising piece, and then how the printing press is manufactured. Write well in advance to Advertising Department, Miller Printing Machinery Company, 1117 Reedsdale Street, Pittsburgh 33.

5. "Trees to Tribune." 16mm in sound and color, 40 min.

Shows timberland in Canada and paper mill. Complete story of paper supply for this city newspaper. The workings of the city newspaper from the editorial rooms, to the mailing room. Chicago Tribune, Chicago.

P. H. Glatofelter Company, Spring Grove, Pennsylvania.


Illustrates the new Miehle No. 61 offset press. Basic principles of feeding, registering and delivering the sheets. Miehle Printing Press and Manufacturing Company, 145th Street and South Damen Avenue, Chicago 8.


E. G. Williams, president, American Type Founders, tells how the ATF Little Giant press came into being. H. G. Marquardt, vice president in charge of domestic sales, describes the features of the press. American Type Founders, Inc., Elizabeth B, New Jersey.


How to make a linoleum block, also color separation. Brandon Films, 200 West 57th Street, New York 19, rental $2.00.

10. "Blue Streak Linotype Machines." 16mm in sound, 20 min.

Features of model 31 and 32 Linotype machines. Margenthaler Linotype Company, 29 Ryerson Street, Brooklyn 5.


How Bibles are produced showing all printing and binding operations, including gold stamping, binding in leather and some historical data. Typesetting is omitted. National Bible Press, 239 S. American St., Philadelphia 5.


Showing progress in inks and printing processes. Sinclair and Valentine Company, 611 West 129th Street, New York 27.

13. "Heights and Depths." 16mm in sound, 11 min.


Interprets lithographic process in terms of advantages to buyers of printing. Shows production of an experimental folder. These are available for distribution. No charge for film except return express. Write well in advance to Harris-Seybold Company, 4510 East 71st Street, Cleveland 5.

15. "The Intaglio Way." 16mm in color only, 30 min.

The News-Dultgen halftone intaglio process from the art layout, through plate making to the finished product. Intaglio Service Corporation, 305 W. 46th Street, New York 17.

16. "Look to the Years Ahead." 16mm in sound and color, 30 min.

Features of the Miehle 7-50 and No. 29 presses. Miehle Printing Press and Manufacturing Company, 14th Street and South Damen Avenue, Chicago 8.

17. "Caught Mapping." 16mm in sound, 10 min.

How road maps are made. The Jam Handy Organization, 2821 East Grand Boulevard, Detroit 11.

18. "Five Centuries of Type Founding." Strip film in sound, 30 min.

Compares many type faces from earlier types to ATF's current display types. American Type Founders, Incorporated, Elizabeth B, New Jersey.


How Hammermill makes writing papers from spruce logs, from woodland to printing plant. Hammermill Paper Company, 1416 East Lake Road, Erie 6, Pennsylvania.

20. "Lynd Ward at Work." 16mm silent, one reel.

Complete process of wood engraving. Rental fee $2.00 per day. Elias Katz, 1128 South Vega Street, Alhambra, California.


22. "Making an Etching." 16mm silent, two reels, 30 min.

How artist makes an etching. Rental fee, $4.00. Elias Katz, 1128 South Vega Street, Alhambra, California.

23. "Make a Linoleum Block." 16mm silent, one reel.

How artist makes a linoleum block. Rental fee, $2.00 per day. Elias Katz, 1128 South Vega Street, Alhambra, California.


How a modern printing plant operates and every step in the making of books. For sale or rental at $2.50 for 1, 2, or 3 days from Encyclopaedia Britannica Films Incorporated, Wilmette, Illinois.

25. "The Making of a Magazine." In sound and color, 45 min.

Complete mechanical operations including magazine printing and binding, composition, rotogravure processing, rotary, rotogravure, offset printing, foundry and plate make ready, four color process work, automatic machine binding, trimming, individual subscribers and bulk mailing. G. T. Dearing Printing Company, Louisville, Kentucky.


Descriptive booklet available. McCandish Lithograph Corporation, Roberts Avenue and Stokley, Philadelphia 29.


Covers nine phases of the Graphic Arts industry and encompasses what nine plant visits would require. Produced by members of the club. Filled with descriptive titles. Rental, $4.00 per day of use plus transportation both ways. Young Printing Executives' Club, 461 Eighth Ave., New York 1.


29. "Modern Photo-Engraving." 16mm in sound and color, 1500 feet.

Covers the latest techniques, methods, and materials with emphasis on color reproduction. Graphic Arts Sales Division, Eastman Kodak Company, Rochester 4, New York.


Covers Linotype, Monotype, photoengraving, electrotyping, stereotyping, as well as offset. Men working on Miller, Miehle and web presses as well as in bindery. Vocational Guidance Films, Incorporated, Des Moines 9, price $2.75.


Traces development of papermaking over a period of 2,000 years. Y. C. Huyck and Sons, Rensselaer, New York.

32. "Printing." 12 min.

For high school students to show job opportunities, primarily in letterpress printing. Carl F. Mahnke Productions, Des Moines 9, rental fee $2.00.


Concentrating on use in direct advertising. Linton Brothers and Company, Fitchburg, Massachusetts.

34. "Production of a Daily Menu." 16mm, 35 min.

35. "Rainbows to Order." 16mm in sound and color, 22 min.

The manufacture of printing ink and the important part that research plays in ink development. International Printing Ink, 350 Fifth Avenue, New York 1.

36. "Silk Screen Printing."

Describes cutting of a film stencil and how it is attached to screen. Covers all steps. Library Films, Incorporated, 25 West 45th Street, New York.

37. "Spot News." 16mm in sound, 10 min.

Basic principles of transmission of wire photos. Jam Handy Organization, 2821 East Grand Boulevard, Detroit 11.

38. "Type Speaks." 16mm in sound and color, 26 min.

History of type design and manufacture to date. Stars Ben Grauer. American Type Founders, Incorporated, Elizabeth, New Jersey.

39. "The World Behind the Watermark." 16mm in color, 35 min.

Appendix 5 of the Resource Unit

FREE AND LOW COST RESOURCE MATERIALS

1. Advertising Typographers Association
   461 Eighth Avenue, New York City.
   Publish *Type Talks* six times a year. Main concern is to represent Ad Typographers.

2. American Crayon Company
   Sandusky, Ohio.
   Publish *Everyday Art*, a journal devoted to elementary school color and design. Articles frequently relate to graphic arts.

3. American Forest Products Industries, Incorporated
   1319 Eighteenth Street, N.W., Washington 6, D. C.
   The Story of Pulp and Paper

4. American Institute of Graphic Arts
   102 East 40th Street, New York 16.
   *50 Books of the Year*, issued annually in April.

5. American Newspaper Publishers Association
   270 Lexington Avenue, New York 17.
   *Opportunities for Young Men in the Mechanical Departments of Daily Newspapers*.

6. American Type Founders Sales Corporation
   Elizabeth, New Jersey.

7. George S. Armstrong and Company, Incorporated
   52 Wall Street, New York 5.

8. Book Manufacturer's Institute, Incorporated
   25 West 43rd Street, New York 18.
   *Job Possibilities in the Printing, Publishing and Allied Graphic Arts Industries*.

   Chicago, Illinois
   Booklet, *Trees to Tribunes*
10. Crane and Company  
   Dalton, Massachusetts. 
   Some Notes on Paper.

11. Eastern Corporation  
   Bangor, Maine.  
   Wall charts of Type Specimens.

12. Eastman Kodak Company  
   Rochester 4, New York  
   Commercial Camera, Magazine  
   Photography in Camera. Booklet

13. Franklin Institute  
   Benjamin Franklin Parkway, Philadelphia 3.  
   Series of stories about Benjamin Franklin.

14. General Printing Ink Corporation  
   100 Sixth Avenue, New York 13.  
   A series of interesting booklets on color.

15. P. H. Gladfelter Company  
   Spring Grove, Pennsylvania.  
   Paper and its Performance. booklet.

16. Hammermill Paper Company  
   Erie, Pennsylvania.  
   Your Next Letterhead  
   Manual of Paper Information  
   From Spruce Tree to Writing Paper

17. Charles M. Higgins and Company  
   271 Ninth Street, Brooklyn, New York  
   School Correlation Project No. 8, Bookbinding

18. F. C. Huyck and Sons  
   Kenwood Mills, Albany, New York.  
   Paper: Facemaker of Progress.

19. Joint Lithographic Advisory Council  
   75 Varick Street, New York 13.  
   Is There a Job for Me in Lithography?

20. Kalamasoo Vegetable Parchment Company  
   Kalamasoo, Michigan.  
   Paper: The Lifeblood of Civilization  
   The History and Story of Paper Making
21. Kimberly-Clark Corporation  
   Neenah, Wisconsin.  
   More for Your Printing Dollar, a 40-page booklet.  

22. M. and L. Typesetting and Electrotyping Company  
   4001 Havenwood Avenue, Chicago 15.  
   The Genesis of Machine Typesetting.  

23. New York Employing Printers Association  
   461 Eighth Avenue, New York 1.  
   Brochures of interest to teachers.  

24. Philadelphia Inquirer, Newspaper  
   A Facsimile Newspaper.  

25. Socony-Vacuum Oil Company  
   216 East 45th Street, New York 17.  
   Oil Power, March and April, 1948. See for "The Story  
   of the Newspaper Printing Press."  

26. Strathmore Paper Company  
   West Springfield, Massachusetts.  
   Making Expressive Strathmore Papers.  

27. S. D. Warren Company  
   89 Broad Street, Boston.  
   Yearbook Suggestions.  

28. Wilson Company  
   950 University Avenue, New York 52.  
   Vertical File Service  
   Readers Guide to Periodical Literature  
   Industrial Arts Index  
   The Biographical Index  
   The Art Index
Appendix 6 of the Resource Unit

ANNOTATED LIST OF THESSES

The research accomplished by industrial arts teachers in graphic arts has been limited. The following are available via inter-library loan.


   A curriculum for high school printing including methods and teaching aids suggested. Related subject matter outlined, with emphasis on skill.


   Preparation of job sheets for elementary printing. Data based on an analysis of fourteen groups of jobs.


   Includes a survey of 134 printing instructors throughout the United States.


   Includes a survey of 160 printing instructors.


   Organization and development of two courses of study in photography for secondary schools.

Background of the trade and methods of teaching. Job of pressman analysed and training program outlined.


Operation sheets to be used in industrial arts classes. Covers the basic operations in printing recommended by a committee of the American Vocational Association.


Interviews six ink manufacturers and experiments to determine the suitability of certain inks on various papers. A guide for printing teachers in the selection of proper inks for papers.


Data from state safety codes, insurance companies, and safety organisations. Validation by tradesmen and printing teachers.


Possibilities of cover designs in bookbinding. Inexpensive and creative methods for designing bookbindings.


Methods and scope of printing instruction.


An overview of bookbinding. Introduction of instruction in the graphic arts in secondary schools.

A study outline for letterpress printing as a phase of graphic arts in the senior high school.


An historical and exhaustive study of the processes and industrial methods of planography focused on introducing it in industrial arts and industrial-vocational programs.


Exhaustive review of the literature of graphic arts for references on intaglio printing. Presents information for introducing a unit or course in intaglioigraphy.


A study of cinematography for industrial arts education. It includes an historical study of optics with emphasis on the motion picture machines then available.


A list of 129 instructional units (job, information, operation) in junior high school printing placed in rank order from high to low, according to the experience and opinions of twenty-five teachers of junior high school printing.


Description of the methods of making frames, benches, and other equipment necessary for silk screen printing. Samples of printing in single and multiple colors.


A study of the printing trades in Tulsa, Oklahoma and printing as taught in the public schools of that city in 1932.


Relative emphasis and time given various topics or related information in printing.


An investigation of printing, duplicating, and related graphic arts to determine their adaptability to the industrial arts curriculum. Data based on survey of literature, interviews, correspondence, and government codes.


Development of one hundred lessons in printing to be used in the training of teachers of printing. Material developed on an experimental basis and tried out in the writer's classes over a three year period.


A program of printing for secondary schools, based on an analysis of printing industry and opportunities for correlation of printing instruction with other high school subjects.


The justification of printing in a general shop program of general education.


A two-semester course of study in printing. Problems and related material are presented to accompany the shop work.
Appendix 7 of the Resource Unit

NON-ANNOTATED STUDIES


2. Bilsley, George J. (M.A.). Content Affecting the Development of a Graphic Arts Laboratory. Columbus, Ohio State University, 1944.


9. McIntyre, Harold J. (M.A.). Possibilities of Photography as a Unit in the Laboratory of Industry. Columbus, Ohio State University, 1931.


14. Wertz, Clifford R. (M.A.). *Photography in the Industrial Arts Laboratory*. Columbus, Ohio State University, 1940.

Appendix 8 of the Resource Unit

FOREIGN MADE PAPERS

Arnold and Foster, Ltd., 19 New Bridge Street, London

Beau Papier, La Maison de, Paris, France

Bertini, O. and Figlio, Florence, Italy

Borjeson, Mme. I., Enskede, Sweden

Cockerell, Douglas and Son, Letchworth, England

d'Arches, Papeteries, 30 Rue Mazarine, Paris

de Freudenberg, Mme. O. de Manchot, Ecichens-sur-Morges, Switzerland

Delcroix, Papeteries, Neveu, Belgium

Fletcher, Robert and Son, Ltd., Manchester, England

Giannini, G. and Figlio, Florence, Italy

Green, J. Barcham, Ltd., Maidstone, Kent, England

Marais, Papeteries du, et de Sainte Marie, Rue du Pont-de-Lodi, Paris

Miliani-Palviano, Cartiere, Palviano, Italy


Portales, Ltd., Whitchurch, Hants, England

Puchois Freres, Paris, France

Rives, Papeteries de, Rives, Isere, France

Rizzi, G., Varese, Italy

Russell, G. W. and Sons, Ltd., Herts, England

Takumi Artists, The, Tokyo, Japan

Val la Laga, Moulins a' Papier, Ambert, Puy de Dome, France

Zerkall Ranker and Sohne, Papierfabrik, Zerkall uber Duren, Germany
Appendix 9 of the Resource Unit

**FORTUNE MAGAZINE INDUSTRIAL REPORTS**

<table>
<thead>
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<th>Year</th>
<th>Company</th>
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<td>Champion Coated Paper Company</td>
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<tr>
<td>1933</td>
<td>Funny Papers</td>
<td>April</td>
<td>44</td>
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<tr>
<td>1934</td>
<td>Simon and Schuster</td>
<td>January</td>
<td>48</td>
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<td>April</td>
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<td>April</td>
<td>63</td>
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<td>Doubleday, Doran and Company</td>
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<td>1941</td>
<td>Container Corporation</td>
<td>December</td>
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<td>1943</td>
<td>Boom in Books</td>
<td>November</td>
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Chapter VII

IMPLICATIONS FOR INDUSTRIAL ARTS EDUCATION

The American Council on Education in 1938 pointed out that the task of teacher education was in part breaking with tradition and also building new concepts in education and a creative approach to the problems of teaching. In this respect, the textbooks used in the preparation of industrial arts teachers do not include sections on the development and use of resource units by teachers.

The needs of industrial arts teachers can be easily identified. They are: content studies, analyses of student needs and wants, information concerning technological changes and projected plans for bringing these changes into the curriculum, continuous notation and experimentation with diversified learning activities, as well as the necessary aids for learning. A special need is to experiment with the development and use of resource units because all teaching methods are involved.

The program needs increasingly to emphasize relationships with industry. Two examples of this type of relationship can be related. As a result of this dissertation, western capital will be used to produce a sound film in color which will demonstrate a graphic arts program involving the use of this study. A second example is the adoption of a proposal by a western publication to devote at least one page each month to the graphic arts and industrial arts education program of the public schools. Both of these industry-school
relationships bear observation, evaluation, and amplification. The activities of the International Graphic Arts Education Association, sponsored by the Education Council of the Printing Industry of America, as well as the Education Committee of the International Association of Printing House Craftsmen, can be cited as examples of organizations willing to assist teachers with their problems. The graphic arts industry is the only industrial group which has such an organization.

The implications which may now be drawn for the industrial arts profession are based on the findings of Chapter II, in part from Chapter III, and especially from Chapters IV, V, and VI. The important thing for any education situation is first, to have a condition of pupil readiness, second, to have access to the subject matter or resources involved and third, to achieve an optimum outcome of pupil growth as a result of the experiences involved. Industrial arts, historically, has always contributed in part at least, to each of these three. Such work has always been interesting, its subject matter specific in a limited or technical way, and its outcomes sufficiently technical and objective to be self-evident, but also in a limited way.

The possibilities for each of the above have been materially strengthened with the advent of the "resource unit." The condition of readiness is at least positive and reasonably high in the hands of a sensitive and skilled teacher, the penetration reported in the
example of the unit on Books, in Chapter VI is shown to be at a maximum, and the greatest gain results from the rich variety of integrational elements or learnings that are shown to be possible and stimulated via the processes outlined for student-teacher evaluation. These imply a variety of conditions which must be present and operating if industrial arts education is to move forward. They especially involve a teacher education situation that extends into in-service and refresher services, an outstanding physical setting, and especially the results of a continuous program of research especially focused on the enormous variety of resource materials involved.

**For Teacher Education.** One of the most perplexing problems concerns the planning of learning units, because so many variations exist. The problem may be traced to conflicting theories of secondary education because each suggests a different role for industrial arts education and a correspondingly different type of teacher planning. When this includes appropriate methods for guiding the learning of adolescents, then the problem presents a challenge for departments preparing industrial arts teachers.

Beyond this is an even greater problem, the selection of content to be included in the industrial arts program. Plans which will implement the intentions of the leaders in the industrial arts movement have failed to materialize. Teacher plans neither reflect the technology, nor the evolving high school curriculum. Yet, both
of these factors were included in the early proposals of Bonser and Russell, Richards and Snedden, as well as in the accepted definition of industrial arts education which appears in the many state courses of study for the program.

The Laboratory of Industries program which Warner created, gave direction and has been generally accepted in all states. The professional journals and books for industrial arts teachers describe a variety of plans for constructing courses of study. The format or suggested sections for courses of study appear valid. Obviously lacking, however, is a frame of reference that reflects the economy, the needs and wants of adolescents, and significant curriculum units in general and special education.

Recent graduates of teacher education programs appear to be more aware than others that a new departure is necessary in planning. Some college programs have introduced their industrial arts candidates to the use and development of resource units through general methods courses. There is evidence, however, that the contents and suggestions of resource units vary. Certainly a course of study of the 1930's should not be repeated with today's resource units. Far too many resource units are merely teaching units with a new name.

Industrial arts teachers should indicate their point of view, but this is seldom done in state or local guides. Because of this, industrial arts teacher education departments should guide their
students in an interpretation of the theories of secondary education and the type of industrial arts programs which would evolve. This should assist immature teachers in their development of a consistent philosophy, and appears to be of major importance.

Resource units have been used by teachers in "core" and in subject type units. They have been used in small and large school systems. They have been developed by individuals and groups of teachers representing various content areas. If more units of this type were available, industrial arts programs would be materially enriched and strengthened. Furthermore, the suggestions contained in a unit would assist teachers to select and use methods appropriate to the needs and diverse capacities of adolescents. Many of the suggested learning activities, books, films, and test items would be duplicated regardless of the unit. Variation would exist in the sections on objectives and evaluation.

Industrial arts teacher education departments should emphasize that students exchange ideas in beginning courses concerning resources and learning activities. Senior students should have an opportunity to develop one or more fairly complete resource units and use these in student teaching. More professors of industrial arts need to become aware of the strengths and weaknesses of resource units as a planning technique. All such programs should include units in which students will be able to demonstrate their ability
to develop and use such units in terms of a consistent philosophy of education.

Bonser was the first to suggest that society was so centered in the industries that industrial arts should become the articulating subject or center for an integrative type of study concerning "the changes which man makes in the forms of materials to increase their values, and of the problems of life involved." Some industrial arts programs since that time have accomplished this, but only incidentally and all too rarely. Creative teachers in isolated locations and a limited number of graduate studies have provided suggestions, but teacher education has lagged in this field.

The units most frequently developed are parallel to traditional and narrow work areas such as mechanical drafting, woodworking, metal working, printing, and the like. Recent proposals suggest a more broadly conceived pattern in keeping with the rapidly evolving pattern of an ever more complex technology. At the same time there it a trend for traditional school subjects to be replaced by functional curriculum units that cut across all subjects. Seldom has the industrial arts program gone this far. However, many schools now have an industrial arts program, in comparison to specialised and incidental, - if not accidental, - shop programs which were so common prior to World War II. The colleges should explore this trend in anticipation of reconstructing their technical and professional
course perspective in order to provide more time for the preparation and development of resource units.

The colleges have a major responsibility for improving the high school curriculum, in which there are three problems encountered, the first concerns the philosophy or theory of education employed, the second concerns the content and scope of the program, and the third concerns the question of methods, techniques, and devices. Because teachers must determine the answers to such problems, the curriculum research and role of the college becomes increasingly important. However, as teachers become capable of developing and using resource units, many good features from previously agreed to plans for teaching, plus more favorable results can be obtained. Industrial arts teachers in particular should become just as proficient in developing and using resource units as they are in the use of tools, machines, and materials.

Unit shop teachers in metropolitan high schools are usually taught by specialists, and frequently represent specialized trade experiences, rather than the industrial arts program as such. Why should not major divisions of the technology be recognised in the process of curriculum analysis and development? This suggests Warner's reference to the following divisions of the technology: Power, Transportation, Communication, Construction, Manufacture, Service, and Management or Personnel.
The development of resource units by teachers provides for their feeling of security. Furthermore, that which results will provide many suggestions for the introduction, development, and evaluation of learning units. New learning units are intrinsically motivated and identified in parallel units. Suggestions for other teachers are available.

Basic moves, as indicated by preceding chapters which should and can be taken by college departments are as follows:

1. **Develop criteria** for selecting, developing, and evaluating resource units for industrial arts programs in terms of the needs, interests, and problems of students in schools represented by the area served by the college.

2. **Develop pilot programs** in the area for illustrating the possibilities.

3. **Assemble a file of resource materials** which can be loaned to teachers in the area.

4. **Serve as a clearing house** for ideas and suggestions for developing and improving resource units.

5. **Provide candidates with the competencies required** to develop resource units for use in their schools.

For In-Service and Refresher Programs. There is evidence that many leaders of industrial arts got lost in the selection and use of content in the schools. Technical courses in the use of tools meet only a limited number of the needs of adolescents. Learning w.
centered in an evolving technology more nearly represent the intent of the industrial arts program today.

Inasmuch as a universal philosophy of high school education will probably never be determined it appears that a first step for all teachers would be to arrive at a consistent philosophy of education and industrial arts education. Once this has been done, the strengths and weaknesses can be discussed. Teachers should:

1. Become more sensitive to the major curriculum role to be played by industrial arts in general education.

2. Prepare statements which incorporate their beliefs as regards: (a) the nature of the individual, (b) the nature of society, (c) the nature of the economy, and (d) the role of the school.

3. Improve their learning activities. They should be able to propose a series of resource units from which pupils can select any one of a variety of units.

4. Plan learning activities that will provide for a balance in student behavior changes and not alone the mastery of tool skills and the employment of mechanical ingenuity.

5. Examine the distribution of time in the evolving high school curriculum in anticipation of the contributions that industrial arts activities can provide to general and special programs.

6. Experiment with resource units and compare the results with previous units as well as with those in other areas.
A variety of techniques can be used to assist teachers who wish to improve their methods. Pre-school conferences, workshops, and committee work have proven value. Book reviews, film evaluation programs, and intensified study of professional literature, parallel if not precede the development and use of resource units.

The values of in-service education for the individual teacher are reflected in the school, in that they more effectively contribute to the total program of child growth and development.

For Additional Research. Chapter I of this study proposed that additional researches should be recommended. These now follow:

1. **Philosophical penetration and refinement**, such as: a comparative analysis of the characteristics of an industrial arts program for the junior high schools based on Justman's *Theories of Secondary Education*.

2. **Adolescent needs and wants**, to include: a study of interests and problems in terms of typical communities in the United States and especially concerning the technical interests of girls.

3. **Free and Low Cost Resources**. Prepare annotated lists of materials which are available for studying the following divisions of industry: power, transportation, construction, communications, manufacturing, the services and management. Also, an index of articles appearing in trade magazines and house organs which are useful for industrial arts teachers but not indexed by Wilson and Company, or others.
4. **Professional.** Do a study which will clarify and illustrate the principles of student-teacher planning. Then do an experimental study of the results of the use of the resource unit on *Books* in a junior high school industrial arts program. Next, do an experimental study of the use of this dissertation with a group of industrial arts teachers who are interested in developing resource units, some of the titles of which are suggested in Chapter VI. Finally, check the opinions of junior high school principals as regards so-called "non-manipulative" activities and "homework" in or with industrial arts classes.

Study the implications of the thesis that industrial arts education makes its best contribution to students who will not enter apprenticable trades.

Examine the validity of changing the name of industrial arts education programs to "Technology" and the name of the physical setting to the "Laboratory of Technology." This implies a major series of researches concerning the physical setting, and especially in industrial arts education.

Do a study which will identify techniques to be used to break the barrier of concepts which confuse industrial arts education with its heritage of manual or hand training as the principal method of teaching.

Identify superior practices in the many school programs which have developed.
Survey the opinions of professors of general methods elected by industrial arts students concerning their understanding of the nature and the extent of industrial arts in the public schools.

Do a series of studies similar to this for special area teachers, i.e. woodworking, drafting, electrical, metal work, plastics, handicrafts, and auto mechanics.

This chapter points to some changes which can be made by industrial arts teachers as they plan for an optimum result in learning. Direction is given in this study to the problem of planning consistent with the purposes of general education, with the needs of adolescents, and with the concepts of industrial arts education. Teaching methods suggested and illustrated in Chapter VI should give aid to teachers interested in the diverse capacities of their students.
Chapter VIII
SUMMARY AND CONCLUSIONS

This dissertation concerns curriculum organization and method in industrial arts education with reference to the preparation of junior high school teachers, and features the development of a resource unit from the graphic arts industry, which is called, Books.

Summary. The problem is defined in Chapter I and the hypotheses involved are identified and developed in Chapter II. These are based on the postulates that have been presented by such leaders as Richards, Bonser, Warner and others. They concern the individual, the social order, the economy, and the school,—then especially the junior high school movement,—which is the subject of Chapter III.

Chapter IV examines the American program of industrial arts education and Chapter V analyses the problem of curriculum procedures especially those integrational types which occur in core curricula, or at least where richly conceived "resource units" are required. The development of one of these on Books, comprises the presentation of Chapter VI, which is in nine Sections as follows:

A. Nature
B. Philosophy
C. Purposes
D. Scope
E. Content
F. Activities
G. Evaluation
H. Development
I. Leads

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Chapter VI concludes with nine especially valuable Appendices:

1. Technical Bibliography  
2. Professional References  
3. Periodicals  
4. Films  
5. Free Materials  
6. List of Theses  
7. Other Researches  
8. Foreign Papers  
9. Fortune Magazine

Description of the Unit. Section V of the resource unit on Books, includes a total of 33 specific activities under 12 headings all the way from a variety of manipulative activities to a vocabulary analysis or "spelling bee." It has breadth and penetration, and is especially rich in interest as well as integrational outcomes such as history, language, mathematics, science, vocation and industrial orientation.

Recommendations. The richness, effectiveness and integrational possibilities of the unit derived, presented and evaluated to exemplify curriculum procedures in industrial arts teacher education,—in addition to the background materials presented in Chapters II, III, IV, and V,—make it possible to reach the following professional recommendations:

1. Viewpoint. The profession obviously needs to raise its sights concerning both subject matter penetration and method, and especially concerning the development and use of resource units.

2. Research. The rapidly evolving technology has progressed far beyond the comprehension and practice of the industrial arts
profession which means that a coordinated program of curriculum research needs to be organized by all leadership agencies: industrial, institutional, governmental, associational, and fraternal.

3. **Industrial Participation.** The industries themselves need to be stimulated to participate more widely. The examples of John Woodman Higgins (Steel), Dard Hunter (Paper), and Edward D. Libbey (Glass), in behalf of the industrial arts profession are especially suggestive. Millions of dollars are spent regularly by the industries on developmental research, but their relationship to the schools is neglected.

4. **Curriculum Development.** This too must be a continuous process. It requires organization, experimentation and evaluation like that presented in Chapter VI.

5. **Teacher Education.** Reference is made here to the reorientation of both technical and professional courses and to in-service as well as to refresher courses on both bachelor's and master's levels.

6. **Administration.** Federal, state, county and municipal school authorities are called upon to foster curriculum development and especially resource units. The responsibility for progress is theirs.

7. **The Literature.** This is in extremely short supply and needs to be stimulated, provided it is developed on a research basis.

8. **Motivation.** The professional associations, the honors groups, and salary awards or bonuses, should provide the necessary stimulation for expediting these recommendations.
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I, DWIGHT W. NICHOLS, was born at Jackson, Ohio on July 28, 1911. My elementary and secondary education was received in the Jackson, Ohio, Public Schools where I was graduated in 1929. My Bachelor of Science and Master of Science degrees were granted by The Stout Institute, Menomonie, Wisconsin, in 1941 and 1947 respectively.

I have taught industrial arts in the elementary schools of Franklin County, Ohio, and the secondary schools of Ripley, Coalton, Oak Hill, and Yellow Springs, Ohio. I was an Educational Advisor in the Civilian Conservation Corps. I was an Assistant at The Stout Institute during 1946-47. From the Fall of 1947 and through the Summer of 1949, I taught industrial arts at The Ohio State University as an Instructor in the Department of Education. I have been an Associate Professor and Director of Industrial Arts Education at San Francisco State College, California since September 1949.


I was appointed Consultant on Industrial Arts for the San Francisco Board of Education in 1950, and have served in similar capacities to other California schools. I serve the Printing
Industries of America, Inc., as a member of their committee evaluating graphic arts education curricula in secondary schools and colleges.

My associational memberships include: The American Industrial Arts Association, The California Industrial Education Association, The American Vocational Association, The International Association of Printing House Craftsmen. I am Regional Vice-President of the International Graphic Arts Education Association. I am a member of Phi Delta Kappa, honorary in education, and a Laureate Member of Epsilon Pi Tau, international honorary professional fraternity in industrial arts education.

During World War II, I served as a civilian instructor in the U. S. Navy Teacher-Training Center at Chicago and in the Aviation Technical Training Center at Norman, Oklahoma. I was later made a non-commissioned officer in the Fourth Air Force Technical Training Command. My last military assignment was with the rank of Sergeant Major.