

T H E S I S

on

INDUSTRIAL ARTS OBJECTIVES
(A Study of Oregon and Adjoining States)

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INDUSTRIAL ARTS OBJECTIVES

INTRODUCTION

Changing conceptions. Practical arts, as school subjects, are at present undergoing some very radical changes. A distinct change in the philosophy of education is noted by such men as F. G. Bonser, Frank McMurray, Dean James E. Russel and other leaders in educational thought. This changing philosophy has resulted in beginnings of decided changes in the method of teaching industrial arts, one of the phases of the practical arts subjects. With these changes it becomes necessary to reinterpret industrial arts in terms of its contribution to the field of general education.

It is the purpose of this study

1. To define the relationship existing between the industrial arts and the present needs of education.
2. To determine the objectives that are striven for by the teachers now in the field.
3. To link the objectives to the major activities of life as outlined by leading educators.

In order that the discussion of the objectives may be more clearly understood, their treatment is preceded by a brief discussion of the salient facts concerning education in general. This preliminary discussion is primarily concerned with the major activities of adults and with what may be termed the major activities of children. Comparisons are made in terms of recent trends in the field of general education as sponsored by leading educators.

Industrial arts a phase of the practical arts.

In order that there may be no confusion in the terms practical arts and industrial arts, their definitions are briefly set forth herewith. Practical arts is a title used in education to refer to those activities of men and women which produce, or render available material goods for human use or consumption. It is apparent that this definition comprises a very large portion of human activities. For educational purposes practical arts is divided into five major groups:(1)

1. Household Arts

Cooking, needlework, etc.

2. Hunting Arts

Game hunting, fishing, berry hunting, nut hunting, etc.

(1) Reconstruction of Industrial Arts, Snedden, David and Warner, W. E., p. 8, 1927.

3. Agricultural Arts

Gardening, crop raising,
animal husbandry, etc.

4. Commercial Arts

Bartering, salesmanship,
typing, records, filing, etc.

5. Industrial Arts

Handicraft, machine fabrication,
change of materials, as
wood, metal, fiber, leather, etc.

Industrial arts is only one phase of the practical arts subjects, and is more completely defined in terms of materials in part III of this treatise.

I. SALIENT FACTS CONCERNING EDUCATION.

Major activities compared. An excellent conception of the object of all education, however attained, may be had by making a comparison of the listing of major activities as given by prominent educators:

MAJOR ACTIVITIES ACCORDING TO BOBBITT⁽¹⁾

1. Language activities; social intercommunication.
2. Health conservation through habitual safeguarding practices.

(1) Technique of Curriculum Making by Harap, H. A.
1928 pp. 19-21.

3. Health conservation based upon applied knowledge of technical hygiene.
4. Health conservation through bodily development and exercise.
5. Cultural participations.
6. Moral behaviors.
7. Civic behaviors.
8. Religious behaviors.
9. Personal and household regimen.
10. Vocational participations.

MAJOR ACTIVITIES ACCORDING TO CHAPMAN AND COUNTS (1)

1. Caring for the body.
2. Rearing children.
3. Organizing for civil action.
4. Securing economic necessities.
5. Engaging in recreation.
6. Satisfying religious cravings.

MAJOR ACTIVITIES ACCORDING TO BONSER (1)

1. Maintaining and preserving life and health through the use of material necessities of life and appropriate care of the body.
2. Producing the necessities and luxuries for which man feels the need and making them valuable through exchange.

(1) Harap, H. A. Op. Cit., pp. 19-21.

3. Cooperating with others in maintaining the protective and regulative measures for the common good, the institutions of life, the family, the state, the vocation, the school and the church.
4. Occupying leisure in pursuits engaged in for the enjoyment they yield.

MAJOR ACTIVITIES ACCORDING TO THE COMMISSION⁽¹⁾
ON THE REORGANIZATION OF SECONDARY EDUCATION

1. Health.
2. Command of fundamental processes.
3. Worthy home membership.
4. Vocation.
5. Citizenship.
6. Worthy use of leisure.
7. Ethical character.

With a view to securing an entirely composite group of major activities, the entire list was compared, carefully, and a new list prepared that seemed to embody all the ideas expressed by the authorities. This list appears below.

COMPOSITE MAJOR ACTIVITY GROUP

1. Health.
2. Command of fundamental processes.
3. Worthy home membership.
4. Vocation.

(1) Harap, H. A. Op. Cit. pp. 19-21.

5. Citizenship.
6. Worthy use of leisure.
7. Ethical character.
8. Cultural participations.
9. Social activities; mingling with others.

Education and major activities. If the activities in which we are likely to engage are our ultimate aims, then of necessity these activities must become the aims of education. Major activities of adults should, then, become the aims of education. The degree of one's education may be measured by judging to what extent the individual has become proficient in the major activities. Inglis has defined education as "The method of producing, directing, and preventing changes in human beings."⁽¹⁾ Bobbitt says: "Education is to prepare men and women for activities of every kind which make up a well rounded adult life."⁽²⁾ Meriam defines education as, "a means to help boys and girls do better in all those wholesome activities in which they normally engage."⁽³⁾ Salisbury says: "The objective of all education is to help the individual to help himself to grow aright. He gains in ability to grow through experience,

(1) Inglis, Alexander James. The Principles of Secondary Education, 1918, p. 3.

(2) Bobbitt, J. Franklin, How to Make a Curriculum, 1923, p. 7.

(3) Meriam, C. J. Child Life and the Curriculum, 1920, p. 137.

activity, and interest. He learns to do by doing. There can be no growth apart from self activity."⁽¹⁾ Another definition that may be found useful is that the aim of education is to help the person do well those things which he most likely will need to do.

Perhaps a more complete definition may be had by enlisting the use of one or more of the 'major activities lists'. With the use of the composite list we may arrive at the following definition:

EDUCATION AIMS:

1. To help one gain and retain health, both of mind and of body.
2. To help one gain the command of the fundamental processes.
3. To help one become a worthy member of his home.
4. To help one choose and learn a vocation.
5. To help one become a useful citizen.
6. To help one use his leisure properly.
7. To help one become moral and properly religious.
8. To help one gain some cultural background.
9. To help one become a social being.

Proper skills, habits, attitudes, ideals, and knowledges of these major activities is the ideal of education for present day needs.

(1) Salisbury, E. I. An Activity Curriculum, 1924 p. 35.

Exploration. It is sometimes a much simpler problem to decide what should be taught than it is to properly do the teaching. To vitalize a program of education is, indeed, a difficult task but it is just as important, perhaps more so, than the program itself. And yet the problem of what to teach too often is solved by chance or by precedent. In accordance with the sound doctrine that children learn by doing, it is well to examine the major activities of children and compare them with the final desired result in the adult. This may be done by listing the activities of the adult and of the child so that a comparison may be made. Such a comparison is attempted below.

Adult

Child

Health

Active in a health pro-	:	Active in learning a
gram that he has found	:	health program. Discover-
most efficient for him-	:	ing the program that best
self through practice	:	fits his need.
and learning.	:	

Fundamental Processes

Active in the proficient	:	Active in discovering the
use of those fundamental	:	use of fundamental processes
processes that best fit	:	and in determining the ones
his needs.	:	that best fit his needs.

Worthy Home Membership

Active in being a : Active in discovering the
 :
 worthy home member. : program of worthy home mem-
 :
 : bership.

Vocation

Actively engaged in a : Active in exploring the vo-
 :
 vocation. Earning a : cations. Simulating adult
 :
 livelihood and contri- : activities in play. Active
 :
 buting to the common : in the vocation of attending
 :
 good. : school.

Citizenship

Active in the affairs : Active in school citizenship
 :
 of citizenship as re- : and in larger fields to the
 :
 quired by society and : extent of his ability. Ac-
 :
 desired by the indi- : tive in discovering the
 :
 vidual. : meaning of citizenship.

Leisure

Active in use of de- : Active in school leisure
 :
 sirable leisure. : program. Active in find-
 :
 Hobbies and avoca- : ing the use of leisure to
 :
 tions. : best advantage.

Ethical Character

Active in proper : Active in discovering the
 :
 ethical relationships. : proper ethical relationships.
 :
 : Maintaining proper ethics to
 :
 : the extent of his ability.

Cultural Participations

Active in enjoying the	:	Learning to appreciate
	:	
culture of the race to	:	present day culture. En-
	:	
the extent of his	:	gaged in a study of contri-
	:	
ability	:	butions of past generations.

Social Activities

Active in helpful and	:	Active in learning to be-
	:	
constructive social	:	come a social being.
	:	
activities.	:	

In the comparison of the major activities of adults with those of children, it is apparent that there is one chief difference, namely that the adults are actively engaged while the child is merely learning to become engaged in the major activities. The extent of the child's activity is dependent upon his progress in the major activities. Thus we may add as a major activity of the children's program another item which is commonly called learning, but which might better be called in a vitalized program, "directed explorational activities." It is these directed activities that lead to the attainment of the major activities as a goal.

It will be observed that all the major activities of adults present to youth the element of discovery or of exploration. In the health program the child is led

to discover what policies are most conducive to his good health. Often the individual needs to make his own exploration to find the program that best fits his needs. In health, as in other major activities, it becomes necessary to guide the child through an exploratory period in order to provide him with a basis for building his own health program. Even in as basic an activity as that of fundamental processes we find it necessary to provide exploration. To the child the whole process is one of discovery. The matter of selecting or engaging in a vocation is to the child an exploratory process. In a broad way we may say that a major activity of children which ranks of first importance is that of exploration.

The exploratory element as a factor in human activities in the past has played an important part in the development of our present civilization. In early history this exploration took the form of discovery of new lands and territories. This form of exploration has not entirely disappeared as is exemplified by the present Polar Expedition by Commander Byrd. The present important role of exploration is found in its application to scientific and industrial discoveries.

That exploration is a native instinct is shown by the fact that people never grow too old to use the

words, "I wonder," "Try this" and other similar expressions that typify explorational activities. Exploration is based upon the instinct of curiosity but is more than curiosity since it implies action. The radio fan turns and adjusts the dials to get new stations. The Sunday excursionist takes another road, the housewife attempts a different combination for cakes and the farmer plants his crop on a different kind of soil. All these various activities are the result of motivated curiosity or exploration.

Most children are fortunately endowed with curiosity and for the most part are able to motivate this endowment. The child's limitation is found in the fact that the field for his exploration is limited. It is here that the teacher steps in to furnish the field for his exploration, and motivate his curiosity when necessary.

It is obvious that the entire field of human activities can not be furnished the child all at one time. The child's explorational activities are a gradual unfolding. In general, for teaching purposes, children may be divided into four groups in which the major activities play varying roles. The following listing shows the age distribution and the relative importance of the various activities during the different periods.

Children of Pre-school Age (1-6 years).

- " of Elementary School Age (6-11 years).
- " of Junior High School Age (12-14 years).
- " of High School Age (14-).

Prior to school age the child engages in a very few activities:

1. Fundamental processes. (Learning to talk, count or add).
2. Leisure. (Learning to play alone and with children).
3. Ethical. (Home training towards honesty, etc.)
4. Vocations. (Simulating adults in play, dishes, dolls, wagons, etc.)

During the elementary school period the activities list increases. The list may be summarized as follows:

1. Fundamental processes. (Emphasis on reading, etc.)
2. Leisure. (Continues to learn to play).
3. Social activities. (Parties, attendance at school).
4. Vocations. (Continued simulations of adults).
5. Ethical. (Continues ethical learning in groups).
6. Citizenship. (Learning proper behavior).
7. Health. (Discovering elements of the health program).

The activity in this period that should receive the greatest attention is that of the fundamental processes. This period in the child's life is essentially one of unification, in which he begins to fit himself into his surroundings. In both these periods, the exploratory activity appears. The very familiar example of the child burning himself to find out that the stove is hot provides an excellent example. The desire on the part of boys to take things apart, especially toys, demonstrates the exploratory activity. There are countless examples of these voluntary and unguided tryouts in which every normal boy and girl engages.

The next period in the child's life is marked by the tendency to become socialized. With the completion of the unification process which may ordinarily be completed by the time the child is twelve years of age, it should next be concerned with the matter of socialization. The major activities which are important at this stage are as follows:

1. Health. (Individual and group).
2. Leisure. (Use of leisure as a group).
3. Ethics. (Group conduct).
4. Citizenship. (Group activity).
5. Vocations. (Exploration for guidance).

This period is one of tryout experiences for all chil-

dren in discovering their aptitudes for vocations or for education. These tryout or exploratory experiences should be under competent guidance so that the child can secure an adequate conception of what lies before him.

From the period of fifteen years and on, the activities again change in importance as follows:

1. Citizenship.
2. Cultural participations.
3. Vocations. (Specialization, learning a trade, etc.)

As in the junior high school period, all the other major activities are incorporated in an incidental way, their degree of its importance depending upon the individual.

A very clear conception of the major activities of the four periods is summarized in table I.

TABLE I.

Important	Pre-school period.	Incidental
1. Command of fundamental processes.	1. Health. : : : 2. Leisure.	

Pre-school period (Continued).

<u>Important</u>		<u>Incidental</u>
2. Ethical.	:	3. Exploration.

Elementary school period (6-11 years).

<u>Important</u>		<u>Incidental</u>
1. Fundamental processes.	:	1. Home membership.
2. Leisure.	:	2. Mingling.
3. Health.	:	3. Vocations.
4. Ethical.	:	4. Exploration.

Junior high school period (12-14 years).

<u>Important</u>		<u>Incidental</u>
1. Citizenship.	:	1. Command of fundamental
2. Health.	:	processes.
3. Exploration.	:	2. Cultural participa-
4. Worthy home member-	:	tions.
ship.	:	3. Social activities.
5. Leisure.	:	
6. Vocations.	:	

Senior high school period (15 years on).

<u>Important</u>		<u>Incidental</u>
1. Vocations	:	1. Fundamental processes.
2. Citizenship.	:	2. Exploration.
3. Health.	:	
4. Leisure.	:	
5. Worthy home membership.	:	

Senior high school period (Continued).

<u>Important</u>	<u>Incidental</u>
6. Cultural participa-	:
tions.	:
7. Social activities.	:
8. Ethical character.	:

The method by which this program of activities is tied to the present organization of secondary schools is shown by table II. This chart is adapted from Inglis in which he defines the various types of secondary schools in terms of their basis for admission, their purpose, their content, the nature of the guidance program and the types of pupils.

TABLE II.

Elementary school.

<u>Basis</u> <u>for</u> <u>Admission:</u>	<u>Purpose</u>	<u>Content</u>	<u>Guidance</u> <u>Program</u>	<u>Types</u> <u>of</u> <u>Pupils</u>
Minimum age de- fined by law. Similar needs.	To teach things which are the common need of all.	Acts in which chil- dren parti- cipate, have same degree of knowl- edge, skill and ability. No election of subjects by the student.	To explore interest and abili- ty for purpose of determin- ing school progress. To guide into activities of his abilities.	Similar tenden- cies of thought action and feelings and sus- ceptible to a com- mon appeal.

TABLE II (Continued).

Junior high school.

Basis for Admission:	Purpose	Content	Guidance Program	Types of Pupils
Varying needs. Training for com- mon needs in mini- mum essen- tials.	To pro- vide in- dividual differ- ences. To adapt to psy- chology of early adoles- cence. To con- tinue unifica- tion pro- cesses of elementa- ry school.	Experiences of unifying nature. Vo- cational training for those who will not enter high school. Preparation for high school. Try out courses. Continuation courses.	To find life ca- reer. To keep pu- pils in school. To place in work and fol- low up.	Early ado- lescence. Those who will fin- ish high school. Those who will not.

Senior high school.

Junior high gradu- ates.	Continue purpose of the junior high. Training parallel to human activi- ties.	Curriculum in agricul- ture, indus- try, trade, commerce pro- fessions. Training in common fields of experi- ence. Try out courses, continuation courses. Preparation for college.	College choice. Curricu- lum selec- tion. Orienta- tion in vocation and avo- cation.	Those going to college. Those not going.
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Summary: This brief outline of educational philosophy has been given for the purpose of making it easier for the reader to tie up the Industrial Arts program with the major activities of life. Education should be based upon the major activities of adults as exercised at present or likely to be exercised in the near future. In order that children may become desirable citizens as we know them, it is necessary to train the children in the major activities of adults. This means that the children must simulate the activity program of the adults. It is the teacher's task to adjust the activity program to the children and to motivate it when necessary. Since the child is discovering and is adjusting his activities to those of adults, this additional activity may properly be termed exploration. In other respects, except as to time of usage and degree of application, the activity program of children is much the same as that of adults.

II. THE USE OF MATERIALS IN TEACHING

History of use of materials. Perhaps there has never been a time in the history of education in which teaching was conducted without the use of materials. Materials and mentality are practically inseparable. No teacher ever gives a lesson or solves a problem in which no reference is made to materials. The use of the material, however, has been employed in a very haphazard way. Usually the material is merely referred to and not actually used in the class room. Evidence of the haphazard method in the use of materials is had by examining the present practice in elementary schools. One is surprised by the various kinds of materials used and by the variety in the method of class presentation. The high school, in the past, probably has been just as variable as have the grade schools, but somewhat more effort has been made in recent years to determine how materials may best be used in teaching high school subjects.

The following outline gives a very brief history of the introduction and use of materials for teaching purposes:

1860 - Dr. A. E. Sheldon, supt., Oswego, N. Y., introduced the PESTALOZZIAN principles.⁽¹⁾

(1) Bonser, F. G. and Mossman, L. C. Industrial Arts for Elementary Schools, 1923, pp. 464-468.

1876 - Centennial Exposition at Philadelphia featured an exhibit of joints and tool exercises in wood.

1876 - Runkle established School of Mechanic Arts at Boston (M. I. T.), as a result of the interest in the Russian exhibit. (1)

1879 - Woodward established the first manual training shop, The St. Louis Manual Training School. (1)

1886 - Gustaf Larsson, a Swedish educator, introduced the Swedish Sloyd in Boston. (2)

1890 - Thirty-eight high schools taught manual training similar to the St. Louis School. (2)

1890-1900 - saw the spread of the manual training course. (2)

"At the close of the nineteenth century there is seen to be a gradual change in the emphasis placed on manual training and the point of view held toward it." (2)

This change was brought about largely by the influence of the teachings and philosophy of John Dewey. The following diagram gives a graphic picture of the evolution of the trend of methods in the use of materials in teaching:

(1) Bonser, F. G. and Mossman, L. C. Op. Cit. pp. 464-468.
 (2) Snedden, David and Warner, W. E. Op. Cit. pp. 5-8.

Brief Summary of Trend of Industrial Arts.

ITEMS COMPARED : EARLY PRACTICES : MODERN TRENDS		
1. Terms used.	: Manual training,	: Practical arts,
	: sloyd, arts and	: industrial arts.
	: crafts, manual	:
	: arts.	:
<hr/>		
2. Type of	: Wood shops and	: General and unit
shop or	: metal shops.	: shops, excursions,
laboratory.	:	: boy life, and home.
<hr/>		
3. Core of	: Subject matter.	: A growing boy or
teaching	: Wood to be	: girl.
situation.	: shaped.	:
<hr/>		
4. Materials	: Making models	: Available industrial
and activ-	: and joints as	: material; activities
ities.	: perscribed.	: of observation,
	:	: construction, recrea-
	:	: tion, investigation,
	:	: experimentation and
	:	: evaluation.
<hr/>		
5. Objectives.	: Training skill	: Better choosers and
	: and transfer.	: users of products.
	: "Skilled hand,	: Better attitudes
	: cultured mind."	: toward industry; ex-
	:	: ploration for gui-
	:	: dance.
<hr/>		

Brief Summary of Trend of Industrial Arts (Continued).

ITEMS COMPARED : EARLY PRACTICES : MODERN TRENDS		
6. Emphasis	: Manipulation,	: Activities as in 4.
placed on.	: hand work, skill,	: Outcomes judged by
	: learning, keeping	: habits, knowledge,
	: busy.	: skill, appreciation
		: and attitudes.
7. Selection	: Stated series of	: Projects challeng-
and	: exercises, tech-	: ing activities
arrangement	: nical and logi-	: arising from pres-
of curricu-	: cal.	: ent day settings,
lum materi-		: psychologically
als.		: organized and
		: treated.
8. Class or	: Based on doctrine:	: Experience in real
laboratory	: of formal dis-	: situations with real
method used.	: cipline. Logi-	: products and occupa-
	: cal steps, dic-	: tions.
	: tated directions.	
9. Results	: A great deal of	: Desirable differ-
functioning	: some type of lim-	: ences in conduct,
in.	: ited skill and	: abilities, attitudes,
	: some culture.	: knowledges, habits,
		: and industrial
		: skills.

10. Elements	:	Exhibits at Cen-	:	Changing industries,
causing	:	tenial Exhibi-	:	changes in the phi-
change.	:	tion. Opinions	:	losophy of teach-
	:	of prominent	:	ing, measuring re-
	:	educators.	:	sults in objectives
	:		:	and criteria based
	:		:	on above, research.

Industrial arts defined. Practical arts has previously been defined as a title assigned in education to activities of men and women, which activities produce or render available material goods. It has been suggested according to the outline on page 2 that industrial arts is one phase of the title subject "practical arts." Bonser defines industrial arts as a "study of the changes made by man in the forms of materials to increase their value and of the problems of life related to these changes."⁽¹⁾ Another definition by L. L. Winslow is: "Industrial arts is the art of manufacture in which skill and creative ability are employed, either in the conceiving or in the forming of a product of utility in accordance with the

(1) Bonser, F. G. and Mossman, L. C. Op. Cit. pp. 464-468.

principles of design." (1) (2) Payne says: "Industrial Arts is a school study from the social as well as the material side - a cultural study with the emphasis upon the how and why of industrial life." As indicated by the trend chart above, the early teachers of manual arts defined the term as hand work with materials that afforded physical discipline or even mental discipline. Others defined it as a subject designed to train boys in trade work.

By a strict interpretation of Bonser's definition, we may read household or other arts into the program. The second definition might preclude many industrial phases which do not include design. With this definition, the study of lumber manufacture might be omitted.

A better understanding of industrial arts may be had if we list the materials that may be used as subject matter. By careful grouping this list may be made quite comprehensive. The wealth of industrial materials makes it practically impossible to secure a complete outline.

(1) Article by L. L. Winslow, Ind. Arts Mag. March 1928 pp. 385-387.

(2) Payne, Arthur Frank. The Administration of Vocational Education, 1925, p. 26.

The following list of materials is a modified form of one prepared by L. L. Winslow.⁽¹⁾

Kinds of Industrial Arts Products

Fabrics: Felt, textile, net and costume.

Precious metals: Gold and platinum (jewelry), silver
(table ware, flat ware, etc.)

Copper, brass and bronze: Builders' hardware, musical
instruments, grill work (hinges, coronets, etc.)

Pewter: Flat ware, hollow ware, ornamental ware, etc.

Iron and steel: Builders' hardware, lighting fixtures,
grill work, autos, locomotives, machines,
accessories, tools, etc.

Glass: Window panes, table ware, bottles.

Ceramic products: Pottery, porcelain, china, brick, etc.

Wood: Furniture, buildings, vehicles, boats, toys,
paper, etc.

Paper: Wall, printing, etc.

Bone and ivory: Novelties, buttons, handles, etc.

Synthetic materials: Pyroxylin, bakelite, etc.

Building stone: Marble, quartz, cement, etc.

Industrial arts is concerned with the study of the materials mentioned, and other materials that may

(1) Winslow, L. L.: The Analysis of Industrial Arts. The Industrial Arts Magazine, Volume 17, pp. 385-388, N°28.

have been omitted, with relation to the changes made by man in these materials. But if these raw materials are to be shaped there must be a language by which the shaping processes may be expressed. Shapes, relationships and intricately formed members can not be expressed or specified in verbal form alone. The language for such expression is known as graphic art or more commonly as mechanical drawing. For purposes of further study the various industrial arts subjects may be divided into these several groups:

I. Graphic Arts, a study of the technique of concise expression.

Mechanical drawing, freehand drawing, sketching and printing.

II. Mechanic Arts, a study of the transformation of solid materials.

Wood, metal, bone, building stone, etc.

III. Plastic Arts, a study of the transformation of plastic materials.

Cement, brick, ceramics, rubber, bakelite.

Summary: Materials have always been a part of the program of education because they are inseparable from it. No defined method of using materials in teaching was employed until, under the direction of

Dr. A. E. Sheldon, the Pestalozzian principles were introduced to America. The period from 1876 to 1890 saw the beginnings of manual training and the following decade saw the movement spread. Materials are being employed in teaching at the present time to a greater degree than ever before. They find a large place in the teaching of all laboratory subjects and in many of the more academic branches. Certainly they reach a plane of high importance in the industrial arts program.

III. OBJECTIVES IN INDUSTRIAL ARTS

Opinions concerning objectives. In the past, manual training merely selected one of the predominant materials, usually wood, and used this material as a means of training for hand skill in the production of some object. That this condition still exists is shown by the fact that the term 'manual training' is still emphasized in the terminology of shop teachers. The following table is a good illustration of this fact: (1)

TERMS	(1)	(2)
	OHIO. Frequency of mention	OREGON. Frequency of mention
Manual arts	113	3
Manual training	110	39
Industrial arts	74	7
Vocational training	45	1
Industrial arts education	37	
Trade work	30	2
Practical arts	26	
Technical teacher	17	
Farm shop	13	28
Mechanic arts	13	3
Construction work	11	

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- (1) Warner, W. E. Policies in Industrial Arts, 1928, p. 8.
 (2) Compiled from results of the questionnaire sent to Oregon teachers for this study.

Industrial work	9	
Arts and crafts	8	
Woodworking	2	2

From the frequency of mention of terms it will be noted that the emphasis is still on the formal training known as manual training. This term is in disrepute among progressive teachers. The old type of formal discipline in industrial education is rapidly finding disfavor because of the fact that so little contribution is made toward attaining the major activities of life. The fact that the skill which a boy attains in junior high school is not transmitted, to any marked degree, to the trade or vocation in which he afterwards engages is regarded as sufficient evidence that such training does not have much vocational value. The failure of the manual training to contribute in a functional way to vocational training has discredited the formal discipline idea as it concerns manual training.

Regardless of this lack of vocational training value the industrial arts work has enjoyed a considerably increasing popularity. This fact, combined with

the knowledge that no vocational value could be attached to the teaching of industrial arts, has resulted recently in a critical study of the industrial arts work for the purpose of determining what its real contribution to general education might be. This general tendency to analyze the subject may be attributed in part to John Dewey and his teachings of "specific abilities." A large part may be ascribed to the professional improvement of teachers engaged in the teaching of industrial arts subjects. The need for research is being accepted and at present we have a few institutions that have established research bureaus. Because of the recency of the establishment of these bureaus very little information is available as to the actual contribution of industrial arts to general education. It is probable that these contributions may never be accurately measured and that we may arrive at their values only by analysis. What the teachers, leaders and educators think may also provide a means of arriving at some definite conclusions. The following list has been selected from a great variety of sources. A composite list, compiled from these several sources will be found immediately following these references. The capital letter preceding the stated objective is used to

show its classification in the compiled list. See page 44.

TYPICAL OBJECTIVES OF INDUSTRIAL ARTS SUBJECTS AS STATED
BY LEADERS IN THIS PHASE OF EDUCATIONAL THOUGHT

F. G. Bonser (1)

- N. 1. The vocational purpose. The vocational
- C. study of an industry includes provision for gaining both a knowledge of its processes and sufficient practice in their execution to develop skillful and efficient production.
- D. 2. The general educational purpose. The purposes or outcomes of the general study are realized in the degree in which it helps one to become efficient in the selection, care and use of the products of industry and to become intelligent and humane in the regulation or control of industrial production.
- 3. Specific values:
 - L. The health purpose. (Remote objective).
 - D. The economic purpose.
 - D. The art or aesthetic purpose.
 - K.
 - I. The social purpose.
 - G. Recreational purpose.

(1) Bonser, F. G. and Mossman, L. C. Op. Cit. pp. 27-36.

To the specific values gained by industrial arts, Bonser assigns various purposes: "To health, a study of industrial arts provides for better clothing, better lighting, better heating facilities, etc. Many of the units of industrial arts provide us with the information that makes for wholesome and intelligent attitude in caring for health, giving reason and reinforcement for the formation of health habits." To the economic purpose he ascribes the knowledge and ability to gauge the proper values of the things we use in everyday life. To art he ascribes appreciation of workmanship. With regard to the social purpose he has this to say: "The social purpose in the study of industrial arts is realized in the measure that this study helps us to be intelligent and sympathetic in the regulations of the conditions of production so that employers, employees and consumers shall all receive complete fairness and justice in the production or use of the products." Concerning the last mentioned specific value, recreation, he says: "To develop an intelligent, permanent interest in the changes and progress of industry is believed to be a worthy purpose in the study of industrial arts." These values are ascribed primarily to the elementary grades but are equally applicable in any grade in secondary education.

Dr. Snedden: (1)

- F. 1. Prevocational training. "Let us assume
B. the case of a boy who takes a fairly
extensive and rigorous course in woodwork-
ing in the junior high school. If
such a boy later enters an apprentice-
ship in cabinet making, it is probable
that in some noteworthy degree, his
school shop woodworking would prove
functional as prevocational preparation."
- C. 2. Vocational guidance objective: "When,
as a consequence of participation in
certain studies, learners discover either
distinct aptitudes or distinct inaptitudes
to such an extent as to permanently
attract them to or repel them from the
vocations utilizing such studies, then
it is a fair inference that these studies
have served a useful purpose in giving
vocational guidance."
- K. 3. Centers of correlation. "When abstract
forms of training are required in school
courses, it becomes important for educa-

(1) Snedden, David and Warner, W. E. Op. Cit. pp. 27-36.

tional method that concrete materials of reference, application, or interpretation be supplied in abundance, and that these be as realistic and interesting as practicable." (1)

- E. 4. Handyman avocations. "It is clearly
H. one of the possible functions of the junior high school to train prospective handymen." (1)
- D. 5. Utilizers appreciations. "A boy of fifteen who has made a table or bookcase suited to his parental home has necessarily acquired a kind of realistic experience with cabinet woods and processes which might be of significance to him when later he comes to buy furniture for his own use." (1)
- I. 6. Social insights. "One of the possible
D. values of industrial arts is to assist young people to attain at least some fragmentary experiences with realistic machines and the other processes involved in production." (1)
- H. 7. Training the hand and eye. (1)

(1) Snedden, D. S. and Warner, W. E. Op. Cit. pp. 27-36.

- L. 8. Developmental experience. "The 'nurtural values' of stories, of pictures, of social contacts, of exploration, of nature, of music, and of the use of tools are steadily gaining in educational appreciation."

Bobbitt and Cox: (1)

- E. 1. Ability to perform unspecialized activities about the house, basement, yard, garage, garden, motor car, etc.
- D. 2. Ability as a consumer to judge the qualities and values of the products of specialized occupations.
- G. 3. Ability, disposition and habit of observation and reading of things in the world of productive industry as enjoyable and fruitful leisure occupations.
- I. 4. Proportional intellectual apprehension
D. of the world of productive industry,
 of the specialized occupational groups
 which compose it, and of tools, machines,
 raw materials, processes, products, etc.,
 involved. Ability to think in terms of
 reality.

(1) Bureau of Education, Wash. D. C. The Preparation of Teachers by William T. Bawden. Industrial Education Circular # 22, March 1924. pp 12-25.

- A. 5. Ability to choose a vocation.
- C.
- L. 6. A disposition and habit of being up and doing independent, active and positive in one's home life and one's affairs in general.
- L. 7. A disposition and habit of holding one's practical labors to reasonably high standards of performance; of always doing one's best.
- D. 8. Ability to appreciate training and skill required of craftsmen or mechanics and the value of their contribution of service to society.
- D. 9. Ability to appreciate the value of organization, management and quantity production in industry.
- D. 10. Ability to offer better judgment and sympathetic understanding of the problems of labor and capital, and a realization of the necessity for greater cooperation between these two..public agencies.

Touton and Struthers: (1)

- N. 1. Ability to gain necessary information concerning shop theories and to apply, safely and efficiently, shop processes to real situations.
- H. 2. Ability to use shop tools and machinery
J. in the construction of useful and decorative models.
- D. 3. Ability to develop permanent interest in the past and present knowledge of various materials used in the different types of work and to choose suitable material for different requirements.
- C. 4. Ability to select certain types of work as best suited to one's ability and aptitude and to put forth one's best effort in doing such work.
- B. 5. Ability to choose senior high school work with better appreciation of abilities and disabilities.
- E. 6. Ability to do certain unskilled tasks
D. as they appear in everyday situations and to appreciate the requirements

demanding in the industrial world.

- C. 7. Ability to appreciate and choose with intelligence, when necessary from the field of industry, the type of work one may best be fitted to follow.
- I. 8. Appreciate and respect the divisions of
D. responsibility in industrial and economic relations, to respect the rights of one's fellow men, and to appreciate his work and craft.
- D. 9. Ability to appreciate and desire beauty in material things, color, line, design, form, etc., in one's environment.
- I. 10. Ability to attain high moral standards in work habits and in vocational relationships.

Colorado course of study: (1)

- K. 1. To overcome the isolation that so often exists between school and life.
- O. 2. To teach creative interests and develop
H. creative powers.
- K. 3. To bring boys into a more complete contact with life.

- L. 4. To insure the natural and healthy growth and development of our youth.
(Remote objective).
- D. 5. To train for an appreciation of all
I. life activities and the development of good citizenship.
- K. 6. To bridge the gulf between thinking and doing.
- A. 7. To uncover tastes and ability for vocational work.
- C. 8. To lay the right foundation for all
A. forms of productive and creative work.
- D. 9. To embody in its teaching, a more
I. strictly vocational trend for a broader view of life.
- K. 10. To touch the life of the boy in his work, play school and home.
- A. 11. To give boys to whom book methods do not appeal an opportunity to find themselves.
- K. 12. To correlate with other school subjects or academic work. Must be cultural as well as vocational.

Leavitt, Frank: (1)

- B. 1. Retention of pupils in school.
- B. 2. Recognition of individual differences.
- A. 3. Provide for differentiated curricula.
- B. 4. Providing opportunities for educational
- C. and vocational guidance.
- F. 5. Providing means for prevocational and
- N. vocational training.
- B. 6. Preparing the pupils better to perform
- the academic work of the senior high
- school.
- I. 7. Providing training in ideals of
- citizenship.

Course of Study, Baltimore, Maryland:

- C. 1. It is the aim of woodwork to give an
- insight into the woodworking trades
- so that the pupil may make a more in-
- telligent selection of his life work.
- D. 2. It is the aim also to instill an
- appreciation and respect for manual
- arts and artisans.
- E. 3. It is the aim to put the pupil in a
- G. position where he can make repairs in
- and about the home and occupy his
- leisure time profitably.

(1) Course of Study, Fifth Yearbook, Dept. of Supt.
Pittsburg, Pa., all.

Davis, Calvin O.: (1)

- D. 1. To give every boy and girl in the
- A. school some appreciation of the kinds
and nature of practical activities
that go to make up the industrial
and commercial world around them.
- A. 2. To enable pupils, by means of tryout
- E. courses, to discover their interests,
aptitudes and ambitions, with respect
to certain vocations, and to give
training in the ordinary practical
affairs of home, garage, garden, shop
and playground.
- N. 3. To give specific training in particular
vocations to pupils who show special
aptitudes for such vocations; those
who are unable to profit by other
courses; and those who because of cir-
cumstances can not continue in school
beyond the junior high school period.

Thomas, Tindal and Meyers: (2)

- B. 1. To develop the personal characteristics
- L. that will make for a success in any

(1) Davis, Calvin O. Junior High School Education, 1924. p 34

(2) Thomas Tindal & Meyers. Junior High School Life, '24. p 75.

line of work.

- L. 2. To afford opportunity for the formation of habits essential to industrial success.
- A. 3. To encourage and direct self analysis
- B. by students that they themselves may discover their latent abilities and predilections.
- C. 4. To advise pupils regarding studies in line with their future vocational plans and to encourage them to consult the school counselor before answering want ads or visiting employment bureaus.
- C. 5. To increase the pupils knowledge of the types of work open to junior employees and to point out to them the immediate and deferred values of each type.
- A. 6. To provide sufficient tryouts to enable the pupils to find the type of work best suited to their capabilities.
- N. 7. To anticipate withdrawal from school and to provide extra opportunities for vocational training adapted to the needs of each case.

Vaughn and Mays: (1)

(Elementary school)

- O. 1. To supply the psychological demand for motor activity during the period in which the instincts are dominant.
- A. 2. To give such an abundance of experience with objects, materials and fundamental activities as will furnish a broad basis for associated judgments and guides to conduct, and at the same time leave a kind of residue of habitual reactions.
- K. 3. To serve as an energizing process or method of presenting the other subjects of the curriculum.
- D. 4. To assure the early establishment of the idea of the nature, necessity and importance of work.

(Junior high)

- O. 1. To meet in a constructive and satisfying way, those compelling interests of boy nature.
- E. 2. To furnish some information and training that will function directly in

(1) Vaughn and Mays, Content & Method of Industrial Arts, 1924, pp. 64-67.

the pupils' relations and obligations
to the home.

- D. 3. To give the pupils a more definite under-
C. standing of their industrial environment.
- D. 4. To give an appreciation from the con-
sumers standpoint, of the work, the method
and the products of industry.
- C. 5. To prompt and to guide those first con-
siderations of occupations as possible
lines for their life work.

(High school)

- 1. A continuation of the grammar grades.
- N. 2. To provide opportunity for trade train-
ing.

Selecting the objectives. From the preceding extensive
and conglomerate list we may select objectives which
embody all the major concepts that have been expressed.
The composite list is as follows:

- A. Exploration. (Exploration and findings value of
shop and drawing courses for the detection, dis-
covery or tryout of interests and aptitudes).
- B. Educational Guidance. (Guidance as a result of
student observation and analysis of numerous vo-
cations by which he discovers what to anticipate
in further education and training).

- C. Vocational Guidance. (Guidance and information gained through the study of various industries by visits, readings, reports and active participation in some vocation for short periods of time).
- D. Consumers' Knowledge and Appreciation. (An all around intelligence for things industrial, such as making more intelligent choosers and users of the products of industry).
- E. Household Mechanics. (The development of handyman abilities to be useful about the home).
- F. Prevocational purposes. (Such training as will lead to an apprenticeship or further training in specific vocation).
- G. Avocational purposes. (Leading to the pursuit of hobbies, making things for one's self and for others, as a result of shop experience; a worthy use of leisure).
- H. A degree of skill. (Skill commensurate with the job at hand).
- I. Citizenship. (A sympathetic understanding of industry and workers. To develop good leaders and good followers; to provide for correct adjustments of labor and capital).
- J. Mechanical Intelligence. (Skill and knowledge of tools and materials).

- K. Correlation with other subjects. (Correlating materials to abstract studies. Supplying materials for study in other subjects).
- L. Developing the faculties. (Attention, memory, reasoning, concentration, accuracy, responsibility, etc., developed through shop experience).
- M. Coordinating the hand and eye. (Formal disciple of the hand and eye, a hang-over from the older conception of manual training).
- N. Vocational Training. (Definite and specific training for industrial occupation).
- O. Expressional. (To provide means for expression through materials and processes).

Evaluation of objectives. In a study made by W. E. Warner of the Ohio State University, a list of objectives similar in many respects to the one above, was submitted to 358 teachers and 58 educational leaders for examination and evaluation. (Table III.)

The results of this survey proved interesting and because of its bearing on the problem under discussion some of the findings are reproduced.

JUNIOR HIGH SCHOOL OBJECTIVES AND RATINGS⁽¹⁾

A. Exploration.	H. Avocational Purposes.
B. Educational Guidance.	I. A degree of skill.
C. Vocational Guidance.	J. Cardinal Principles.
D. Consumer's Knowledge and Appreciation.	K. Mechanical Intelligence.
E. Household Mechanics.	L. Correlation with other subjects.
F. Social habits and attitudes.	M. Developing "faculties."
G. Prevocational.	N. Coordinating Hand and Eye.
	O. Vocational Training.

Ratings Assigned The Objectives Listed Above

TABLE III.⁽²⁾

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Jury	: 1:	2:	3:	4:	5:	6:	7:	8:	9:	10:	11:	12:	13:	14:	15:
Ohio Teachers:	4:	6:	12:	10:	9:	1:	13:	11:	5:	7:	8:	14:	2:	3:	15:
Bonser	: 5:	6:	7:	1:	2:	8:	12:	10:	4:	9:	11:	3:	14:	13:	15:
Selvidge	: 4:	6:	5:	1:	3:	2:	12:	7:	8:	10:	9:	11:	15:	14:	13:
Snedden	: 5:	9:	6:	2:	1:	10:	7:	3:	14:	8:	4:	12:	13:	15:	11:
Stone	: 2:	5:	4:	1:	8:	3:	11:	7:	12:	10:	6:	9:	15:	14:	13:
Van Deusen	: 4:	3:	10:	2:	6:	9:	14:	5:	7:	11:	1:	8:	12:	13:	15:

An outstanding fact in this rating is that of the position assigned to vocational training. There is a consensus of opinion that this objective rates very low as compared

(1) Warner, W. E. Op. Cit. p. 34.

(2) Ibid p. 36.

with the others. Mr. Warner places this interpretation upon the study: "It may be assumed, then, that the following objectives are relatively more than the remainder for the industrial arts of the junior high school:"

- A. Exploration.
- B. Educational Guidance.
- C. Vocational Guidance.
- D. Consumers' Knowledges.
- E. Household Mechanics.
- F. Social Habits and Aptitudes.
- H. Avocational Purposes.
- I. A Degree of Skill.

"Before adopting these, it should be remembered that serious question was raised concerning the importance of the following objectives:"⁽¹⁾ (B) Educational Guidance, (C) Vocational Guidance, (G) Prevocational purposes, (K) Mechanical Intelligence and (L) Correlation.

"Relative unimportance is attached to the first two of the following objectives while definite disapproval is made of the last three:"⁽¹⁾ (G) Prevocational, (J) Cardinal Principles, (M) Developing the Faculties, (N) Coordinating Hand and Eye, (O) Vocational Training.

Regarding a similar study of senior high school

(1) Warner, W. E. Op. Cit. pp. 37-38.

objectives Warner says: "Although there is an agreement concerning industrial arts in the senior high school, there is a greater amount of uncertainty shown in the relative importance to be attached to the various objectives than for the junior high school."⁽¹⁾ These findings are reported in table IV, below.

Senior High School Ratings

TABLE IV.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Jury	3	1	2	12	11	6	5	10	8	9	4	13	14	15	7
Teachers	11	4	5	9	14	1	8	13	7	6	2	15	3	12	10
Bonser	3	4	5	6	7	12	1	8	11	13	9	10	15	14	2
Selvidge	12	7	6	1	11	2	5	10	8	9	4	13	15	14	3
Van Deusen	5	3	7	2	10	12	4	6	11	13	1	8	14	15	9
Stone	11	3	8	7	5	1	2	12	6	10	4	9	15	14	13
Strickler	2	5	6	4	10	8	11	1	3	9	12	7	15	14	13

"As in table III, a very careful analysis of table IV indicates that the following two objectives are uniformly accepted as being pertinent to the senior high school industrial arts: (B) Educational Guidance, and (C) Vocational Guidance."⁽¹⁾

"Both approval and uncertainty are shown concerning the following eight objectives: ⁽¹⁾(A) Exploration,

(1) Warner, W. E. Op. Cit. p. 38.

(B) Consumer's Knowledge, (F) Social Habits and Aptitudes, (G) Prevocational Purposes, (H) Avocational Purposes, (I) A Degree of Skill, (K) Mechanical Intelligence and (O) Vocational Training."

"Very definite disapproval is indicated in the ranking given the following five objectives:

(E) Household Mechanics, (J) The Seven Cardinal Principles, (L) Correlation with other Subjects, (M) Developing the Faculties, and (N) Coordinating Hand and Eye." (1)

As a result of this study Mr. Warner says: "Opinion concerning the senior high school is more scattered than for the junior high school. Some of the jurors freely acknowledge their ignorance of what the objectives should be for these levels. Others are certain that vocational purposes should control the work. The conclusion is that still more needs to be known before a positive conclusion can be reached." (1)

"It is possible, however, to reconcile the points of view made in the rankings and reactions in the following brief terms, which will apply in a greater or less degree:"

1. General guidance.

(1) Warner, W. E. Op. Cit. p. 39.

2. Further exploratory and avocational opportunities.
3. Vocational preparation for a specific industrial vocation.
4. Consumers' or utilizers' knowledges and appreciations of the products of industry.
5. Formation of desirable personal and social habits.
6. Development of a degree of skill with tools and in tool or machine processes, commensurate with the ability of the pupil and incidental to the completion of a project or activity which seems to have educational value." (1)

Objectives in the Northwestern States. In a similar study by the author, for the purpose of discovering the industrial arts objectives in Oregon and adjoining states, a list of industrial arts subjects and their objectives were sent to selected shop teachers in Oregon, Washington, Idaho and California.

The following questionnaire illustrates how the information was obtained:

THE QUESTIONNAIRE.

The department of Industrial Education, Oregon

(1) Warner, W. E. Op. Cit. p. 44-45.

State College, is undertaking a survey of the objectives attained or striven for in the field of secondary school industrial arts, farm shop work, trade training and related subjects in Oregon and adjoining states. Since these objectives have differed widely in other parts of the country it will no doubt be found that they also differ somewhat in the various sections of the Northwest. It seems wise, however, to arrive at a concrete statement of these differences with the hope that comparisons will eventually lead to a coordinated program. To this end we solicit your cooperation in briefly checking your work in terms of the aims and objectives stated below.-----.

Certain subjects and general objectives have been listed, with the key numbers opposite each listing. This list is merely suggestive and you will confer a favor by listing any additional subjects or objectives that have a part in your program. Please assign numbers to any thus added and use these key numbers as suggested.

On the forms enclosed you will find space for the classification of subjects in terms of their place in the curriculum and in the training of the boy. To tabulate a subject merely select its key

number from the list and place that number in the
subject given column. Next list the objectives, in
the "objectives in mind" column, in the order of
their apparent importance.-----.

SUBJECTS GIVEN	OBJECTIVES IN MIND
1. <u>Bench Woodwork.</u>	1. <u>Exploration.</u>
2. <u>Cabinet Making.</u>	2. <u>Educational Guidance.</u>
3. <u>Wood Turning.</u>	3. <u>Vocational Guidance.</u>
4. <u>Etc.</u>	4. <u>Etc.</u>

No additions appeared to the column of "objectives in mind" as sent out. A few subjects were added to the list that was sent in the questionnaire. The complete list of subjects and objectives from which the information was obtained is as follows:

SUBJECTS GIVEN	OBJECTIVES IN MIND
1. Bench woodwork.	A. Exploration.
2. Cabinet making.	B. Educational Guidance.
3. Wood turning.	C. Vocational Guidance.
4. Pattern making.	D. Consumers' knowledge and appreciation.
5. Carpentry.	E. Household mechanics.
6. Farm shop.	F. Prevocational purposes.
7. Painting and finishing.	G. Avocational purposes.
8. Mechanical drawing.	H. A degree of skill.
9. Machine drawing.	I. Citizenship.
10. Architectural drawing.	

- | | |
|---|-------------------------------|
| 11. Perspective, freehand. | J. Mechanical intelligence. |
| 12. Machine shop. | K. Correlation with other |
| 13. Forging. | subjects. |
| 14. Foundry. | L. Developing the faculties. |
| 15. Sheet metal. | M. Coordinating hand and eye. |
| 16. Electricity. | N. Vocational training. |
| 17. General metal work. | |
| 18. Home mechanics. | |
| 19. Auto mechanics. | |
| 20. Farm mechanics. | |
| 21. Cement work. | |
| 22. Leather work. | |
| 23. Fiber furniture weaving. | |
| 24. Occupations or vocational guidance. | |
| 25. Plumbing. | |
| 26. Building construction. | |
| 27. Brick work. | |
| 28. General shop work. | |

Seventy-five schools responded to the questionnaire, representing more than fifty per cent of the Oregon school shops, plus excellent samplings from Idaho, Washington, and California. Three types of school shops were represented, viz., (1) the distinctly industrial

arts type as represented by the average public school,
(2) the vocational agriculture type of shop, and
(3) the trade and industrial school shop.

The trade and industrial school and the Smith-Hughes agriculture shop are subsidized under the Smith-Hughes law and presumably have well defined objectives. For this reason the three types of schools are segregated in the results in order to differentiate the objectives of each type. All schools reported by school grades so that the objectives for each grade are fairly well stated. In rating the objectives, the importance of each objective, as evaluated by the school reporting was scored on a scale of 10 for the most important, 9 for the next, and so on to 1 for the least important. No single subject was selected but all the subjects reported were used and compiled to make a composite expression for all types of shop work. Table V contains the total scores for all schools reporting and table VI shows the order of importance in rating by grades, by types of shops and by total ratings.

Objectives	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.
	Ex- plor- ation	Educ: Guid	Voc: Guid	Cons: Know	House: Mech	Pre- voc	Avoc	Skill	Cit- izen- ship	Mech: Int	Cor- rel- ation	Devel- op- ment	Hand: and eye	Voc: Train- ing
Grade VII.				Appr										
Ind. Arts	235	150	144	184	83	83	35	109	167	114	169	134	131	20
Trades & Ind.			No Rating											
Voc. Agr.			No Rating											
Grade VIII.														
Ind. Arts	326	158	217	207	149	137	79	232	218	150	113	147	128	12
Trades & Ind.	30				27				24					
Voc. Agr.		No Rating												
Grade IX.														
Ind. Arts	577	320	463	373	219	377	130	550	289	375	298	358	293	31
Trades & Ind.	21	2	16	13	47	35	29	24	32	45	27	20	32	32
Voc. Agr.	75	19	52	94	117	84	46	275	65	86	195	97	109	172

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TABLE V.

Scores for VII, VIII and IX Grades in
three types of shops.

Objectives	:A.	:B.	:C.	:D.	:E.	:F.	:G.	:H.	:I.	:J.	:K.	:L.	:M.	:N.	:
	:Ex-	:Educ	:Voc	:Cons	:House	:Pre-	:Avoc	:Skill	:Cit-	:Mech	:Cor-	:Devel	:Hand	:Voc	:
	:plan	:Guid	:Guid	:Know	:Mech	:voc	:	:	:izer	:Int	:rela	:op-	:and	:Train-	:
	:tion:	:	:	:Appr:	:	:	:	:	:ship:	:	:tion:	:ment:	:Eye	:ing	:
Total score	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Grade VII	:235	:150	:144	:184	:83	:83	:35	:109	:67	:114	:60	:134	:131	:20	:
Grade VIII	:356	:158	:217	:207	:176	:137	:79	:232	:242	:150	:113	:147	:128	:12	:
Grade IX	:673	:341	:531	:480	:383	:496	:205	:849	:386	:506	:520	:475	:434	:235	:
Grades VII,	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
VIII & IX	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:1264	:649	:892	:871	:642	:716	:319	:1190	:695	:770	:693	:756	:693	:267	:50

TABLE V.

Total scores for grades VII, VIII, and IX and
for the three grades.

Objectives.	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.
	Ex- plor- ation	Educ: Guid	Voc Guid	Cons: Know Appr	House: Mech	Pre- voc	Avoc	Skill	Cit- izen- ship	Mech: Int	Cor- rel- ation	Devel- op- ment	Hand: and Eye	Voc Train- ing
Grade X.														
Ind. Arts.	418	275	347	325	117	368	163	432	307	302	231	249	206	93
Tr. & Ind.	10			38	37	25	20	29	15	35	10	18	14	3
Voc. Agr.	79	10	27	83	116	55	68	305	76	128	167	109	54	244
Grade XI.														
Ind. Arts.	299	140	380	310	46	281	98	309	278	231	94	207	88	146
Tr. & Ind.	12	4	26	6	8	32		46	12	40	25	23	14	27
Voc. Agr.	7		34	91	75	81	58	210	78	108	165	105	28	198
Grade XII														
Ind. Arts.	83	15	37	32		33	26	90	21	34	29	78	26	101
Tr. & Ind.	10		28	11	3	26		30	25	26	17	16	9	17
Voc. Agr.			25	35	65	62	49	104	26	41	74	29	19	158

TABLE V.

Scores for grades X, XI and XII in three types

Objectives	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.
	Ex- plor- ation	Educ -Guid	Voc -Guid	Cons -Know	Huse -Mech	Pre- voc	Avoc	Skill	Cit- -zen	Mech -Int	Cor- -rela	Devel -op-	Hand -and	Voc -Train
Total score	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Grade X	:507	:285	:374	:446	:270	:488	:251	:766	:398	:465	:408	:376	:274	:339
Grade XI	:318	:144	:440	:407	:129	:394	:156	:565	:368	:379	:284	:335	:130	:371
Grade XII	:93	:15	:90	:78	:68	:121	:75	:224	:72	:101	:120	:123	:54	:286
Grades X, XI and XII	:918	:444	:904	:931	:467	:1003	:482	:1555	:838	:945	:812	:834	:458	:996

TABLE V.

Total scores for grades X, XI and XII and
for the three grades combined.

Ratings.	:	1:	2:	3:	4:	5:	6:	7:	8:	9:	10:	11:	12:	13:	14:
Grade VII.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Ind. Arts.	:	A:	D:	I:	B:	C:	L:	M:	J:	H:	E:	F:	K:	G:	N:
Tr. & Ind.	:	:	:	No Rating	:	:	:	:	:	:	:	:	:	:	:
Voc. Agr.	:	:	:	No Rating	:	:	:	:	:	:	:	:	:	:	:
Grade VIII.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Ind. Arts.	:	A:	H:	I:	C:	D:	B:	J:	E:	L:	F:	M:	K:	G:	N:
Tr. & Ind.	:	A:	E:	I:	:	:	:	:	:	:	:	:	:	:	:
Voc. Agr.	:	:	:	No Rating	:	:	:	:	:	:	:	:	:	:	:
Grade IX.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Ind. Arts.	:	A:	H:	C:	F:	J:	D:	L:	B:	K:	M:	I:	E:	G:	N:
Tr. & Ind.	:	E:	J:	F:	N:	M:	I:	G:	K:	H:	A:	L:	C:	D:	B:
Voc. Agr.	:	H:	K:	N:	E:	M:	L:	D:	J:	F:	A:	I:	C:	G:	B:
Totals for Grades VII, VIII & IX.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Ind. Arts.	:	A:	H:	C:	D:	I:	J:	L:	B:	F:	M:	K:	E:	G:	N:
Tr. & Ind.	:	E:	I:	A:	J:	F:	M:	N:	G:	H:	K:	L:	C:	D:	B:
Voc. Agr.	:	H:	K:	N:	E:	M:	L:	D:	J:	F:	A:	I:	C:	G:	B:
Total rating for the three types & three grades.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Final Rating.	:	A:	H:	C:	D:	J:	L:	F:	I:	M:	K:	B:	E:	G:	N:

TABLE VI.

Showing the order of importance of objectives, by grades, by types of shop and by totals assigned by the teachers reporting.

Ratings : 1: 2: 3: 4: 5: 6: 7: 8: 9:10:11:12:13:14:

Grade X.

Ind. Arts.	H	A	F	C	D	I	J	B	L	K	M	G	E	N
Tr. & Ind.	D	E	J	H	F	G	L	I	M	K	A	N	B	C
Voc. Agr.	H	N	K	J	E	L	D	A	I	G	E	N	C	B

Grade XI.

Ind. Arts.	C	D	H	A	F	I	J	L	N	B	G	K	M	E
Tr. & Ind.	H	J	F	N	C	K	L	M	I	A	E	D	B	G
Voc. Agr.	H	N	K	J	L	D	F	I	E	G	C	M	A	B

Grade XII.

Ind. Arts.	N	H	A	L	C	J	F	D	K	G	M	I	B	E
Tr. & Ind.	H	C	J	F	I	N	K	L	D	A	M	E	B	G
Voc. Agr.	M	H	K	E	F	G	J	D	L	I	C	M	A	B

Totals for
Grades X,
XI and XII.

Ind. Arts.	A	H	C	F	D	I	J	L	B	K	N	M	G	E
Tr. & Ind.	H	J	F	L	D	C	I	K	E	N	M	A	G	B
Voc. Agr.	H	N	K	J	E	L	D	F	I	G	M	A	C	B

Total rating
for three types
and three
grades.

Final Rating.	H	F	N	J	D	A	G	I	L	K	G	E	M	B
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TABLE V.

Showing the order of importance of objectives, by
grades, by types of shop and by totals.

Significant findings. The results of the ratings may be stated relatively by placing the important objectives in one column and the unimportant ones in another.

GRADES VII, VIII and IX.

Important objectives

Unimportant objectives

IND. ARTS

A. Exploration.	:	N. Voc. Training.
H. Skill.	:	G. Avocational Purposes.
C. Voc. Guidance.	:	E. Household Mechanics.
D. Consumers' Know. & Appr.	:	

TRADE & INDUSTRY

E. Household Mechanics.	:	B. Educational Guidance.
I. Citizenship.	:	D. Consumers' Knowledge.
A. Exploration.	:	C. Voc. Guidance.
J. Mechanical Intelligence.	:	

VOC. AGR.

H. Skill.	:	B. Educational Guidance.
K. Correlation.	:	G. Avocational Purpose.
N. Voc. Training.	:	C. Voc. Guidance.
E. Household Mech.	:	

TOTAL

A. Exploration.	:	N. Vocational Training.
H. Skill.	:	G. Avocational Purpose.
C. Voc. Guidance.	:	E. Household Mechanics.
D. Consumers' Knowledge.	:	

The objectives of mediocre importance have not been mentioned in the table.

GRADES X, XI and XII.

Important objectives

Unimportant objectives

IND. ARTS

A. Exploration.	:	E. Household Mechanics.
H. Skill.	:	G. Avocational Purposes.
C. Vocational Guidance.	:	M. Coordinating Hand and
F. Prevocational Purposes.	:	Eye.

TR. and IND.

H. Skill.	:	B. Educ. Guidance.
J. Mechanical Intelligence.	:	G. Avocational Purpose.
F. Prevocational.	:	A. Exploration.
L. Developing Faculties.	:	

VOC. AGR.

H. Skill.	:	B. Educational Guidance.
N. Vocational Training.	:	C. Vocational Guidance.
K. Correlation with subjects.	:	A. Exploration.
J. Mechanical Intelligence.	:	

TOTAL

H. Skill.	:	E. Household Mechanics.
F. Prevocational Purpose.	:	B. Educational Guidance.
N. Vocational Training.	:	M. Coordinating Hand and
J. Mechanical Intelligence.	:	Eye.

Conclusions. The matter of objectives in industrial arts is considerably conjecture and opinion. From these opinions we are able to select a composite list such as is found on page 44 of this paper. Very few studies have been made relative to the rating of these objectives. The most recent and perhaps the most important one is that made by W. E. Warner of Ohio State University at Columbus. In the Oregon study presented by this paper, the final rating may be expressed as follows:

JUNIOR HIGH SCHOOL

SENIOR HIGH SCHOOL

1st. Exploration.	:	skill.
2nd. Skill.	:	Prevocational.
3rd. Vocational Guidance.	:	Vocational Training.
4th. Cons. Know. & Appre.	:	Mechanical Intelligence.
5th. Mech. Intelligence.	:	Consumers' Know. & Appre.
6th. Developmental.	:	Exploration.
7th. Prevocational.	:	Avocational.
8th. Citizenship.	:	Citizenship.
9th. Coord. Hand & Eye.	:	Developmental.
10th. Correlation.	:	Correlation with subjects.
11th. Educ. Guidance.	:	Avocational.
12th. Household Mechanics.	:	Household Mechanics.
13th. Avocational.	:	Coord. Hand & Eye.
14th. Vocational Training.	:	Educational Guidance.

IV. CONTRIBUTIONS OF OBJECTIVES TO MAJOR ACTIVITIES.

Objectives and major activities. Objectives are of no value unless we know how, when and why to use them. The following tables represent an effort to show the tangible relationship between the major activities of life and the general objectives of industrial arts. In these tables, the major activities are listed as respects their importance or unimportance according to grade, showing what objectives to stress and when to stress them. The first table of each group classifies the major activities as important or unimportant for the grades concerned, while the second table more completely classifies the activities and objectives in terms of the contributions of the industrial arts subjects.

ELEMENTARY GRADES.
(Grades I-VI)

Important major activities :	Unimportant major activities
for these grades.	for these grades.
<hr/>	
1. Command of fundamental	1. Home membership.
processes.	2. Exploration.
2. Health.	3. Mingling.
3. Leisure.	4. Vocations.
4. Ethical.	

Major activities.	Ind.Arts	The contribution of Ind. Arts Objective	Sample of Content
		objective:	
Command of fund.proc.	Correlation.	Supplies material to correlate abstract studies to child activity.	Using yard stick to measure. Use of all measures.
	Expressional.	Supplies material for expression of will and emotions.To provide outlet for motor activity.	Coloring,paper cutting,blocks,etc.
Health	none	Incidental	Body activity.
Leisure	none	none	
Ethical	none	incidental	Respect for property.
Home memb.	none	none	
Exploration	Exploration.	Introduces materials of industry.Leads to attempts at toy & tool manipulation.	Trips,materials for classification.
Mingling	Citizen-ship	Pupils begin to understand each other by working together at something material	Class projects,toy house,toy store.
Vocations	Vocational	Arouses interest in work,creates respect for work and workers.	Simulating adult activities.Canning,etc.

In the elementary grades, the essential purpose of industrial arts is to contribute as best possible to the main purpose of those grades,- that of securing the fundamental processes. The use of a variety of material for teaching is to be encouraged. The use of the material not only makes the learning more pleasant for the child, but also introduces him to the materials in the community. It is not necessary that many tools be used; in fact the program can be handled with very little equipment. No tool should be used that is beyond the ability of the child to use it. Trips, especially in the fifth and sixth grades are to be encouraged. Visits to paper mills, lumber mills, manufacturing concerns, etc., stimulate an interest in vocations and supply interesting subject matter for the mastery of the fundamental processes.

JUNIOR HIGH SCHOOL GRADES.
(Grades VII- IX.)

Important major activities :	Unimportant major activities
for these grades.	for these grades.
1. Exploration.	1. Fundamental Processes.
2. Citizenship.	2. Cultural Participations.
3. Health.	3. Social Activities.
4. Home Membership.	
5. Vocations	

Major activities.	Ind. Arts objective	The contribution of Ind. Arts objective	Sample of content.
Exploration.	Exploration.	Supplies field for sampling vocat ^{ns} & tryout courses. Sampling abilities.	General shop course. Excursions and visits to industrial plants.
Citizenship	Citizenship	Social setting for group. Teaches respect for public property.	Class projects. Tool keepers, etc.
	Consumers knowledge & appreciation	Teaches value of manual labor. Teaches respect for industrial work. Contributes sympathetic understanding between labor and capital.	Study of occupations. Making of things simulating industrial products.
Health	Incidental	Affords activity for student who does not get exercise. Teaches caution in machine tools to avoid accidents.	
Leisure	Avocational	Arouses interest in an activity that may be pursued as a hobby.	Radio. Aeronautics, etc.

(Continued)

Major Activities	Ind. Arts Objectives	The contribution of Ind. Arts objectives	Sample of Content
Worthy Home Membership	Household Mechanics	Teaches boy to repair things about the home, to make useful articles for home.	Soldering utensils, repairing doors, etc.
Vocations	Vocational Guidance	By tryout courses, makes it possible for boy to pick out jobs he likes or dislikes early in life.	Tryout courses, woodwork, metal work, etc.
	Prevocational	Gives boy who leaves school early, a chance to learn a few skills that will help him secure an apprenticeship.	Tryout course in which boy shows some ability.
	Avocational	Teaches an avocation that may in time of need develop into a vocation.	Photography, radio repair, etc.
		Teaches skills that may be transferred to a pupils vocation later.	Tool use, accuracy, etc.
	Mechanical Intelligence	Teaches manipulation and mechanical judgment.	Construction problems, shop math., etc.

Major Act-	Ind. Arts	The Contribution of Ind. Arts	Objective	Sample of Content
ivities	Objective			
Fundamental	Correlat-	Continues the motive, to link the		Shop mathematics.
Processes	ion	abstract to the concrete. Provides means		Applied science.
		for making difficult school work		
		likable and interesting.		
Cultural	Avocational	Provides interest in reading about		Presence of
Participa-		inventions, new devices, progress in		scientific mag-
tions.		industry, etc.		azines in shop.
Social	Citizenship	Cooperative attack on common		Mass production.
Activities:		problems		Shop responsib-
				ilities. Project
				design of common
				problems

In the junior high school grades, it is desirable to make as many contacts as the school plant and other facilities will permit. It is, obviously, impossible to give samples of all the jobs that are available in the community, much less the entire list of occupations. But it is possible to introduce the boy to phases of industry that will give him an inkling as to the nature of the work required on such jobs. While it is desirable to make many contacts, this should not be done at the expense of fundamental characteristics such as accuracy, thoroughness, stick-to-it-iveness, etc. The boy should be encouraged to secure a fair sample of a type of work in which he is engaging, rather than to jump from one type of work to another. A boy who has begun a project should be required to finish it. There may be times when he is discouraged and dislikes the work, but he may find that at the completion of the project, he has actually acquired a liking for the type of work in which he is engaged. If he had been permitted to drop the project, a permanent dislike would have been the result.

All boys should engage in some shop work during the junior high school period. The fact that the boy is sure not to be engaged in industry is no excuse for not

taking industrial arts. A knowledge of work and an appreciation of it is an important factor in the lives of boys who subsequently become professional people. A sympathetic understanding of things industrial is essential to an harmonious national existence. Strikes, walkouts, and other industrial disturbances are the result of the lack of such understanding.

SENIOR HIGH SCHOOL.
(Grades X-XII)

Important major activities in these grades	:	Unimportant major activities in these grades.
1. Vocation.	:	1. Command of Fundamental
2. Citizenship.	:	processes.
3. Leisure.	:	2. Exploration.
4. Worthy Home Membership.	:	
5. Health.	:	
6. Cultural Participations.	:	
7. Social Activities.	:	
8. Ethical Character.	:	

Major act-	Ind. Arts	The contribution of Ind. Arts objective	Sample of content.
ities.	objective		
Vocational	Exploration:	Exploration of <u>materials and processes</u> .	More intensive shop
		Additional subjects not adaptable to	work than in the
		junior high school pupils.	junior high.
	Skill	Specialized skills with view to use in	Hand and mental
		a vocation. Skill of mind and hand.	processes.
	Prevocat	Specific training for a vocation.	Special intensive
	tional		course.
	Avocational	Pursuit of hobby in shop work.	Any advanced shop
		May result in vocational selection.	course.
	Vocational	Specific training in a selected	Any advanced shop
		vocation.	course.
Citizen-	Consumers	Teaches respect for vocations.	Any advanced shop
ship	Knowl. &		
	appreciation	Teaches evaluation of workmanship.	course.
	Citizenship	Teaches understanding of industrial	Occupations study.
		workers and their problems.	
Leisure	Avocational	Pursuit of constructive hobby.	

(Continued)

Major Act-	Ind. Arts	The contribution of Ind. Arts	Objective	Sample of Content
ities.	Objectives.			
Worthy	Household.	Household Mechanics, Repair, etc.		Home mechanics and
Home Member-	Mechanics			repair, if not
ship.	(if not			previously furnished
	previously			in junior high.
	furnished)			
Health	Incidental	Furnishes bodily activity. Source of		Any shop
		mental hygiene.		activity.
	Consumers			
Cultural	Knowledge	Appreciation of workmanship.		Any
Participa-	and	Appreciation of values in		shop
tions.	Appreciation:	manufactured articles.		construction.
Social				
Activities:	None	None		
Ethical	None	None		

On the senior high school levels, a considerable difference in emphasis on objectives is to be expected.

If a student had a variety of shop work in the junior high school, very little emphasis need be placed upon the exploratory objective in the senior high school. If the school is a trade school, much more emphasis should be placed upon the skill objective than upon the 'knowledge and appreciation' objective. The local situation, pretty largely defines to the teacher, the degree of emphasis to be placed upon the high school objectives.

General conclusions. The best measure of a school subject as regards its contribution to adult life is the measure of its contribution to the major activities of life. Major activities of adults are the result of similar activities in child life. To be effective, then, the school subject must contribute to the major activities of children. This contribution becomes the objective of the subject. The industrial arts objectives as listed on page 44 indicate the purpose of the industrial arts courses. Exploration, the objective that has been neglected until recent years is among the important ones mentioned. Most teachers are placing more and more value upon it as they understand its significance. Exact values cannot be placed upon any objective, but it is possible to determine in a general way, the relative value of the objective for each period of child life. This has been the aim of part III. of this.

thesis, wherein an evaluation of the objectives for the junior and senior high schools has been attempted. Whatever the degree of success, it will be considered worth while if the points here noted shall serve as a means of further crystalizing and unifying professional thought along these lines.

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