THE PLACE OF THE INDUSTRIAL ARTS
IN THE
JUNIOR HIGH SCHOOL

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By

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CHAPTER I

THE PROBLEM FORMULATED

A half century ago secondary education achieved its major purpose if it prepared its graduates to enter college. A generation ago a few shop courses served to make the school more attractive for those not so much interested in the academic program which was designed primarily for college preparation. Today secondary education is faced with the problem of developing youth for citizenship in a democratic industrial nation. Since interest in industrial affairs is pronounced at the junior high school level, one quickly recognizes the place and value of industrial arts in the junior high school. The fact that a large number of junior high schools offer only the minimum required industrial arts activities consisting chiefly of woodwork and drawing, causes the industrial arts teacher to question this lack of development in so rich a field. What are the values to be realized from the inclusion of a wide choice of industrial arts activities in the junior high school? How do leaders in secondary education view industrial arts in the junior high school? How can industrial arts make its greatest contributinn to the realization of the aims and functions of the junior high school? These questions along with others have led the writer to seek to determine how this field of

activity can best serve the needs of the pupils of the junior high school.

Statement of Problem. Industrial arts has been given an important place in the curriculum of the junior high school since the beginning of the junior high school movement. The evaluation of the place and of the value of industrial arts in the junior high school has never been fully made. Industrial arts activities have received wide publicity in connection with the exploratory and guidance function of the junior high school. One is aware that progress is being made in the interpretation of aims and functions of the junior high school so that the needs of the pupil and the demands of society are being met more adequately. Today, when the efforts of the administration are toward integration of all educative efforts, the alert industrial arts instructor is in need of a better understanding of the place and function of the industrial arts activities in the junior high school. It is believed that industrial arts experience can make a valuable contribution to a number of the aims of general education, if the experiences are well planned. Thus having recognized the need for a clear conception of the function of industrial arts in the junior high school, the writer has undertaken an exposition of the general subject: The Place of Industrial Arts in the Junior High School.

Delimitations. This subject covers a large field of study, so in order to limit its scope the writer has arranged to include in this investigation a study of: (1) textbooks written on the junior high school; (2) magazine articles pertaining to the aims, functions and place of the junior high school in secondary education; (3) magazine articles and books written by leaders in secondary education indicating the place of industrial arts in the junior high school; (4) magazine articles by leaders in industrial education pointing to the place of industrial arts in junior high school, and (5) courses of study in seven selected industrial arts subjects. The study is further limited to publications issued since 1930.

Definitions of Terms. In this study certain terms are used quite often in such ways that formal definitions of them would prove helpful. The definitions given are by recognized authors in fields of industrial arts and secondary education or by accepted authorities.

> Education. Education involves the acquisition of information, skills, habits, ideals, attitudes, concepts and tastes, and is not to be thought of as merely acquiring KNOWLEDGE. (Douglas, H. R., 20, page 126).

> Secondary Education. Secondary education is to be thought of as the stage of formal education extending from the study of the basic tools of learning, involving the first five or six years of schooling, to the period

of specialization at the university or college in professional or subject-matter fields. (Douglas, H. R., 20, page 125).

General Shop. A general shop is a single school shop dealing with several activities simultaneously, such as electricity, metalwork, woodwork and plumbing. (Parks, 39, page 143).

Secondary Education. Secondary education should be to provide experiences which will lead to the development of abilities, interests and attitudes, the value of which may be defended on the basis of their worth in enabling each individual to live his life more effectively both as an individual and as a member of a complex society. (Wrinkle, 60, page 165).

Industrial Arts. Throughout the report of this study, the term "industrial arts" will be interpreted to mean, in the words of Bonser and Mossman, "the changes made by man in forms of materials to increase their values, and the problems of life related to those changes." (Bonser and Mossman, 5, page 5).

Junior High School. The junior high school shall consist of grades seven, eight, and nine, organized and administered as a separate unit. (Oklahoma State Dept. of Education, page 8).

Exploratory Function. The exploratory function in the junior high school includes all of the means that have been devised for ascertaining the pupils' individual traits. (Pringle, 41, page 95).

Predicted Outcomes. It is expected that the following outcomes may be realized in the development of this study.

1. The movements that were responsible for the organization of the junior high school will be described.

2. The modern conception of the junior high school, including aims, functions, current trends and its place in the field of secondary education will be discussed.

3. The trend in the formulation of objectives for industrial arts activities and suggested ways and means of accomplishing these purposes will be shown.

4. The opinion of representative writers in the area of secondary education respective to the place of industrial arts in junior high school will be reviewed.

5. The concept of a program of industrial arts for a typical Oklahoma junior high school will be developed.

6. A group of industrial arts subjects will be suggested and detailed courses of study for each will be formulated. A program of industrial arts in the three years of the junior high school will be proposed.

7. The conclusion will consist of statements of controlling principles for selecting courses, planning the shop and administering the industrial arts program.

8. The whole junior high school program, showing the place of industrial arts in its program of studies will be developed.

Summary. A clear understanding of the place of industrial arts and the special functions of the junior high school, will make it possible for the industrial arts teacher to formulate his objectives and plan the activities necessary to achieve them. The boy in the shop soon recognizes the fact that the course has definite objectives and that all activities are organized so as to contribute to these objectives. This

example of good planning is also noticed by the boy and he knows that for best results he must develop such habits. A knowledge of the place of these activities and how they are to function provides a basis for personnel organization and other future development of the shop activities.

An understanding of "the place of the industrial arts in the junior high school" would not be conceivable without a thorough investigation of the junior high school, as to its aims, functions and trends. This study of the junior high school will follow in Chapter II.

CHAPTER II

THE DEVELOPMENT OF THE JUNIOR HIGH SCHOOL

The development of the junior high school has been characterized by discussion, investigation, and experimentation. It aims to present an organization of life experiences, activities or opportunities, appropriate to the needs of its adolescent pupils. In attacking this problem, the place of industrial arts in the junior high school, the natural procedure would be a study of the movements that were responsible for the organization of the junior high school. It seems that a knowledge of the development and a clear concept of the meaning of the term, junior high school, and an understanding of its aims, functions, and place in the program of secondary education, trends and problems, would be most helpful in the solution of the problem.

THE REORGANIZATION MOVEMENT

The movement for reorganization of the American public school, culminating in the establishment of the junior high school, started during the latter part of the nineteenth century. By the year 1888, leading educators recognized the great need for reorganization of the elementary and

secondary schools in order to cut down the time spent in college preparatory work, and to meet more adequately the needs of those pupils who never finish high school or go to college.

Early Committees and Research Programs. It was through the efforts of Doctor Eliot, then president of Harvard, that three National Education Association committees were appointed during the last decade of the nineteenth century to study the problems of the public school system. The third committee appointed by the Department of Secondary Education to study the college-entrance requirements made the greater contribution to the movement for reorganization. Its final report was submitted to the National Education Association in 1899. This report was very definite and firm in all of its recommendations. A part of this report as given by Pringle is as follows: (41, page 19)

> The most necessary and most far-reaching reforms in secondary education must begin in the seventh and eighth grades of our schools. Educators agree that these grades must be enriched by eliminating non-essentials and adding new subjects taught only in the high school. The problems involved can be solved most quickly and most surely by making the seventh and eighth grades a part of the high school under the immediate direction of the high school principal.

Discussion of proposed plans and criticism of the old order continued for another decade before any action of a

permanent nature was effected. During this period Ayers, Strayer, and Thorndike made careful studies of a number of city school systems. Among the findings was information about the enormous number of eliminations in the seventh, eighth, and ninth grades. Thorndike made a study of school systems in twenty-three cities with population of 25,000 or more. He reported 46 per cent elimination of pupils in the seventh grade, 60 per cent in the eighth grade, and 73 per cent in the ninth grade. Ayers and Strayer, in their studies of a larger number of cities reported similar results as to eliminations in the seventh, eighth, and ninth grades. (Pringle, 41, page 3)

The results of these studies arrested the attention of both educators and laymen and added force to the demands that the school system on every level meet the changing needs and interests of the pupils. Thus a new unit in secondary education was soon to appear, characterized by the demands of the public for a program of education that will meet the changing interests and needs of the adolescent period in the pupil's life. It was expected that this new unit, composed of grades seven, eight, and nine, would be so coordinated with the elementary grades and the senior high school that the youth's movement through school would not call for new adjustments in moving from one grade level to another, but would be one of continued adjustment. It was

thought that school environment so conceived would make a pupil happy as well as wise.

The First Junior High School. Where the junior high school was first established depends on the definition which is adopted to describe the organization and on what is meant by first established, or first started. Two cities in the United States made very definite plans for what would now be called a junior high school, during the first six months of the school year 1909-10. At Columbus, Ohio, the board of education approved a resolution July 9, 1909, for the reorganization of the city schools, and provided for the organization of a new unit made up on the seventh, eighth, and ninth grades which was to be organized and administered as a separate school unit. The superintendent of schools was unable to carry out these plans the first year. The new unit was organized, but one class of each grade below the seventh grade was housed in the building the first year, due to building difficulties. (Clifton, 12, page 164).

Another city claims to have started the first junior high school in the United States. After the start of school in September of the year 1909, at Berkeley, California, the superintendent of schools, faced with the problem of providing more classrooms at the high school, decided that the organization of a new unit composed of the seventh, eighth, and ninth grades would be the proper solution of the problem.

Plans were perfected and approved by the board of education, December 21, 1909, for the opening of a new unit which was then called the Introductory High School. This school was opened at the beginning of the school semester, January 10, 1910. This new school was housed in a separate building and was under the direction of a principal who was in charge of the new school. (McClellan, 35, page 167).

Extent of the Movement. The success of the experiments at Columbus and Berkeley gave the movement the needed publicity and within a short time junior high schools were organized in many of the large cities throughout the United States. Since 1920, the movement has been more gradual, but an ever increasing tendency is evidenced to replace the traditional 8-4 organization with the 6-3-3 plan. The extent of the movement is shown by the number of reorganized schools, which by 1930, had affected 5,000 of the 20,000 high schools in the United States. (Douglas, 20, pages 4-5).

JUNIOR HIGH SCHOOLS IN OKLAHOMA

From the number of reorganized schools compared with the total number of high schools, it appears that the movement is far behind in the State of Oklahoma. This state had a total of 859 approved high schools during the school year 1937-38, and only 62 were listed as approved junior high schools. These junior high schools were located almost

exclusively in county-seat towns and cities. Only three cities, Enid, Oklahoma City, and Tulsa, had more than one junior high school. (51, page 8-43).

Classes of Junior High Schools in Oklahoma. The State Department of Public Instruction recognizes two classes of junior high schools, Class A and Class B. Class A is further divided into Class A Segregated and Class A Combined. They are defined as follows: (52, pages 35-36).

> Class A Segregated. Class A Segregated junior high school shall consist of approved segregated junior high school units, including grades seven, eight, and nine, adequately organized and administered with separate housing facilities and teaching staff, and providing suitable curricula involving courses exploratory, as well as integrating and differentiating in nature.
>
> Class A Combined. A Class A Combined junior high school shall consist of grades seven, eight, and nine, organized and administered as a separate unit, except that other units or grades may be located in the same building. This class will include the junior high school division of larger units, such as six-year high schools, etc., where such divisions are conducted according to standards and regulations for approval of junior high schools.
>
> Class B Junior High Schools. A Class B junior high school shall consist of grades seven and eight, or grades eight and nine, organized and administered as a separate unit. Two-year junior high schools which make special attempts to realize the objectives and functions of the junior high school, but which, on account of building or organization difficulties are unable to organize on the 6-3-3 plan, may be given temporary approval. This step is recognized as a step in the right direction of a desirable reorganization on the basis of a Class A junior high school.

The Department of Public Instruction also gives a basic definition of the junior high school and states minimum pro-

gram and building requirements for approved junior high schools. They are as follows: (52, page 42).

> Definition of Junior High School. The Junior High school shall consist of grades seven, eight, and nine organized and administered as a separate unit.
>
> Building Requirements. The grades of the Junior High school shall be housed in a single building, provided that such special subjects as home economics, industrial arts, science, and physical education may be cared for in a separate building located on the same grounds.
>
> Program of Studies. There shall be three years work in English and in social studies, and a minimum of two years of mathematics, one year of general science including agriculture and geography, one year of homemaking for girls and industrial arts for boys, and definite training in physical and health education for both boys and girls, shall be required of all pupils.

The figures in Table 1 show the trend in the junior high school movement in Oklahoma during the last ten years. (18, pages 56-57).

TABLE 1

Oklahoma Junior High Schools Applying for Approval in a Ten Year Period

Class	1929-30	31-32	33-34	35-36	37-38
Class A Segregated	24	24	21	21	28
Class A Combined	29	10	10	23	19
Class B	28	5	3	8	15
TOTALS	81	39	34	52	62

The figures in Table 1 show that during the year 1937-38 Oklahoma had a total of 62 junior high schools, It also shows that Class A Segregated is the only class that shows a gain during the ten year period. Under the present system of financing schools in Oklahoma, Senate Bill No. 22, districts having approved junior high schools are apportioned funds for teachers at a lower ratio of Average Daily Attendance of pupils per teacher, than schools organized on the 8-4 plan. This fact will probably cause certain sizes of schools to organize on the 6-3-3 plan. (18, page 56-7).

AIMS AND FUNCTIONS OF JUNIOR HIGH SCHOOLS

Perhaps in no field of educational endeavor has there been a greater variety of statements and classifications than in the attempts to formulate the aims and functions of the junior high school. This vast difference is unfortunate and is certainly confusing. It appears there is agreement to this extent, that many of the early claims for this unit such as, economy of time, enrichment of the program, bridging the gap, recognition of individual differences, are still considered important functions. The discussion that follows is given with the idea of showing the trend of thought.

Definition in Light of Modern Functions. In view of early aims and functions, one may associate the commonly accepted definition of the junior high school, that of

consisting of grades seven, eight, and nine, organized and administered as a separate unit, but today when boys and girls are pressing their demands for schools that meet their needs, stimulate their interests and develop their abilities, the current concept of the junior high school must be broad enough to include these demands. Pringle, in thinking of the vital aims and functions, defines a junior high school as: (41, page 68).

> An organization of grades seven, eight, and nine; into an administrative unit for the purpose of providing instruction and training suitable to the varied and changing, physical, mental and social natures, and needs of immature, maturing, and matured pupils. Maturity here means arrival at adolescence.

The implications of this definition are perhaps many. The definition implies that the most important implication pertains to subject content and methods of instruction. In the interest of enrichment with a view to meeting a wider range of interests, the definition implies an early introduction of vocationally important subjects.

Aims. When the aim of any unit in the public school system is considered, one would think of the seven cardinal principles, or, more recently, the social-economic goals. However, the placing of "training for citizenship" is often thought of as the fundamental aim. Still Pringle contends that this worthy aim has not been accomplished when judged by positive results. "It would appear that either we have chosen a fruitless aim or we have proved we do not know how

concluding

to realize the aim." (41, page 72). He leads us to believe that one of the fundamentals in training for citizenship in a democracy is the discovery and development of individual potentialities. Thus he formally states the aim of this unit: (41, page 72).

> To develop and train to the highest capacity the physical, mental, social, moral, and aesthetic powers of the immature, maturing, and matured pupils of the seventh, eighth, and ninth grades.

Here we see the emphasis on the "seven cardinal principles" as the basic aims of education. Because of the extreme individual variation among high school pupils as to maturity, capacity, and aptitudes, the aim thus stated is of great importance.

The junior high school attempts to arrange life situations that are of vital concern to its pupils, and as they make adjustments and as adjustments are made for them, they not only grow in ability to meet new situations but frequently they see ways and means for improvement and better control. The problem solving attitude is expected and encouraged to become the pattern of reaction. The aim should be to make school so true to life that it will be life for all of its pupils. Dr. Alice Ball Struthers, who has been connected with the junior high school movement in California for many years, writes: (55, page 213).

> The aim is to present an organization of life experiences, activities, or opportunities appropriate

> to serve the needs of each pupil....The junior high school, in receiving the pupils who are sent, accepts the responsibility and obligation of providing opportunities and stimuli to growth which will further the interest and stimulate the capacities of all pupils who become members of its population.

The committee on science in general education of the Progressive Education Association expresses this view of the purposes of education in this recent definition of general education. (13, page II-1).

> The purposes of general education are to provide rich and meaningful experiences in the basic aspects of living, so directed as to promote the fullest possible realization of personal potentialities and the most effective participation in a democratic society.

Functions of Junior High School. In order to realize the aims previously stated, the junior high school unit must function in specific ways that take into account the nature of the pupils and educational material furnished by society as a whole. Pringle lists four important functions of the junior high school, the first and most important being: (41, page 72).

> The recognition of the nature of the pupils, including their individual traits, interests, capacities, and needs, and the discovery of tendencies and habits of more important pupil groups as such.

He points out that this is the logical statement of functions following the aims previously stated. This is a function that can be realized to the fullest only by a sympathetic study of the pupils and pupil groups by the individual teacher in cooperation with the faculty.

Of other functions mentioned, the exploratory-guidance function seems to be the most important. Pringle makes this comment on the exploratory phase of this function: (41, page 81).

> The exploratory phase of this function includes all of the means that have been devised for ascertaining pupils' individual traits. . . Use is made of scholastic records, pupil's social responses in and out of class, results of various objective tests, and the social economic status of the family in each case. . . In recent years many junior high schools have established carefully worked-out exploratory courses.
>
> The most marked progress in the organization of these try-out courses has been in the field of industrial arts for boys. Although such courses must always be used as a means to an end, all are agreed that these exploratory and survey courses should be constructed from material that has positive value for pupils as judged by their immediate interests and needs; this means that the program of studies must be wide in range and rich in content. No argument is needed to show that exploratory function is closely correlated with the principle of individual differences and really part of our recognition of it.
>
> . . . Especially because of the broadening outlook and developing interest in adult life and occupations characteristic of adolescents, the junior high school may well assume a high degree of responsibility in the exercise of this function.

Five special functions of the junior high school as given by Dr. Thomas H. Briggs are listed below: (9, page 97).

1. Continue in as far as may seem wise and possible and in a gradually diminishing degree, common integrating education.

2. Ascertain, and reasonably to satisfy, the pupil's important and immediate and assured future needs.

3. Explore by means of materials, in itself worthwhile, the interests, aptitudes, and capacities of pupils.

4. To reveal to them, by materials otherwise justifiable, the possibilities in major fields of learning.

5. To start each pupil on a career which, as a result of exploratory courses, he, his parents, and the school are convinced is most likely to be of profit to him and the state.

Dr. Briggs thinks the junior high school is primarily a guidance institution. Efficient guidance as a method of education is regarded as a modern expression by many leaders in secondary education.

PROGRAM OF STUDIES

Any program of youth education should be formulated in light of capacities and interests, as well as adjusted to probable needs. Young people must be prepared to do a variety of things, and provided opportunities to explore and exploit their points of strength. Education must not only be integrative, providing for common types of information, skills, understandings; but must be differentiative, preparing a wide variety of minds with suitable equipment to carry forward work and progress along all fronts of knowledge and activity. Much thought is being focused upon the subjects and subject content of the junior high school curriculum. (Douglas, H. R., 20, pages 27-28).

Types of Programs. The junior high school builds on elementary school foundations, gradually increasing the difficulty as capacities, aptitudes, and interests develop. The pupils coming to the junior high school soon learn of

the two general types of programs known as "electives" and "requireds". The required subjects are usually thought of as those minimum essentials which all pupils need in common from the standpoint of general educational objectives. In Oklahoma these required subjects are accrediting agency requirements.

As the pupil progresses in junior high school, he learns that he may choose certain subjects or activities depending on his interests and desires as long as these do not conflict with the required part of his program. The opportunity for choice is greatest in the ninth grade.

Methods of Choosing Electives. There are two schemes in general use for directing the student and the parents in the choice of elective subjects. One plan is to permit student and parent to choose electives without restrictions, except those arising from the daily program of the school. This plan permits pupils to use electives for try-out courses, thus increasing the exploratory function for those who have not made a vocational choice.

Another plan, known as the multi-curriculum type, provides differential curriculums from which the pupil is called upon to choose. These curriculums are frequently given descriptive names such as "Foreign Language", "Commerce", "Industrial Arts", "Home Economics", and "Agriculture".

The names employed are usually vocationally suggestive. The subject or sequence of subjects may be thought of as two and and three year majors. This plan assumes that the school authorities are better qualified to make a purposeful grouping of subjects suited to the needs of pupils than the pupils and parents. Some of these programs have a vocational outlook and will eventually function as a beginning of vocational education, but they should not be planned or administered so as to commit pupils irrevokably to a fixed vocational program. Due to this danger, some schools are using a combined method of both and are conserving as many advantages of each as possible. (Pringle, 41, pages 103-8).

TRENDS IN JUNIOR HIGH SCHOOL ORGANIZATION

The Junior High School the Accepted Unit. In a period of thirty years the junior high school has developed into an efficient and accepted unit in our program of education. Pringle states: (41, page 27).

> . . . We know that there has gradually come about extreme faith in the worthwhileness, possibilities, and effectiveness of the junior high school. This confidence is possessed by all concerned: taxpayers, patrons, students of education, and others immediately connected with the work.

It is true that it has not met all expectations, but when all evidence is considered, one can safely say that it has more than justified itself. Briggs makes this comment: (8, pages 1-10).

> There can be no doubt that the junior high school has made valuable contributions to the betterment of education for children in their early adolescence. On the whole one can safely conclude from all evidence available that they have more than justified themselves. . . . If the stated and generally approved special functions of the junior high school are to be achieved, the administration must not only make careful preparation, but also work continuously to effect proper attitudes in teachers and both to stimulate and lead them to an effective educational reorganization that is never ending.

The challenge is evident for the individual teacher to become more than a teacher of special subjects is clearly indicated.

Program of Studies. Experimentation in organization and administration has been less in evidence and the energies of the superintendents, principals, and teachers have been turned to a vigorous attack on the problem of determining suitable subject content and methods of presentation.

Trend in Place of Emphasis. In the junior high school of today more and more attention is being given to the child. "When specialization was put into practice," writes Struck, (54, page 20) "some teachers lost sight of the child and centered the work upon subject matter." Doctor Struthers expresses the trend of today regarding emphasis on the child. (55, pages 210-14).

> Many schools are minimizing the significance of the mechanistic in educational devices expressed in marks, grades, units, and credits, and are paying more and more attention to the democratic significance

> of integration of the wholesome personality, diversification of opportunity, exploration, guidance, recognition of individual differences as indicative of progress.

Integration, with the child as the integrating agent, represents a worthy ideal that will be realized increasingly as teachers learn the effective procedures.

Trend in Regard to Mastery of Fundamentals. Since the length of the educative period has been extended, the responsibility for checking the various forms of knowledge and skills for which the elementary school assumed responsibility is a function of the junior high school. Dr. Briggs implies this in his list of functions for this unit and Doctor MaComber comments as follows: (32, pages 11-25).

> The exploration function of the junior high school is rapidly giving away to the concept of the junior high school as an institution for continuing the general education of the youth coming up from the grades. . . The idea that the junior high school is an institution different from that of other units of the public schools is no longer tenable.
>
> The value and need for numerous short exploratory courses in junior high school is being seriously mentioned. The high school itself, for most pupils, is an institution of general education. Specialized vocational education is being pushed to higher levels. This relieves the junior high school of the necessity for providing vocational guidance.

There seems to be no question regarding junior high school responsibility for providing a program that will meet the needs of its pupils.

Besides problems already mentioned, the junior high school is faced with the problem of how the process of discovery of individual interests, aptitudes, and abilities can be made more effectual. Should it find a solution to this problem, it would be faced with the problem of developing these abilities.

CONCLUSIONS

The junior high school is an accepted unit in the public school program of education. It is defined by Pringle as an organization of the seventh, eighth, and ninth grades into an administrative unit for the purpose of providing instruction and training suitable to the varied and changing physical, mental, and social natures and needs of immature, maturing, and mature adolescent pupils. The "seven cardinal principles" or more recently stated "social-economic goals" are accepted aims. The remote aim, training for citizenship, is an aim of all education. Special functions of this unit are:

1. Continue common integrating education to the extent of the needs and capacity of pupils for profiting by same.

2. Ascertain, and reasonably satisfy, the pupil's important, immediate, and assured future needs.

3. Explore by means of materials in itself worthwhile, the interest, aptitudes, and capacities of pupils.

4. To reveal to them, by materials otherwise justifiable, the possibilities in the major fields of learning.

5. To start each pupil on a career which as a result of exploratory courses, he, his parents, and the school are convinced is most likely to be of profit to him and society.

A junior high school so defined and organized with the above mentioned aims and functions, raises the question as to "What is the place of the industrial arts in the junior high school?" How can the industrial arts program aid in the achievement of its aims and functions? Questions as to the objectives of the industrial arts and the specific objective that the industrial arts teacher would assume responsibility for, might also be asked. The discussion of objectives of industrial arts will be taken up in the next chapter.

CHAPTER III

OBJECTIVES OF INDUSTRIAL ARTS

"Objectives are end-goals in any field of endeavor and should stand out so clearly and so brilliantly that they will never be lost sight of for a moment," so Badger writes. (2, page 160-4). School activities of all descriptions should make definite contributions to the accepted objectives. If the primary purpose of education is to develop young people into useful, happy and successful citizens, then the objectives should be so formulated that in the realization of them the experiences so necessary for the development of good citizens are provided. There is no conflict between general education and industrial arts. In attaining many of the objectives of general education it is believed the industrial arts experiences are more effective than the experiences offered in many academic subjects (16, A.V.A., page 9). The claims of interested advocates of industrial arts are expressed in their statements of its objectives which are reviewed in this chapter.

GENERALLY ACCEPTED STATEMENTS OF OBJECTIVES OF INDUSTRIAL ARTS

Many and varied are the statements of objectives of industrial arts. They range from the inclusion of minimum skills and vocational information to almost every virtue

possible to be developed in schools. John J. Voth, working under the direction of William L. Hunter at Iowa State College, assembled all available objectives for industrial arts found in books and periodicals up to October, 1923. This compilation of statements of objectives filled sixty-nine pages. No similar study has been made since that time, yet many new statements of objectives have been formulated. Several of the more widely known statements of objectives are the results of extensive investigations carried on over a period of years with a number of people and schools cooperating. In the statement of objectives that are to follow, the intent is to reveal the specific values of industrial arts in the junior high school as indicated in these statements.

The Ohio Objectives. The industrial arts section of the 1937 edition of Ohio School Standards list the objectives of industrial arts in six statements of functions. These functions are as follows: (38, page 143).

> The Orientation Function. Industrial arts helps the secondary-school pupil achieve orientation in an industrial society by exploring many types of tools, materials, processes, products and occupations. Manipulation is only a means for promoting other ends. Habits and skills derive their value from appropriate use. The emphasis is rather upon attaining a pattern of knowledges, attitudes, habits, skills and understandings essential to individual and group welfare in a technological society. One of the outcomes of the orientation function is occupational guidance.
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> The Technical Function. Industrial arts should provide as many opportunities as possible for pupils to spend at least a year in any phase of work where

orientation may help to define specialized interests that can be pursued with profit. The opportunity, for example, should be provided for a pupil to delve into the intricacies of cabinet or furniture making, electrical communication and power, lighting, automotives, printing a monograph, making a cabin or a boat including drawing the design and writing specifications, designing and making a small machine, studying the occupational possibilities of certain local industries or any similar problem or group of related problems in one or more areas of the industrial arts program.

The Avocational Function. Industrial arts also provides a wide variety of useful, wholesome and enduring leisure time interests and activities. Collection and appreciation is involved in addition to manipulation. The importance of this function is increasing. There is now almost as much time for leisure as for labor and sleep together. Increased leisure times affords not only an educational opportunity but it also becomes a liability and a responsibility with which the schools must cope.

The Consumer Function. Industrial arts also helps the individual develop intelligent attitudes and understandings concerning the selection and use of the products of industry. This involves studies and experiences covering a range of topics and problems all the way from the production of raw materials, through the processes and problems involved in their manufacture, to the distribution of finished products and their wise use by the ultimate consumer. It should help him achieve consumer literacy since he needs to live intelligently in the midst of an involved technology.

The Social Function. Industrial arts, because of its nature, is also able, through activities in the shop or laboratory as well as outside, to help develop desirable social habits and attitudes. The program is concerned, for example, with helping pupils understand and formulate wholesome opinions toward such things as integrity of workmanship, sanitation, housing, wages and hours of labor, safety, preservation of natural resources or any other related social problem.

The Cultural Function. Industrial arts helps the individual enjoy a finer culture as regards materials in an involved technological society. This means helping

> him develop and use his material inheritance. For example, the pupil can learn to know style or design in architecture, furniture, rugs, pottery, silverware, glass, dress, china, printing, machinery, and other items of common use and to appreciate the forces that have influenced them. With a cultured taste, he is prepared to surround himself with those things from which he can derive life-long satisfaction.

The close relation of industrial arts to other subjects is shown when these functions are considered, as for example, physical science, art, homemaking, social science, language, economics, and agricultural engineering. In the seventh and eighth grades, the purpose should be exploratory, and designed to capitalize on the natural curiosity of youth. The introduction of the pupils to hand tools used in the different crafts and to a variety of general shop work is its purpose. The course should provide activities and information contributing to a well-rounded education and an industrial background. Suggested projects might include toys, household necessities, and simple tools to aid in developing home workshops.

American Vocational Association Objectives: The American Vocational Association Committee on Standards of Attainments in Industrial Arts reporting in 1936, formulated objectives for industrial arts that are considered basic from the standpoint of what changes are expected to be achieved in a pupil. A brief statement of these objectives is as follows: (16, page 12).

> 1. To develop in each pupil an active interest in industrial life and in the methods of production and distribution.
>
> 2. To develop in each pupil the ability to select wisely, care for, and use properly the things he buys or uses.

3. To develop in each pupil an appreciation of good workmanship and good design.

4. To develop in each pupil an attitude of pride or interest in his ability to do useful things.

5. To develop in each pupil a feeling of self-reliance and confidence in his ability to deal with people and to care for himself in an unusual or unfamiliar situation.

6. To develop in each pupil the habit of an orderly method of procedure in the performance of any task.

7. To develop in each pupil the habit of self-discipline which requires one to do a thing when it should be done, whether it is a pleasant task or not.

8. To develop in each pupil the habit of careful, thoughtful work without loitering or wasting time (industry).

9. To develop in each pupil an attitude of readiness to assist others when they need help and to join in group undertakings (cooperation).

10. To develop in each pupil a thoughtful attitude in the matter of making things easy and pleasant for others.

11. To develop in each pupil a knowledge and understanding of mechanical drawing, the interpretation of the conventions in drawings and working diagrams, and the ability to express his ideas by means of a drawing.

12. To develop in each pupil elementary skills in the use of the more common tools and machines in modifying and handling materials, and an understanding of some of the more common construction problems.

Stop

Each objective was taken up in order and methods suggested as to the arrangement of the program to contribute directly to its realization. An example is given here. (16, A.V.A. page 18).

9. To develop in each pupil an attitude of readiness to assist others when they need help and to join in group undertakings. (Cooperation). This attitude may be developed through the assistance of tasks which will make necessary:

(a) Assistance from others.
(b) Assistance to others.
(c) Group cooperation.

This report recommends that objectives should be stated as the teacher's objectives and not as objectives of industrial arts or general education. "The objectives are the attitudes, habits, and accomplishments which the pupil is expected to acquire in some measure, as a result of the experiences provided for him in the field of industrial arts." Emphasis is on what the boy is expected to know, to do, and to be in all objectives formulated.

Tulsa Objectives. The industrial arts teachers in the city of Tulsa, Oklahoma, through the leadership of O. B. Badger, director of industrial education, have formulated a statement of industrial arts objectives. Others, under Badger's directions, have suggested ways and means of accomplishing the ends proposed. (56, page 2).

The objectives listed are those developed by the teachers of industrial arts in the Tulsa public schools. The analysis of these objectives was made by a number of different people who have drawn from their own experience and from the literature in the field of industrial arts. Since so many people have made contribution in this analysis, it is possible to give but little individual recognition. However, Professor R. W. Selvidge, Chester L. Bueker, M. R. Engle, C. L. Hill, and J. W. Bollinger deserve special mention.

The Tulsa list of objectives represents a more complete statement of what is possible to accomplish in the industrial

arts shop. A single major objective has been formulated and twelve criteria suggested to guide in accomplishing this objective. Fifteen other objectives follow, each with detailed information as to how these objectives may be achieved. A list of the objectives and an example of the detailed suggestions as to their accomplishment will be given here. (56, pages 1-15).

MAJOR OBJECTIVE: THE MAJOR OBJECTIVE OF THE JUNIOR HIGH SCHOOL MANUAL ARTS IS TO DEVELOP DESIRABLE HABITS OF THINKING IN TERMS OF MATERIAL THINGS THROUGH ANALYZING, PLANNING, AND PERFORMING MECHANICAL TASKS WITHIN THE ABILITY AND INTEREST OF THE STUDENT.

Objective I. To help vitalize and give meaning to, and in a measure fulfill the purpose of academic knowledge, especially in the fields of art, science, and mathematics.

Objective II. To provide exploratory experiences in several representative occupations, for the development of interests and discovery of aptitudes.

Objective III. To provide opportunity for the exercise of the creative urge in terms of material things.

Objective IV. To develop mental and physical coordination through the use of hand tools, machines, and materials.

Objective V. To provide forms of activity within the school which will appeal to and interest the adolescent boy.

Objective VI. To contribute to the development of avocational activities and interests which may be followed outside of the school in later life.

Objective VII. To develop ability in the consumer to judge and appreciate qualities of industrial products and their values.

Objective VIII. To give an understanding of, and to develop a favorable attitude toward industrial pursuits, and the men who work in industry.

Objective IX. To contribute toward the development of self-confidence through having successfully completed a shop project.

Objective X. To contribute to the development of leadership by giving the boy an opportunity to assume responsibilities in the shop.

Objective XI. To develop a knowledge of the more common tools of the household and to acquire some degree of skill in their use so that the boy may contribute his share to the up-keep of the home.

Objective XII. To train in skills and abilities technically correct which may serve as a foundation for later vocational training.

Objective XIII. To develop a health and safety consciousness in relation to manufacturing conditions and the general use of tools and machines.

Objective XIV. To give to each pupil a knowledge of good workmanship.

Objective XV. To contribute to the development of self-confidence in the individual to enable him to meet unusual or unfamiliar situations regarding material things.

An example of suggestions that are included with each objective is shown in connection with the avocational objective number VI. (56, Tulsa Objectives, page 5).

OBJECTIVE VI

TO CONTRIBUTE TO THE DEVELOPMENT OF AVOCATIONAL ACTIVITIES AND INTERESTS WHICH MAY BE FOLLOWED OUTSIDE OF THE SCHOOL AND IN LATER LIFE.

1. Develop clubs.

2. Provide various phases of activity in the shop.

3. Study possibilities of various phases of activity for them and requiring good workmanship in order to get the credit.

4. Give aid in the establishment of home workshops.

5. Encourage work on home projects by allowing credit for them and requiring good workmanship in order to get the credit.

6. List of magazines, blueprints, books, and other materials available for particular phases of activities.

7. Hobby shows and displays.

8. Study of materials, equipment, space, time, and cost of activity.

9. Consult vocational workers for information regarding the avocation.

This practice of planning for the accomplishment of the objective at the time of its formulation was given national publicity by the American Vocational Association Committee on Standards of Attainments in Industrial Arts, and is carried out more in detail by the teachers of the Tulsa system. It probably represents one of the trends in the formulation of objectives which will contribute to efficiency in industrial arts teaching.

In the consideration of objectives of industrial arts in the junior high school, one may think of them as functions of the industrial arts that contribute to the development of youth. These functions are given here.

1. Avocational -- leisure time -- hobby.

2. Consumer knowledge.

3. Health, mental and physical.

4. Exploratory -- discovery of individual interests and aptitudes.

5. Guidance.

6. Planning -- drawing.

7. Social -- leadership -- followship.

8. Development of industrial interests.

9. Development of correct habits and attitudes.

10. Aid in further development of the fundamental processes.

11. Home maintenance abilities.

12. The development of safety attitudes.

No attempt was made to list the functions of industrial arts in the order of their importance. All of these functions point to the necessity of a modern interpretation of the industrial arts, as disclosed in a recent revision of Bonser's definition:

> Industrial arts consists of a study of the machines, tools, and processes by means of which natural substances are changed by man to make them more useful and valuable and pleasing to him. It includes a knowledge of the raw materials and of the methods and practices of utilizing these materials and forces. It is also concerned with the social and economic effect of these changes. (Proposed by J. Sterling Teel and Dr. DeWitt Hunt).

The examples of definitely defined objectives, in light of the modern interpretation of the industrial arts and plausible ways and means of achieving them, point to the importance of the place of the industrial arts in the junior high school. The chapter which follows will disclose the place of the industrial arts in the junior high school as viewed by representative writers in the field of secondary education.

CHAPTER IV

THE PLACE OF INDUSTRIAL ARTS IN THE JUNIOR HIGH SCHOOL AS VIEWED BY LEADERS IN SECONDARY EDUCATION

The teacher of any subject in the junior high school is always interested in the latest thoughts, trends and developments as to the value and place of his subject. Industrial arts teachers respect the opinion of textbook writers on the junior high school and its development, and read with interest the comments of leaders in the field of secondary education as to the value and place of industrial arts in the junior high school. To determine the place of industrial arts in the junior high school as viewed by representative writers on the junior high school and in the field of secondary education is the intent of this chapter.

THE PLACE OF THE INDUSTRIAL ARTS IN THE JUNIOR HIGH AS VIEWED BY WRITERS OF TEXTBOOKS ON THE JUNIOR HIGH SCHOOL

There have been very few books written on the junior high school during the last ten years. The writers, whose opinions will follow as to the place of industrial arts in the junior high school, are accepted authorities on the junior high school unit of secondary education. Three textbook writers on junior high school selected for this discourse were: Leonard V. Koos, Professor of Secondary Education, University

of Minnesota; Phillip W. Cox, Professor of Secondary Education, New York University; and Ralph W. Pringle, Professor of Education, Illinois State Normal University.

Phillip W. Cox. This writer devotes two chapters of his book, The Junior High School and Its Curriculum, to "Practical Arts" and "Industrial Arts, Home Arts, and Prevocational Training". (17, pages 207-26, 343-63).

Cox suggests that a home mechanics course for both boys and girls be required of seventh and eighth grade pupils. It is believed that a degree of acquaintanceship with, and proficiency in, practical arts of significance to home and community life, is doubtless of universal value. Cox points out that some of the practical arts activities are commonly spoken of as men's jobs, and others as women's jobs, but since men help with the housework and women occasionally must tinker with the Ford, he believes the home arts or practical arts activities are well worthwhile for both boys and girls. One should not confuse the practical arts with vocational training or exploratory try-out courses, or with the fine arts. However, some of the objectives of the related arts will be incidental outcomes. The major goals of practical arts for both boys and girls should be a functioning knowledge and mastery of skills sufficient for the practical needs of home life, civic participation and desirable leisure time activities. These experiences

are provided in the core-curriculum courses of many schools for both boys and girls. Where these activities are not provided in the core-curriculum, some provision should be made to arrange these experiences for seventh and eighth grade pupils.

Industrial arts should be an elective for ninth grade boys and girls. It should provide a place where many pupils should find: ". . . a high grade developmental play, a chance to construct, alter, experiment, read and discuss their hobbies with others." (17, page 345). It is thought with the shop environment and acquaintanceship made with materials, tools, machines and commercial products used in the shop, that there will develop an abiding interest in industrial processes. From these developed interests, may result temporary or permanent choice of a life career. This choice is not to be thought of as the most important objective, because for most boys and girls, industrial arts will be: ". . . general cultural education--a sympathetic understanding of and experience in the world of producers and consumers of industrial products." (17, page 346).

What criteria to use in selecting activities and experiences to be included in the industrial arts curriculum is a problem for the industrial arts teacher. Cox suggests certain criteria and makes these comments: (17, page 341).

> Analysis of the actual interests and activities of boys and girls and young adults of the community served by the school furnish the only secure basis for determining what opportunities the school should offer.
>
> Trade analysis at this stage as a basis for curriculum construction has very narrow limits. The school shop is not a factory: to restrict pupils by meaningless jobs on the grounds that individuals in industrial plants do only specialized work is vicious. The objectives being information, interest and experience, the boys and girls must carry processes through or, at least far enough to appreciate the operations and instruments in relation to the whole.

Cox bases the activities on the needs and interests of the pupils, which is the modern trend or practice. Four groups of pupils that will, or perhaps should, elect industrial arts in the ninth grade are as follows:

1. Those who are more or less artistically manipulative, who need opportunity and encouragement to work successfully in completing reasonably well finished jobs.

2. Those pupils who have more of the rough and ready manipulative interest, who just want things to work and do not care how it looks.

3. Those pupils who have little propulsive manipulative interests, but have even less talent or desire for book-work.

4. Those pupils who have vocational or prevocational industrial enthusiasm.

Boys and girls in the junior high school enter industrial arts and homemaking experiences joyfully and eagerly. These industrial arts, and home arts electives, are units of vigorous

experiences and joyous satisfying adventures. To the degree that boys and girls do now, and probably will continue, to participate in the activities of industry and home, should these activities be provided in the junior high school.

The place of industrial arts in the junior high school as viewed by Cox is clearly described. Another leader in the junior high school development and an author of a textbook on the junior high school is Leonard V. Koos. The place of industrial arts in the junior high school as viewed by Koos follows.

Leonard V. Koos. Koos, in his recent book, The Junior High School, devotes one chapter to the discussion of the place and value of the industrial arts activities in the junior high school. He is clear in his statement that it is desirable to provide a wide range of contact with the field of industrial arts in the junior high school. The accepted aims of the work indicate the emphasis attached to the exploratory function. The aims of industrial arts in the junior high school as stated by Koos are as follows: (30, page 281).

THREE COMMONLY ACCEPTED AIMS

1. To provide opportunities for boys to make and do the things they like to do.

2. To give training in the common usable skills everyone should possess.

3. To provide technical exploratory or try-out experiences in the shops representing typical industrial occupations, in order to help boys determine whether they possess general mechanical aptitudes or possibly some special one.

FIVE SPECIFIC ADDITIONAL AIMS

4. To give related or industrial-art training, in order to develop an appreciation of art as applied to industry and to develop intelligent, discriminating consumers of industrial products.

5. To give information about occupations represented in various shops, and other occupations closely allied with them.

6. To provide educational guidance, in which occupations study forms a background. . .

7. To give an insight into present-day industrial problems of a social and economic nature faced by capital, labor, and the general public.

8. To give training in problem solving as opposed to . . . copying models and blindly following directions.

Koos cautions the industrial arts teacher about the tendency to anticipate the accrual of a large number of incidental values without definitely planning courses and curricula to achieve them. He reports studies made by Glass and Edgerton revealing the tendency to provide from three to ten activities for the junior high school pupil to contact and explore.

Koos leaves no doubt in the reader's mind in regard to the inclusion of a rather large number of the industrial arts activities. He realizes that the program is in the experimental stage of development and that much research is needed in development of objectives, instructional materials, and methods of

organization and instruction. A more recent writer on the junior high school movement is Ralph W. Pringle.

Ralph W. Pringle. Pringle's ideas as to the aims and functions of the junior high school, that of discovery and development of the individual's mental, physical, social, moral and aesthetic powers to their highest capacities, represents the modern trend in adapting the school to the individual pupil. Pringle thinks the industrial arts courses have a very important place in the junior high school. (41, pages 276-90).

Pringle speaks of industrial arts as including manual training, a subject which occupied a very secure place in the educational program for almost a half century. Manual training: ". . . has functioned as an instrumentality which makes for economic and social adjustment, and more important, it provides activities that makes a strong immediate appeal." (41, page 276).

"Industrial arts" as it is thought of today includes woodworking, mechanical drawing, machinery, electricity, printing, auto mechanics, general metal-work, cement work, machine shop-work, and forging. Emphasis is on completion of successful projects and on pupil development rather than exercises and problems.

Many of the activities in the industrial arts field are not definitely classified as "required" or "electives," neither is there agreement as to grade placement. This lack of agreement does not mean that the industrial arts teacher has

seriously been placed on the defensive. It seems that it must be the result of two rather fundamental differences of conception relative to the functions of these subjects. The trend is to formulate the objectives in terms of general education, rather than in terms peculiar to the practical arts. The theoretical trend during the last decade has been toward Snedden's conception of the industrial arts. "He conceives of these subjects as furnishing developmental experience which is suggestive of learning units that are both comprehensive and significant." (41, page 281).

The objectives should be formulated in terms of definite effects, which it is hoped will be produced in the individual, and that these effects must not be vague and remote educational ideals. These objectives should be worthy traits rather than skills in the manipulation of tools which industrial arts teachers are in danger of making their objectives. There should be added to these desirable traits, correct habits, points of view, and attitudes. This leads one to the conclusion that there are no conflicts between the objectives of general education and objectives of industrial arts. Pringle further expresses the trend of thought in regard to objectives of industrial arts and general education: (41, page 282).

> Dean H. S. Ganders expresses the trend of thought when he says: "Teachers in the industrial-arts must cease thinking of their work as elements separate and apart from the rest of education," and he attributes this tendency toward the unification of educational results to the influence of the project method which has been the favorite form of teaching industrial-arts

> subjects for many years and is now causing the: ". . . artificial wall between cultural and vocational education to crumble." In progressive schools, projects "are entirely displacing the old subject-compartmentalized curriculum." Dean Ganders is bold to assert that there is now an opportunity for teachers of this field to furnish "leadership to the whole of education."

This claim is supported by the fact that the objectives in academic education are not clear when compared to the clear and definite statements of industrial arts. Pringle further writes in regard to the projects method of teaching, and selection of instructional materials: (41, page 283).

> It must be conceded that the project method of teaching, as to both content and method, makes for a definiteness of purpose and conformity to the principle of individual differences. Provided the teacher of the industrial arts will, as Ganders urges, focus continually on the interests of their individual pupils rather than on a standardized list of projects, we may safely agree with much for which he contends; and may further agree that the aims and methods of the industrial arts should have a very wholesome influence, both as to theory and practice, on general education, especially on the junior-high-school level. However, neither the effectiveness of the methods of modern industry nor the character of the immediate community must be allowed to detract the attention of school officials and teachers from the immediate individual interest of the pupils: this point of view should be a safeguard against the dangers that have from the beginning beset the teachers of the practical arts.

Pringle's position as to the place of "the industrial arts in the junior high school" is clearly stated. He leaves no doubt as to the importance of keeping the pupils' interests and needs first. A review of the objectives formulated by the Committee's Report on "Standards of Attainment in Industrial

Arts Teaching," brings forth this comment from Pringle because of the omission of the "exploratory objective." (41, page 286).

> Since the committee has attempted so inclusive a formulation of objectives, it would appear that there might have been added "exploration." This is now believed to be an important function of a number of the industrial arts, especially in the junior high school. The claim is based on (1) the wide and varied nature of the materials and activities involved, (2) the adaptability of the usual courses to short time treatment, and (3) the distinctive character of the courses both as to materials and methods. The author has had an opportunity to follow the workings of an exploratory course made up of six six-weeks units: drafting, motor mechanics, woodwork, electricity, bench metal and general mechanics; these units are offered in the ninth grade. The purpose of this composite is educational, not vocational, guidance. In some places teachers of industrial arts are using for exploratory purposes courses in home mechanics, which are suited to pupils in the seventh and eighth grades.

As indicated above the importance of the exploratory objective may well be assumed at the junior high school level. However, the choosing of materials and determining methods of instruction must take into consideration the age and the mental and physical development of the pupils. Pringle is of the belief that woodworking projects are better suited to the stage of development of younger pupils than metalworking projects, which demand more judgment and skill.

From the discussions and statements in regard to Pringle's views as to the place of the industrial arts in the junior high school, one may safely conclude that he regards industrial arts as deserving of foremost consideration in planning a

program for achieving the aims and functions of education at this period in the life of the pupils. The remainder of this chapter will summarize the views of other writers in the field of secondary education as to the place of industrial arts in the junior high school.

THE PLACE OF INDUSTRIAL ARTS IN THE JUNIOR HIGH SCHOOL AS VIEWED BY WRITERS ON SECONDARY EDUCATION

The comments made by writers in the field of secondary education generally apply to industrial arts in the whole field of secondary education. However, their opinion as to the place of the industrial arts in the junior high school, is usually stated or indicated. Writers in the field of secondary education chosen for this interview are as follows: Dr. George M. Wiley, Assistant Commissioner of Education, State of New York, Albany, New York; William A. Smith, Professor of Education, University of California, Los Angeles, California; and Harry S. Ganders, Dean of School of Education, Syracuse University, Syracuse, New York.

These men have long been recognized for their leadership in the secondary education field. The place of the industrial arts in the junior high school, as pointed out first by Dr. George M. Wiley in his recent magazine article, "Increasing the Educational Dividend Through Superior Teaching," will follow. (59, pages 761-68).

Dr. George M. Wiley. This writer speaks of the arts and crafts as a great undeveloped field for secondary education, rich in subject-matter and instructional materials. He thinks this vast area in education has but barely been touched.

> When we stress the importance of the arts and crafts in education and more particularly in the program of education at the adolescent level, we are approaching a field which has been significantly rich in the social as well as in the industrial progress of the world throughout all centuries. In fact history itself, as well as much of the so-called literature, fairly teems with the fine arts, the practical arts and the crafts.
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> As a matter of fact, the rootage of much that man has done and thought is found in the field of the arts . . . In a casual survey of history there seems to be ample evidence that the development in these fields have gone hand in hand with the rise of civilization; where creative genius in the arts and crafts have been stagnant, civilization seems to have made little progress.
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> The crafts, with all the charm and allurement which they present for avocational as well as for vocational purposes, are still largely out of the picture as a major vehicle in secondary education. If education is growth and development, why deny, except as an aftermath or as a poor substitute, these activities or means through which the imagination and cultural development of thousands is supremely challenged.
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> Craftsmanship is a language no less than the spoken tongue. To many of us, yes, to too many of us, it is an unknown tongue.
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> There is still too wide a tendency to fit pupils to the system rather than to adjust the system and instructional materials to serve the needs of the pupils. At these age levels many pupils are already beginning to think of life occupations and show a very definite interest in doing something which seems to have an obvious connection with these interests.

In the new curriculum the subject material will be determined by the value of the material to the pupil and by its contribution to the betterment of society. Until this new curriculum, including the arts and crafts in their proper place as an important vehicle of education, is installed in the public schools, one should not be in too great haste to tell the boy that the gang and the alley have a greater claim on him than the wholesome environment of the school.

Dr. Wiley's views as to the place of the industrial arts in the junior high school have been clearly shown. The importance that he would attach to an industrial arts program in the whole period of secondary education is evident.

The second writer interviewed as to the place of the industrial arts in the junior high school, was William A. Smith.

William A. Smith. In a recent magazine article, "The Place of the Practical Arts in General Education," Smith discusses the value and needs for a practical arts program from a general education view point. He defines the terms "practical arts" and "general education" as follows: (50, pages 141-45).

> The term practical arts, in a broad sense, designates practically the whole range of the practical processes, appliances, and means by which the race further the ends of living. Thus used, the term extends over the entire gamut of production, consumption, industry, commerce and much of what is commonly designated as art.

> General education is obviously concerned with those basic cultural patterns--insights, values and action patterns--which are in any given age or epoch essential for effective functioning as citizens and as human beings.

Industrial arts is one of the broad areas in the practical arts. Smith, in discussing the place of the practical arts in general education implies the place of the industrial arts in the junior high school. He thinks that industrial arts serves its greatest purpose in aiding in the development of the type of citizenship that the modern world demands.

> We are living in an age of technology, large-scale corporate enterprises, and specialization in which the individual is increasingly in danger of losing his identity; an age which has attained phenomenal efficiency in production and industry without comparable advances in distribution and social control of the basic means of livelihood; an age which gives large promise of leisure without corresponding assurance of economic security; an age in which democracy is on trial. Such an age demands above everything else a citizenry that has a realistic first-hand acquaintance with the modern man-made world; a citizenry that understands the factors that condition the production and distribution of the basic means of livelihood so well that it can vote intelligently on all issues; a citizenry that understands and appreciates the contribution and the rights of the many diverse elements that comprise it; a citizenry that consumes discriminatingly in keeping with tried and tested values; a citizenry that is schooled in the practice of democracy. To the development of such a citizenry, the practical arts, properly conceived and soundly articulated with the social studies, should make a major contribution. (50, page 143).

The modern American is confronted with the problems which are concerned with the control of the basic processes and means of livelihood. Unless he has experienced a thoroughgoing, realistic orientation to the world of today,

it will be impossible for him to think clearly and exercise the rights of citizenship intelligently. (50, page 144).

Schools are making little progress toward integrating social studies with the practical arts. In truly aristocratic fashion they have turned to literature, music and art, apparently quite oblivious of the fact that the arts have their roots in the soil. He states the purpose of the practical arts on the secondary education level as follows: (50, page 146).

> The supreme purpose of the practical arts on the secondary school level is to lay the foundation for the type of citizenship which the modern technological democracy demands. To this end a fundamentally sound general practical arts program must be developed and made a part of the curriculum of every pupil. Such a program must have as its primary objectives real insights and tested values rather than technical abilities and skills. These insights and values should, above everything else concern the manner in which man has arrived at his present made livelihood and the manner in which he might improve upon this. (50, page 146).

The type of practical arts program referred to above should bear a close organic relationship with the social studies throughout the junior high school period.

When one thinks of the industrial arts as the major groups of the practical arts provided in the schools, one readily interprets the implications as applied to the place of the industrial arts in the junior high school. The need for the type of citizenry described by Smith is evident. To aid in the development of this type of citizenship has long

been considered one of the important functions of the experiences provided for in the industrial arts curriculum.

Dean Harry S. Ganders. The third writer selected from the field of secondary education to describe the place of the industrial arts in the junior high school was Dean Harry S. Ganders. Dean Ganders' article, "Industrial Arts Must Lead," appeared in the Industrial Arts and Vocational Education magazine of recent date. This writer is very enthusiastic about the place of industrial arts in secondary education. He believes that industrial arts is the medium for revitalizing American education. Ganders writes: (26, page 221).

> An opportunity for revitalizing American education through the industrial arts is a definite possibility. For its realization teachers in the industrial arts must cease thinking of their work as separate and apart from the rest of education.
>
> Fortunately, an increasing number of educators are beginning to realize that interests in industry are excellent centers around which education can be achieved . . . The "generalists" are learning that life interests of individual children, rather than subjects, constitutes the roots through which education feeds.

Dean Ganders warns the industrial arts teacher not to let the industries of the community dominate to the extent that pupils' interests and capacities will be disregarded in the selection of instructional materials and experiences. He also warns of the danger of placing too much emphasis on projects and production. His comments follow:

> Industry is primarily interested in production--education in the development of individuals and society.
>
> Should there not be time in school for education--for the formation of generalizations, for the thorough understandings of fundamental processes, for history of industries, for story of the evolution of processes from primitive form? Should there not be opportunity for reading the rich and thrilling literature of commerce--by mule teams on the dusty plains, of sailing ships, and trans-atlantic steamers, and of the tremendous efforts to harness the forces of nature to do man's bidding? Should there not be time for the literature of trades and industries?
>
> And is there no place for consideration of social values, which after all, are the reason for industries.
>
> Continued failure to include as an integral part of its program the essential elements of a broad vocational culture, the neglect of generalizations and subservience to mass instruction may forever obscure the light of the new day and cause this group to fail in its opportunity.
>
> Industrial arts education faces a challenge to lead, because its basic "project" theory provides a firm foundation for all education, and because it points the way to educational unity. It should avoid a too close adherence to industrial patterns and must never be justly charged with lack of vision and narrowness. (26, pages 225-26).

Dean Ganders points out the opportunity for industrial arts teachers to make their work one of the most valuable subjects in junior high school. There is no question but what he would consider the area of industrial arts as one of the richest sources of material for education purposes available.

It is evident from the comments of these six leaders in secondary education that industrial arts should have an important place in the junior high school curriculum. What industrial arts subjects should be provided and how they should be arranged in the program of studies so as to make their greatest contribution to the development of the child will be discussed in Chapter V which follows.

CHAPTER V

A PROPOSED INDUSTRIAL ARTS PROGRAM FOR JUNIOR HIGH SCHOOL

The extent of the development of the industrial arts program varies from the minimum requirements of accrediting agencies, one unit in Oklahoma, to experiences and activities in representative subject fields of eight or more large areas, as provided in the Chicago junior high schools. Examples of the areas in which activities and experiences in the Chicago system are provided are: ceramics, textiles, planning, metal work, transportation, housing, graphic arts and electrical work. It has been definitely pointed out by writers in the field of secondary education, previously reported in this study, that the minimum program referred to is insufficient to make possible the realization of many of the true values outlined in a statement of industrial arts, which can be achieved only through a more diversified program of industrial arts. This chapter will describe samples of existing industrial arts programs and an ideal program of industrial arts for the typical junior high school of Oklahoma will be proposed. The administrating of such a plan would make a greater contribution to the realization of the aims and functions of the junior high school and to the development of its youth.

A DESCRIPTION OF PRESENT OKLAHOMA JUNIOR HIGH SCHOOL INDUSTRIAL ARTS PROGRAMS

The present junior high school industrial arts programs in Oklahoma vary from the minimum requirements of one unit, which may be woodwork, and often consists of woodwork and mechanical drawing, to subjects providing basic operations and processes in six to eight occupational fields. A brief description of industrial arts programs in several Oklahoma cities will follow.

Industrial Arts Program in Emerson Junior High School, Enid, Oklahoma. The industrial arts activities are made a required part of the eighth grade boys' daily program in Emerson Junior High School. The boys must spend eighteen weeks in the woodwork shop and must take eighteen weeks of mechanical drawing, which is given in a classroom separate from the woodwork shop.

The woodwork shop may be classed as a general woodwork shop. It includes the usual hand tools and necessary power machines needed for general wood project construction. The general objectives formulated for this course are as follows: (40, page 2).

GENERAL OBJECTIVES

1. To increase general intelligence of the pupil.
2. To assist in educational guidance.

3. Appreciation of good construction and design.

4. To develop a neat, orderly, and accurate habit of doing things.

5. Develop a creative instinct.

6. Knowing the value of material and labor.

7. Ability to interpret simple ideas expressed in drawing.

8. Typical use of common tools.

9. Develop desirable personal traits, persistence in meeting difficulties.

10. Care of shop tools and equipment.

At Emerson Junior High School, two teachers are employed for this industrial arts program. They devote approximately three-fourths of their time to teaching the woodwork and the drawing courses. Boys in the ninth grade may elect either woodwork or drawing, or both, as to their interests. The program is shown in graphic form in Table 2.

TABLE 2

EMERSON JUNIOR HIGH SCHOOL, ENID, OKLAHOMA

INDUSTRIAL ARTS PROGRAM

Ind. Arts Subjects	Shop	No. Pupils	Grade 7	Grade 8*	Grade 9
Woodwork I and II	1	25		(Beginners) 18 Weeks	(Advanced) Elect
Indr. Drawing I and II	2	25		18 Weeks	Elect

*Industrial arts program required of all boys in eighth grade.

Industrial Arts in the Junior High Schools of Tulsa, Oklahoma. The Tulsa public school system provides an industrial arts program to begin in the seventh grade. All boys in the seventh grade are required to take the following subjects:

TABLE 3

TULSA JUNIOR HIGH SCHOOL

INDUSTRIAL ARTS PROGRAM

Ind. Arts Subjects	Shop	No. Pupils	Grade 7*	Grade 8	Grade 9
			Beginning Work	Advanced Work	More Adv. Work
Woodwork	1		6 Weeks	Elect	Elect
Ind. Drawing	1		6 "	"	"
Electricity	1		6 "	"	"
Sheet Metal	2		6 "	"	"
Bench Metal	2		6 "	"	"
Ornamental Iron	2		Elect	"	"
Foundry	2		"	"	"

*Industrial arts program required of all boys in seventh grade; elective in eighth and ninth years.

woodwork, drawing and electricity given in a woodwork shop, and sheet metal, bench metal, ornamental iron and foundry, given in the metal shop. The boys may elect a more advanced course, depending on their interests, in the eighth and ninth

grades. The objectives formulated for this course have previously been quoted (page 31) and will not be given here. This program was planned for all junior high schools of the city of Tulsa, however, it is likely that no two schools carry it out the same, due to buildings, equipment, and teaching difficulties. The subjects provided are shown in graphic form in Table 3.

This information in regard to the industrial arts program in the junior high schools of Tulsa was passed out in mimeographed form to a group of industrial arts teachers at Oklahoma A. & M. College, during the summer of 1939, by C. L. Hill, industrial arts teacher in Webster Senior High School, Tulsa, Oklahoma.

Required Subjects. The State Department of Public Instruction (52, page 39) requires all junior high school pupils to take three years of English and social science, two years of mathematics, one year of general science, including geography and agriculture, one year of industrial arts for boys and homemaking for girls, and three years of physical education. Physical education classes usually meet two to three times per week, which is equivalent to half time. The required program of studies for junior high school is shown in graphic form in Table 4 (52, page 39). The program is based on fifty minute periods and schools that

maintain a time schedule of periods longer or shorter than fifty minutes may increase or decrease the number of periods a subject is offered each week to an equivalent of the required number of minutes as set forth in Table 4.

TABLE 4

PROGRAM OF STUDIES REQUIRED BY STATE DEPARTMENT OF EDUCATION OF ALL PUPILS

Subjects Taught	Grade 7	*	Grade 8	*	Grade 9	*
English	36 Weeks	5	36 Weeks	5	36 Weeks	5
Social Studies	36 "	5	36 "	5	36 "	5
Mathematics	36 "	5	36 "	5	Elect	
Science	36 "	2-3	18 "	5	"	
/ Physical Edu.	36 "	2-3	18 "	5	36 Weeks	2-3
Ind. Arts--Boys			36 "	5		
Home Making--Girls			36 "	5		
/ Library Work	36 Weeks	5	18 "	5		
Time Free for Other Subjects		10		5		22
TOTAL		35		35		35

*Number of 50 minute periods per week.

/ Must be an organized program, time given will vary.

The State Department of Education speaks of a fifty minute period as the minimum length of time for required subjects, when taught on a basis of five periods per week. Table 4, shows that the seventh grade has a possibility of as many as ten periods free for other required courses, or elective courses. Generally the program of the seventh grade consists of required subjects, opportunity for choice of subjects coming in the eighth and ninth grades. This writer is of the opinion that a diversified program of industrial arts might well be started in the seventh grade, continued in the eighth and made elective in the ninth grade.

This brief description of the industrial arts program gives some idea as to what is being attempted in industrial arts program planning in this state. The remainder of this chapter will take up the problems of establishing controlling criteria and the selection of the subjects to be included in the proposed industrial arts program for a typical Oklahoma junior high school. This proposed industrial arts program will be shown in Table 5.

A PROPOSED PROGRAM OF INDUSTRIAL ARTS FOR A TYPICAL OKLAHOMA JUNIOR HIGH SCHOOL

A program of industrial arts designed to meet the needs of the junior high school youth must be formulated in the light of his capacities and interests. Sufficient areas of human endeavor must be presented to challenge his imagination

and provide opportunities for him to explore and exploit his points of strength. Provision must be made for continued development of the interests and traits discovered. This will imply that there must be opportunity provided for the boy to spend a portion of his time daily, over a period of years, in the industrial arts shops. It is one function of the industrial arts program to provide experiences that lead to the discovery of special interests and traits, and it is distinctly another function to provide for and encourage the development of these special traits to their maximum capacities. The development of these individual potentialities is one of the fundamentals in training for citizenship.

For the convenience of this study, a typical Oklahoma junior high school is defined as a Class A segregated junior high school, with an enrollment of approximately 800 pupils, and located in a community of diversified occupations with agriculture and petroleum its basic industries.

Suggested Criteria. Modern practices in program planning employ the use of a variety of criteria. However, there seems to be some agreement as to the basic criteria used. The following comments show the modern trends of thought in regard to the selection of instructional materials.

The Commission on Youth Problems (14, page 57) agrees that the modern secondary school curriculum must be a dynamic

and life centered curriculum. This Commission defines a dynamic program as "one that provides a set-up of worthwhile experiences which challenge the immediate interests and purposes of the learner." In the same connection they speak of a life-centered curriculum as "one that is related to the daily living of pupils and is centered in the actual problems of, and opportunities for, modern life." (14, page 57).

Pringle suggests definite criteria for selecting instructional material to be included in the industrial arts curriculum:

> 1. Two dominating and interacting aims run parallel in all the problems and projects. These aims are: (1) learning to do by doing, and (2) training in reflective thinking. The choice of materials and the methods of instruction must be such as to bring about an inter-stimulating relation between manipulative and thought processes. (41, page 287).
>
> 2. In consideration of materials and determining methods of instruction, the age, and especially the mental and physical development of the pupils, should always be among the controlling factors. (41, page 287).
>
> 3. Although such courses must always be used as a means to an end, all are agreed that these exploratory and survey courses should be constructed from materials that have positive value for pupils as judged by their immediate interests and needs: this means that the program must be wide in range and rich in contents. (41, page 81).

Pringle would never have the industrial arts teacher lose sight of the one major aim of the junior high school--that of developing the individual to his highest capacities. Wrinkle (61, page 129) supports this belief that the

individual must always be the object of our efforts by boldly stating:

> The practice of predetermining what should be taught should be cast aside for a plan to accept the individual and to assist him in the development of his own particular problems which are of most concern to him. This means abandoning of set courses of study which assume the needs of all individuals to be the same.

These writers show the trend of thought in regard to the emphasis that is being placed on adapting the school to the pupil. America's foremost educational philosopher, John Dewey, comments as to the importance of considering the needs and capacities of the pupils.

Dewey, in speaking of objective situations set up by educators, that of including materials, books, equipment, and, most important, the social set-up with which an individual interacts, writes: (19, pages 44-45).

> . . . The trouble with traditional education was not that educators took upon themselves the responsibility for providing an environment. The trouble was they did not consider the other factor in creating an experience, namely, the powers and purposes of those taught. It was assumed that a certain set of conditions was intrinsically desirable apart from its ability to evoke a certain quality of response in individuals. This lack of mutual adaptation made the process of teaching and learning accidental. Those to whom the provided conditions were suitable were able to learn. Others got on as best they could. Responsibility for selecting objective conditions carries with it, then, the responsibility for understanding the needs and capacities of the individuals who are learning at a given time. There must be a reason for thinking they will function in generating an experience that has educative quality with a particular individual at a particular time.

> Failure to take into account adaptation to the need and capacities of individuals was the source of the idea that certain subjects and certain methods are intrinsically cultural or intrinsically good for mental discipline. There is no such thing as educational value in the abstract. The notion that some subjects and methods, and that acquaintance with certain facts and truths, possess educational value in and of themselves is the reason why traditional education reduced the material of education so largely to a diet of predigested material. According to this notion, it was enough to regulate the quantity and difficulty of the material provided, in a scheme of quantitative grading, from month to month and from year to year. Otherwise a pupil was expected to take it in doses that were prescribed from without. If the pupil left it instead of taking it, if he engaged in physical truancy, or in mental truancy of mind-wandering and finally built up an emotional revulsion against the subject, he was held to be at fault. No question was raised as to whether the trouble might not lie in the subject-matter, or in the way in which it was offered. The principle of interaction makes it clear that failure of adaptation of material to needs and capacities of individuals may cause an experience to be non-educative quite as much as failure of an individual to adapt himself to the material.

The late William L. Hunter, in expounding his educational philosophy on the value of providing an educational environment that would challenge the natural interests of the pupils, quoted Dr. Charles A. Prosser as follows: "Successful teaching is essentially a process of working with, instead of against, the mind in its operation." (29, page 314).

Criteria Used in Selecting Activities. In the light of the foregoing suggestions, the writer has used the following criteria in selecting the subject material for the Proposed Industrial Arts Program.

The criteria of general control shall be this: All subject matter selected must be considered valuable in proportion to the contribution it will make to the maximum development of junior high school youth, the realization of the aims and functions of the junior high school and secondary education, and citizenship for modern America. Supplementary to the controlling criterion, the eight statements which follow must be considered.

1. All material selected must be considered in light of its adaptation to meeting the important present and assured future needs of the masses of the pupil population.

2. The materials must be of a nature that will challenge the immediate interests and purposes of the learner.

3. Activities must be of a nature that will tie up with things pupils see and want to do outside of school and at home.

4. Groups of activities will be selected that will bring about an inter-stimulating relation between manipulative and thought processes.

5. The instructional materials must provide for projects and experiences that are worthwhile as judged by the pupils.

6. Activities and instructional materials must be considered in relation to mental and physical development of the individual.

7. Activities will be provided in as many occupational areas as the school conditions will permit.

8. Activities will be chosen that have some significance for discovery of interests and aptitudes in various occupational fields.

Selection of Subjects. In applying the criteria selected to a typical Oklahoma junior high school as previously defined, one must assume that a school of this size (800 pupils) would be able to equip two shop rooms and employ two teachers for industrial arts teaching. The subjects that should be included in this proposed program are: art metal work, electricity, leathercraft, industrial drawing I and II, printing, sheet metal, and woodwork I and II. The problem of grade placement of these activities now arises. There is a wide practice of requiring seventh grade pupils to include in their curriculum an industrial arts program consisting of from three to seven or eight subjects. This writer is of the belief that there should not be more than three shop activities included during the seventh year. Many pupils arrive at the junior high school very much in need of continued intensive instruction in the mastery of the fundamentals. Granted he is in need of instructional stimuli in some form that will tie up with his total experiences, but at the same time one must not attempt to broaden his interest at the expense of making him shallow in fundamentals. The junior high school

program by nature tends to make thoroughness seem unimportant. (34, page 39). Other desirable activities can be taken up in the eighth grade and pupils given full opportunity to elect their choice in the ninth grade--why rush him?

A Proposed Program for a Typical Oklahoma Junior High School. In proposing the following three year program, the writer suggests an arrangement of these subjects, fully aware of the incompleteness of the data upon which they are founded. Table 5 shows the seven subjects arranged both according to a required sequence and an elective possibility.

TABLE 5

A PROPOSED TWO UNIT SHOP PROGRAM

FOR A TYPICAL OKLAHOMA JUNIOR HIGH SCHOOL

Industrial Arts Subjects	Shop	Grade 7	*	Grade 8	*	Grade 9	*
Woodwork I and II	1	9 Weeks	5	Elect	5	Elect	5
Industrial Drawing I and II	2	9 Weeks	5	9 Weeks	5	Elect	5
Electric	1	9 Weeks	5			Elect	5
Printing	2			9 Weeks	5	Elect	5
Sheet Metal	1			Elect	5	Elect	5
Leather	2	Elect	5	Elect	5	Elect	5
Art Copper	1			Elect	5	Elect	5

* Number of fifty minute periods per week.

TABLE 6

THE PROPOSED INDUSTRIAL ARTS PROGRAM IN THE JUNIOR HIGH SCHOOL CURRICULUM**

Seventh Year	Periods*	Eighth Year	Periods*	Ninth Year	Periods*
English	7-10	English	5-10	English	5
Literature & Reading		Literature & Reading			
Composition		Composition			
Grammar		Grammar			
Spelling		Spelling			
Penmanship		Penmanship			
Social Studies	5	Social Studies	4-5	Social Studies	5
Mathematics	5	Mathematics	5	≠ Mathematics	5
Gen. Science	3-5	Gen. Science	3-5		
Ind. Arts--Boys	5	Ind. Arts--Boys	5		
Homemaking--Girls	5	Homemaking--Girls	5		
Physical & Health Edu.	2-3	Physical & Health Edu.	2-3	Physical & Health Edu.	2-3
Activities	2-3	Activities	2-3	Activities	2-3
Music & Art	2-3	Electives	0-4	Electives	
		For'n. Lang.		Mathematics	
Pub. Speaking	1	Pub. Spkg.		Music	
		Adjustment		For'n. Lang.	
Electives	None			Homemaking	
				Ind. Arts	
				Adjustment	
Total Periods:	35		35		35

≠ Required in certain curriculums.
* Periods per week.
** Based on school week of 35 periods, 50 minutes each.

Boys in the seventh grade should be required to take woodwork, drawing and electricity with the opportunity of electing for the last nine weeks any subject offered except printing.

Eighth grade pupils should be required to take industrial drawing II, and printing, and should be permitted to choose the remainder of their program.

Ninth grade pupils should have an opportunity to select from the entire program.

The selection of the subjects to be taught is only a part of the planning of an industrial arts program. The chapter which will follow will deal with courses of study for each subject in the proposed program.

CHAPTER VI

COURSES OF STUDY FOR THE PROPOSED INDUSTRIAL ARTS PROGRAM

Since this writer has suggested that certain subjects be made a part of the industrial arts curriculum, the proposal implies that courses of study, giving detailed description of instructional materials to be used, be included in this report.

To propose a program is one part of arranging a curriculum. To develop a course of study that will function in harmony with the basis philosophy of education that brought about the inclusion of the particular subject in the boys' program is a task for master teachers and administrators.

This writer, fully aware of the enormous amount of work necessary to develop courses of study for several subjects to be included in an industrial arts curriculum, took the path of least resistance and has recommended courses of study developed during the past summer at the Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. These courses of study were formulated by graduate students in Industrial Arts Education, under the direction of Dr. DeWitt Hunt, as a part of their school work. They were prepared by twenty-one graduate students (teachers of industrial arts) working in committees. The courses of study included vary in length from

four to fourteen pages and represent many hours of research work and study in their preparation on the part of each member of the respective committees. This writer is aware that it is an impossibility to plan a course of study that would function in all school situations. However, he does recommend these courses of study as examples of good industrial arts curriculum making, and feels that the courses of study included, with few changes, may be adapted to many school situations.

The seven courses of study included are arranged in alphabetical order as follows: Art Metal Work, Electricity, Industrial Drawing I and II, Leather Craft, Printing, Sheet Metal Work, and Woodwork I and II.

ART METAL WORK

Art metal work in the junior high school offers the boy an opportunity to work with a number of the softer metals. Projects made from copper and pewter are practical, attractive and reasonably inexpensive. They furnish a fine opportunity for the boy to work out his own design, complete his project in a short time, and enjoy the thrill of accomplishment. Especially is this true when the design is original. Projects made from such metals require minimum equipment and working space in the junior high school shop. They serve to acquaint the boy with materials, tools and processes that function in everyday life. Success with these softer metals stimulates his interest in metal work to the extent that more difficult projects are undertaken. The course of study which follows was planned and prepared by E. F. Gorton and Clifton D. Green.

A COURSE OF STUDY FOR ONE SEMESTER OF WORK IN ART METAL

By: E. F. Gorton and Clifton D. Green

The increasing uses of metal demand a place for art metal in the school program of industrial arts.

Art metal work is receiving more and more attention, as a means of supplementing other lines of work in the general shop. It makes a special appeal because of the simple and inexpensive equipment required.

Objectives. 1. To contribute to the development of avocational activities and interests which may be followed in later life.

2. To provide forms of activity within the school which will appeal to the boy.

3. To give each pupil a knowledge of artistic workmanship.

4. To give the student a first-hand knowledge of art metal work.

5. A degree of skill in the basic operations involved in working with art metals is attained.

6. Health values are apparent in the opportunity provided for physical activities.

Grade Placement. Art Metal may be given in the junior high school as an exploratory and guidance course and extended in the senior high school as a regular unit for those who desire to specialize to a greater extent in the work.

Teaching Methods. The following list of teaching methods have been selected as the outstanding devices for teaching art metal.

1. Demonstration
2. Examination
3. Lecture
4. Experiment
5. Recitation
6. Discussion
7. Individual Instruction
8. Group Instruction
9. Reference Materials
10. Problems
11. Student Reports
12. Laboratory Practice
13. Job Planning
14. The Project Method
15. Observation
16. Individual Instruction Sheets

A COURSE OF STUDY IN ART METAL

In the outline below, "A" indicates manipulative work included in each unit of instruction, "B" indicates the informational material to be covered and "C" includes suggestive projects or exercises.

Recommended Texts. The three texts listed below are recommended for high school use. Page references to these numbers assigned to the texts.

1. Payne, Art Metal Work With Inexpensive Equipment.
2. Osburn and Wilber, Pewter.
3. Reagan and Smith, Metal Spinning.

Units of Instruction. The work in this course of study is divided into units of instruction. Each unit represents the complete lesson or lecture-demonstration.

A COURSE OF STUDY FOR 18 WEEKS IN ART METAL

Outline of Instructional Units	Payne	Osburn Wilber	Smith Reagan
Unit 1			
A. The correlation of metal work and design. History of metals.	9-24	1-25	11-14
B. Know the history of metals and designs. The uses of pewter, copper, and alloys.	9-24	1-25	11-14
C. Reports on metal and lecture-demonstrations.			
Unit 2			
A. Metal gages, sizes, and casts. Making bill of material.	27-32		
B. Use of metal gages to determine size of metal. Be able to give cost of most important metals. Know the value of a bill of materials and how to make it.			
C. Find by using gages the size of various metals. Make a bill of material.			

A COURSE OF STUDY FOR 18 WEEKS IN ART METAL (Cont.)

Outline of Instructional Units	Payne	Osburn Wilber	Smith Reagan
Unit 3			
A. Peening soft metals, using ball pein hammer with and without turned forms. Planishing.	95-100 88-90	57-62	
B. Know the proper method of peening, using the turned forms. Know the uses and how to use the ball pein hammer.	95-100	57-62	
C. Make a peened finish on an ash tray or small plate.	99-100	59	
Unit 4			
A. Etching processes, using copper, pewter, and other metals.	42-57	77-87	
B. Materials used in etching. How etching is done. How to select proper mordant. Safety methods in using acids.		77-87	
C. Use the process of etching in making a pen knife, a watch fob, or similar project.	42-51		
Unit 5			
A. Bending, lapping and soft soldering.	49-50 52-60	81-83 39-45	
B. Understand processes of soft soldering. Be familiar with methods of bending and lapping, using different types of stakes and anvil.	52-60	81-83	
C. Make a set of book ends using a soft solder joint.	49-50	39-45	
Unit 6			
A. Annealing, riveting, seaming.	73-82		
B. Purpose of annealing, Size of and when to use rivets. Different methods of seaming.	74-77 79-82		

A COURSE OF STUDY FOR 18 WEEKS IN ART METAL (Cont.)

Outline of Instructional Units	Payne	Osburn: Wilber	Smith. : Reagan
C. Make candle sticks or a project in which seaming or rivets are used with the process of annealing.			
Unit 7			
A. Fluting, raising, and choosing.	95-102	81-82	
B. Knowing three methods of raising a shape from flat metal. Tools and processes used in fluting and raising. Understand outline choosing.	95-102 100-120	79-86	
C. Make a tray or a nut bowl.	111-114	82	
Unit 8			
A. Coloring, finishing and enameling.	54-60	77-80	
B. Know commercial and artistic methods of coloring and finishing. Understand the use and methods of preparation of the different solutions used in coloring and finishing. Methods of applying enamel.	157-165	80-87	
C. Use these methods to finish projects made.			
Unit 9			
A. Mechanical set-up for metal spinning. Centers, chucks, and spinning tools.		111-120	16-36
B. Special equipment for lathe. Methods of centering. Name of and how to use the different metal spinning tools. Should know the metals suited to spinning.		127-135	16-22 23-26
C. Spin a plate or some project having a low form.		120	61-74

A COURSE OF STUDY FOR 18 WEEKS IN ART METAL (Cont.)

Outline of Instructional Units	Payne	Osburn :Wilber	Smith :Reagan
Unit 10			
A. Lubricants, and technique of metal spinning.		116-144	54-74
B. Understand the use of the best lubricants for the various metals such as soap, tallow, and oil mixtures, know the proper use of spinning tools, backstick, and tool rests. Understand operations used in spinning high forms.		116-144 120	54-74
C. Practice metal spinning until technique is acquired.		120	61-74

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ELECTRICAL WORK

In this modern world, electricity is recognized as the universal power and a symbol of progress. It is not only doing man's work faster and better, but cheaper than man has ever been able to do it before. In placing electricity in the industrial arts curriculum, one is certain of providing instructional material that is of great value in meeting the immediate and future interests and needs of the junior high school boy. The course of study which follows was prepared by Joe L. Reed and Robert K. Phelps.

A COURSE OF STUDY FOR ONE SEMESTER OF WORK IN ELECTRICAL WORK

By: Joe L. Reed and Robert K. Phelps

Electricity is one of the forces of nature that serves man in the form of power, light, heat and communication. Every girl and boy should have a general course in electricity that is simple and direct, neither technical nor limited to one or two phases of the subject.

Such a course may well serve in an exploratory capacity, so that the student may discover his tastes and talents and thereby make a better choice of a life's career. If properly directed, it should furnish some insight into electrical occupations and a better appreciation of the services rendered by workers in this important field. It will familiarize the boy with the ways of electricity, replace the too prevalent feeling of mystery and fear with confidence and understanding and show him how to use and enjoy this modern form of power without waste or danger. It should introduce him, where his interest so inclines, to the literature of electricity, through specific references to good books and magazines.

Only a small per cent of the high schools in Oklahoma offer this course as a part of the industrial arts curriculum.

Special Values and Specific Objectives for Electricity in the Junior or Senior High School.

1. Educational.

2. For the pupil to become familiar with the tools, materials, terms, and symbols used by the electrician.

3. For the pupil to learn the trade requirements and conditions in the community.

4. To develop the ability to draw correct electrical diagrams before any actual job is undertaken.

5. For the pupil to learn the value of mathematics in the solution of simple electrical problems.

6. To lay the foundation for more advanced courses in electricity.

7. To render service to the home and school.

General Placement. Electricity should be taught in both the junior and senior high school. The way that it may be presented depends on the school curriculum. It may be taught in the junior high school in a diversified, exploratory general shop course and then offered in the senior high school as a separate advanced course in electricity.

If electricity is offered only on the senior high school level, it would probably be more desirable to teach it in the upper classes.

Teaching Methods. Electricity as a school subject is rich in methods. Like all industrial arts subjects various teaching methods and devices have been developed. In presenting this subject a teacher may use a combination of many methods; some of those most frequently used are:

1. Demonstration.
2. Discussion.
3. Individual instruction.
4. Group instruction.
5. Reports.
6. Class excursion and trips.
7. The project methods.
8. Testing.
9. Suggestive question.
10. Lecture.

It seems necessary in planning a course in practical electricity to advocate the use of a series of panels on which these problems are to be solved by the students.

When the student has completed the problem, he is required to present it to the instructor for approval. After the student has completed the series of problems, he is then required to make an electrical device such as: a galvanometer, transformer, soldering copper, or a toaster. This project should be selected by the student with the guidance and council of the instructor.

In addition to these methods and devices, many teaching aids such as record forms, profile grading forms, progress charts, and assignment boards, have been developed by individual teachers.

In general, in all industrial arts classes in Oklahoma schools at least 15 per cent of the total time given to shopwork should be devoted to class demonstrations, discussions, reports or lectures. Two, twenty-five minute class periods per week should be given to theory work including demonstrations. Many teachers use as much as 25 per cent of the total time for classwork.

A COURSE OF STUDY FOR ELECTRICAL WORK

In the outline below, "A" indicates manipulative work included in each unit of instruction, "B" indicates the informational material to be covered, and "C" includes suggestive projects or exercises.

Recommended Texts. The three texts listed below are recommended for beginners course in electricity. Page references to these numbers assigned to the texts.

1. Jones, General Electricity.
2. Tustison, Job Sheets for the Practical Electrical Shop.
3. Jones, Essentials of Electricity.

Units of Instruction. The work in this course of study is divided into units of instruction. Each unit represents the complete lesson or lecture-demonstration.

A COURSE OF STUDY FOR ELECTRICAL WORK

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
Unit 1 **Magnets and Magnetism**			
A. Determining the lines of force of a bar magnet, horseshoe, and electro magnet.			
B. What magnets are, how they work, and some ways to make and use them.	1-4		58-72
C. Plot the lines of force of a magnet by placing iron filings on a sheet of paper over a bar magnet, also an electro magnet. Magnetize a piece of steel. Make a compass. Remagnetize a horseshoe magnet. Make an electro magnet.		Job Sheet 5	
Unit 2 **Door Bells and Buzzers**			
A. Wiring a signal system. Mounting electrical equipment, using electrical tools.			171
B. How bells and buzzers work, and how to install them.	5-6		
C. Wire a bell circuit using one bell, one push button, and a transformer, or dry cells. Wire a bell system with one bell and one buzzer, with separate switches. Wire two bells in a series operating with one push button. Wire two bells in parallel operating with one switch. Wire a two apartment house bell and buzzer system. Wire a three wire return call system.	5-7	Job Sheets No. 6, 7,8,9, 10,11	239-41
Unit 3 **Electric Current**			
A. Inserting ammeter. Inserting volmeter. Electroplating. Connecting wire to instruments.	8-11		21

A COURSE OF STUDY FOR ELECTRICAL WORK (Cont.)

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
B. What electric current is. What it will do, the two kinds, and how to measure current.			31
C. Measure the current in the shop circuits. Measure the amperes in a light circuit.			28-36
Unit 4 Voltage			
A. Installing instruments, connecting wire to instruments, checking circuit for voltage.			
B. What voltage is, how it is produced, and how it works.			31-33
C. Measure the voltage of the shop circuits. Measure voltage of any electric motor or electrical device. Generate an electric current with a coil of copper wire and bar magnet. Set up a circuit like the one in figure 4, page 13. Jones, General Electricity.	12-15		
Unit 5 Batteries--Dry Cells			
A. Making parallel and series connections. Producing electric current chemically.			
B. How batteries are made, how they work, and how to test and use them.			
C. Make a wet cell and test its voltage. Wire a bell with this cell. Test the voltage of a wet cell that has carbon, lead, iron or other metals as electrodes. Bisect an old dry cell and study the composition. Measure the voltage of four dry cells connected in a series.	16-19	Job Sheets No. 34, 35, 36.	

A COURSE OF STUDY FOR ELECTRICAL WORK (Cont.)

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
Unit 6 **Resistance**			
A. Measuring ohms of resistance, connecting ammeter and volmeter in a circuit to measure current.			
B. What resistance is, what it does, and how to use it.			74
C. Connect a battery to a bell with short wires; with long wires; compare the results. Measure the ampers and volts of various household appliances Measure the amperes of twenty feet of number 22 nichrome wire.	20-22	Job Sheet No. 4	239
Unit 7 **Conductors and Insulators**			
A. Cleaning and tinning a soldering capper, soldering, making, and taping wire spices. Gauging wire.			235-36
B. What conductors and insulators are how they work, and how they are used in circuits.			90
C. Test a number of materials to determine whether they are conductors or insulators. Clean and tin a soldering capper. Gauge different sizes of wire. Make the following spices and knots: western union, tap or branch, pig tail, wrapped, knotted tap joint, fixture splice, stranded cable, and stranded cable tap.	23-26		91
Unit 8 **Watts, Kilowatts, Kilowatt Hours**			
A. Reading an electric meter. Figuring cost of kilowatt hours.			83
B. How electric energy is measured and how to figure its cost.			84

A COURSE OF STUDY FOR ELECTRICAL WORK (Cont.)

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
C. Reading a home or school meter at intervals and figure the cost of current during these periods. Check cancelled electric bills and figure the cost of each. Measure the volts and amperes of all consuming devices available and figure the watts and kilowatt hours for each.	28-29	Job Sheet No. 32	84
Unit 9 Electric Fuses			
A. Replacing fuses. Checking fuses with a test lamp. Checking circuits for "short circuits".			
B. How fuses work, how they are made, and how to use them.			115
C. Take some old fuses apart to see their construction. Test the load capacity of a fuse. Remove and insert plug and cartridge fuses. Check appliances and circuits for "short circuits".	30-32	Job Sheet No. 21	
Unit 10 Circuits of the Home			
A. Installing fixtures on panel. Connecting wires to fixtures on panel, drilling pilot holes, boring auger holes, inserting screws, using tools.			
B. Kinds of circuits, how they work; and how to keep them in repair.			96
C. Wire circuit series with three rosettes. Wire parallel circuit with three rosettes. Wire a circuit with one rosette from a master switch using knobs and tubes; add to this a branch circuit with one rosette operating with a separate switch. Wire a flush receptacle in concealing knob and tube work. Wire a circuit with one lamp operating from two three-way switches in concealing knob and tube work. Wire a fixture	33-36	Job Sheets No. 21 22,23, 24,25, 26	177

A COURSE OF STUDY FOR ELECTRICAL WORK (Cont.)

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
outlet in concealed knob and tube work and attach a wall bracket.			
Unit 11 Electric Cords			
A. Tying an underwriters' knot. Removing insulation from wire. Making wire connections.			171
B. Kinds of cords, their uses, and how to assemble and repair them.			
C. Make an extension cord. Make an appliance cord. Repair a defective cord.	37-39	Job Sheet No. 14	
Unit 12 Heating and Cooking Devices			
A. Measuring the resistance of nichrome wire. Installing heating elements. Coiling the wire.			
B. How heating devices work, how they are made, and how to repair them.			
C. Replace heating elements in an electric iron, percolator, and toaster. Build an electric stove or heat reflector.	40-47	Job Sheet No. 18	167
Unit 13 Safety Rules			
A. Determining the causes of fires due to electricity. Administering first aid in case of shocks.			
B. How to prevent fires and shock in the use of electricity.			
C. Check and replace all defective wiring of appliances in the home. Secure and study a copy of the National Electrical Code.	44-46		

A COURSE OF STUDY FOR ELECTRICAL WORK (Cont.)

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
Unit 14 **Electric Lighting**			
A. Determining the candle power of various types and sizes of lamps.			
B. Kinds of lamps, how they work, and how to use them.			169
C. Break open some burned out light bulbs and examine their construction. If a foot-candle meter can be obtained, measure the illumination obtained two feet from an oil lamp. Test a 15, 30, 50, 75, and 100 watt bulb. Test desirability of shades and globes. Test the effect of low voltage on light bulbs.	47-48		
Unit 15 **The Storage Battery**			
A. Testing specific gravity of batteries. Learning the construction of batteries.			50
B. How storage batteries are made, how they work, and how to use them.			44-50
C. Test a six volt battery. Open and examine an old battery. Charge a wet cell with a six volt battery.	50-53	Job Sheet No. 34	
Unit 16 **Generators and Motors**			
A. Care for electric motor and generators. Winding armatures.			142
B. Construction, principles of operation and care of generators and motors.			147
C. Construct a toy motor. Clean and oil an electric motor. Replace brushes in a motor or generator.	54-57		

A COURSE OF STUDY FOR ELECTRICAL WORK (Cont.)

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
Unit 17 **Induction Coils and Transformers**			
A. Showing the principles of an induction coil. Winding a transformer and checking results.			149-53
B. What transformers do, the principle upon which they work and how to make them.			149-51
C. Make a small stepdown transformer. Build a shocking coil. Operate an induction coil.	74-75		236
Unit 18 **Automobile Circuits**			
A. Checking an automobile ignition system. Correcting faulty lights and horns.			
B. The electric system of a car, the parts, and how they work.			
C. Examine the parts of a generator and starter. Set up the principal parts of a generator. Examine an old ignition coil and condenser. Make a spotlight. Examine and operate a motor and vibrator type of car horn.	64-69		
Unit 19 **Telephone and Telegraph**			
A. Placing telephone calls. Writing telegrams. Testing transmitter and receivers. Sending and receiving telegrams.			
B. How the telephone and the telegraph works and how to set up simple circuits.			225

A COURSE OF STUDY FOR ELECTRICAL WORK (Cont.)

Outline of Instructional Units	Jones 1	Tustison 2	Jones 3
C. Examine the construction of the transmitter and receiver of a telephone. Connect a receiver of a low voltage alternating current. Obtain old parts and set up a phone system in the school between rooms. Make a sending and receiving telegraph set.	70-73		
Unit 20 Radio			
A. Construction and testing receiving sets. Studying inventions improvements in radio.	74-75		236
B/ How radio waves are broadcast, and how a receiving set works.			
C. Build a crystal set and a one or two tube set. Make a simple oscilator. Visit a broadcasting station. Mount on panel the various parts of a receiving set and label each.			

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4. Richter, H. P., Practical Electricity and House Wiring, Frederick J. Drake & Co., Chicago, 1937, 183 pp.

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6. Wright, F. B., Electricity in the House and on the Farm, John Wiley & Sons, Inc., New York, 1935, 312 pp.

INDUSTRIAL DRAWING I

The value of industrial drawing to the citizen in the modern industrial world is evident. It is described as the universal language. No one would question its place in the modern industrial arts program. The course of study which follows was prepared by R. L. Wham, Clay DaVault, and Maurice Alton.

A COURSE OF STUDY FOR ONE SEMESTER OF INDUSTRIAL DRAWING I

By: R. L. Wham, Maurice Alton, and Clay DaVault

Introductory Statement. Drawing, usually mechanical, has long been incorporated in industrial arts programs. Instruction dealing with industrial materials and the processes by which these materials are changed to usable forms would be incomplete if drawing, "The language of industries," was excluded.

Grade Placement and Time Allotment. This course of study is designed for beginners in drawing. It is suggested that the course be placed in the first semester of either the ninth or the tenth grades. Class time alloted to the course should be five sixty-minute periods per week for one semester.

Recommended Textbooks. Rather than recommend only one textbook for this course, it is suggested that three textbooks should be available to the students. Many operations are more fully analyzed and explained by some authors than by others; therefore the following list of textbooks is recommended.

1. French, Thomas E., and Carl L. Svenson, Mechanical Drawing for High Schools.
2. Hunt, DeWitt T., Mechanical Drawing.
3. McGee, R. A., and W. W. Sturtevant, General Mechanical Drawing.

Objectives. 1. To develop the power of visualization.

2. To strengthen the constructive imagination.

3. To train exactness of thought.

4. To teach how to read and write the "language of the industries."

5. To give modern commercial practice in making working drawings.

A COURSE OF STUDY FOR 1 SEMESTER OF IND. DRAWING

Outline of Instructional Units	French Svenson	Hunt	McGee Sturtevant
Unit 1			
Straight lines -- One Week			
A. Horizontal lines.	5	22	7
B. Vertical lines.	6	23	7
C. Angles.	7	23	7
D. Parallel lines.	8		7
E. Perpendicular lines.	8		7
F. Test.			
Unit 2			
Sheet Layout -- Two Weeks			
A. Attaching paper.	3	19	6
B. Sharpening the pencil.	4	1	4
C. Layout of the sheet.	148	25	6
D. Test.			
Unit 3			
Lettering -- Two Weeks			
A. Use of lettering instrument.			
B. Vertical and inclined letters.	17	12	40
C. Composition.	19	13	42
D. Numbers and numerals.	16	13	40
E. Test.			
Unit 4			
Freehand Sketching -- Three Weeks			
A. Pencils.	4		45

A COURSE OF STUDY FOR 1 SEMESTER OF IND. DRAWING (Cont.)

Outline of Instructional Units	French Svenson	Hunt	McGee Sturtevant
B. Isometric to orthographic.			45
C. Orthographic to isometric.			45
D. Test.			
Unit 5			
Dimensioning -- Two Weeks			
A. Dimension lines.	45	67	60
B. Reading dimensions.	196	64	60
C. Test.			
Unit 6			
Circles and Tangents -- Two Weeks			
A. Use of compass.	10	48	8
B. Tangents.	125	100	8
C. Arcs.	8 & 125		8
D. Test.			
Unit 7			
Orthographic Projection -- Six Wks.			
A. The alphabet of lines.	80		18
B. Order of procedure.	61		16
C. Orthographic views.	23	1-8	11
D. Projecting and revolving.	25	5	
E. Problems.	166	32	12
F. Test.			

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2. Bartholomew, Roy A., and Francis S. Orr, Learning to Read Mechanical Drawings, The Manual Arts Press, Peoria, Ill., 1937, 48 pp., $ .40.

3. Bennett, Charles A., Beginning Problems in Mechanical Drawing, The Manual Arts Press, Peoria, Ill., 1930, 94 pp.

4. Cobough, H. B., Shop Drawing for Beginners, The Bruce Publishing Company, Milwaukee, 1938, 32 pp., $ .24.

5. DeVette, William A., A Short Course in Mechanical Drawing, Bruce Publishing Company, Milwaukee, 1926, 160 pp., $1.60.

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INDUSTRIAL DRAWING II

The importance of industrial drawing to the average modern citizen seems to justify including advanced work as an elective subject in the eighth grade industrial arts curriculum. It also functions in developing right work habits of planning and orderly procedure. The course of study given here was planned by M. W. Selle and Dennis Williams.

A COURSE OF STUDY FOR ONE SEMESTER OF WORK IN INDUSTRIAL DRAWING II IN THE JUNIOR HIGH SCHOOL

By: M. W. Selle and Dennis Williams

Mechanical Drawing is the universal language of the industrial world today. The making and reading of drawings or blue prints precedes every building or construction job. It is indispensable to the home maker and purchaser of industrial products as well as to the contractor and engineer and also to the manufacturer. In fact, mechanical drawing is a part of every field of endeavor. It is with this concept and appreciation of the wide use of mechanical drawing that its teaching is urged in every high school and a course of study designed to teach the pupil to make simple drawings and understand enough of the fundamentals of drawing to enable them to read those drawings that will be of special benefit to them in later life is submitted.

Number of Units of Credit. A student may at any time during his four years of high school work take Drawing II, for which he will receive one credit or one-half unit toward graduation. The student must have previously completed Drawing I.

Time Given to Each Course. Each course of drawing should cover one semester (18 weeks) of work. Classes should meet five days each week with a minimum length of class period of fifty (50) minutes.

Number of Pupils in Each Class. The number of pupils in each class should not be too large to enable the instructor to give individual attention to the needs of each pupil. If the drawing class is a part of the General Shop Program, the number of pupils should not exceed twelve (12). If taught as an individual class, the number of pupils should not exceed twenty-four (24).

Enrollment in Homogeneous Groups. Enrollment in homogeneous groups is a decided advantage in that it enables the instructor to reach the entire class at one discussion on theory instruction. However, due to the nature of drawing work and the individual differences of students, drawing lends itself easily to heterogeneous grouping.

Teaching Methods. Several methods of teaching drawing can be used, but a combination of methods seems most desirable. Following are fifteen methods that lend themselves easily to drawing instruction.

1. Demonstration by teacher.
2. Lectures on theory.
3. Individual instruction.
4. Group instruction.
5. Class instruction.
6. Reproducing drawings from other drawings.
7. Completion of drawings.
8. Free hand sketching of models.
9. Producing scale drawings from models.
10. Discussion problems.
11. Discussion tests.
12. Reference materials.
13. Problem solving, (including visualizing and producing object from working drawing).
14. Observation.
15. Drawing from specifications.

Personnel Organizations. Personnel organizations should be formed to aid in the care of drawing equipment, reference books, and storage of paper. The committees should not serve more than six weeks at one time and should not serve on the same committee more than once a year.

Outside Preparation. Outside preparation should be made regularly. A collection of house plans, mechanical drawings, and sketches pertaining to mechanical drawing should be made and studied by each pupil to familiarize himself with the types of drawings most used in industry and business.

Examinations and Tests. Examinations and tests should be given at least twice each semester for the purpose of motivating study and testing achievement. The tests should be objective and require a working knowledge of the units covered during the course.

General Objectives of Industrial Drawing.

1. Contributes to the general education of the person.

2. Consumer knowledge and appreciations are developed that enable the person to better judge the quality and construction of such necessities as homes and furniture.

3. Gives practice and develops ability to attack and solve problems.

4. Develops creative thought.

5. Provides a form of activity within the school which will appeal to and interest the student and at the same time supplement academic knowledge.

6. Develops self reliance.

7. Vocational training may be a result. The student may discover a talent for drawing that would otherwise be overlooked.

Reference Texts.

1. McGee, R. A., and Sturtevant, W. W., General Mechanical Drawing.

2. French, T. E., and Svensen, Carl L., Mechanical Drawing for High Schools.

3. Hunt, Dewitt, Mechanical Drawing.

Units of Instruction. The work in this course of study is divided into units of instruction. Each unit represents a particular phase of working area, such as woodworking, machine drawing, sheet metal work, architecture, graphs, and topography.

A COURSE OF STUDY FOR INDUSTRIAL DRAWING II

Outline of Instructional Units	McGee Sturtvt.	French Svensen	Hunt
Unit 1			
A. Making drawings to scale from models. Dimensioning.	22	10-12 47-49	80
B. Use of scale. Theory of dimensioning. Use of working drawings in industry.	18-19		80 67
C. Three views, to scale, of Blind Mortise and Tenon Joint from given model.			
Unit 2			
A. Visualizing object from working drawing.	36-37	23-26	

A COURSE OF STUDY FOR INDUSTRIAL DRAWING II (Cont.)

Outline of Instructional Units	McGee Sturtvt	French Svensen	Hunt
B. Theory of Isometric Drawing. Drawing and blueprint reading.	36-37	102-105	150
C. Make a working drawing and isometric view.	38	103	39
Unit 3			
A. Visualizing object from working drawing.	33-34		
B. Theory of Oblique Drawing.	33-34	106-107	152
C. Make a working drawing and oblique view.	35	103	43
Unit 4			
A. Comparison of Isometric and Oblique views.	33-37		
B. Isometric and Oblique methods of pictorial representation.		102-108	
C. Isometric and Oblique views.	34	214	42
Unit 5			
A. Parallel Perspective.	30-31	109	
B. Use of Parallel Perspective in industrial drawing.		108-110	
C. One view, Parallel Perspective.	34	109	39
Unit 6			
A. Angular Perspective.	30-31	108-109	
B. Use of Angular Perspective.		108-110	
C. One view, Angular Perspective.	23	108	39
Unit 7			
A. Completion of views.			

A COURSE OF STUDY FOR INDUSTRIAL DRAWING II (Cont.)

Outline of Instructional Units	McGee Sturtvt.	French Svensen	Hunt
B. Relation of views in orthographic projection.	15	25-29	
C. Complete missing view by projection.	97	173	104
Unit 8			
A. Section views.	57-58		94
B. Theory and use of sectional views		32-40	94
C. Front view in section.	58	184	48
Unit 9			
A. Isometric sections.			
B. Theory of isometric sections.		105	
C. Make a full isometric section.	37	236	51
Unit 10			
A. Bolt and Nut representation.	76-77		131
B. Types of bolts and where used.	76-77		
C. Diagonal and flat views of square and hexagon head bolts with nuts.	78-79	73	134
Unit 11			
A. Drawing thread forms.	76-77		125-141
B. Characteristics and uses of standard thread forms.		68	
C. Give profile view of each thread form as shown. Pitch--1".	77	68	
Unit 12			
A. Gear representation.			
B. Power transmission and types of gears.	80-81	93-95	

Outline of Instructional Units	McGee Sturtvt	French Svensen	Hunt
C. Spur Gears, two to three ratio. P. D. of pinon equal 3" and N. equals 12.	83	92	115
Unit 13			
A. Detail drawing.			
B. Notes, symbols, and abbreviations		57,64-65	
C. Draw in detail, specifying material.	61	218	86
Unit 14			
A. Use of inside and outside calipers. Drawing from model.			
B. Principles of measurement. Calipers and rule.		55	
C. Three views of shaft bearing from model.			
Unit 15			
A. Surface development of prisms.	106-108		160
B. Patterns and sheet metal fabrication.	110	129-132	
C. Develop pattern for box.	114	130	
Unit 16			
A. Surface development of cylinders.	107		
B. Contrast of cylindrical and rectangular conduits with reference to efficiency and design.		131-134	
C. Develop surface of cylinder.	112	131	
Unit 17			
A. Pattern development of pipe turns		134	

A COURSE OF STUDY FOR INDUSTRIAL DRAWING II (Cont.)

Outline of Instructional Units	McGee Sturtvt.	French Svensen	Hunt
B. Types of turns and uses.	113	134	
C. Two-piece elbow.	115	133	
Unit 18			
A. Cone development.	111	136-38	
B. Funnels, swaged reducers, and other uses of cone forms			
C. Develop cone surface.	12	131	165
Unit 19			
A. Pyramid development	111	134-136	
B. Transition pieces, and other pyramid forms.		138	
C. Develop surface of pyramid.	111	136	
Unit 20			
A. Intersection of cylinders.		141	170
B. Corners, headers, and pipe fitting.			
C. Develop pattern for branch line of a right angle intersection of 4" and 2" pipe.			
Unit 21			
A. Preliminary sketching and floor plan drawing.	144-145	111-112	142
B. Principles of architecture involved in floor planning. Conventional signs and symbols.	145		
C. Design and draw floor plan for a four or five room house.			

A COURSE OF STUDY FOR INDUSTRIAL DRAWING II (Cont.)

Outline of Instructional Units	McGee :Sturtvt:	French Svensen:	Hunt
Unit 22			
A. Foundation plan drawing.		113	
B. Ventilation vents. Plumbing, and concrete reinforcement.			
C. Draw foundation plan and plumbing arrangement for house in unit 21.			
Unit 23			
A. Elevation drawing.		116-120	
B. Principles of architectural design and landscaping.	165-166		
C. Draw front elevation and landscape for house in unit 21.			
Unit 24			
A. Wall and cabinet detail drawing.			142
B. Wall and cabinet construction. F. H. A. requirements.			
C. Draw front view of kitchen cabinet and section of wall showing detail of construction.			
Unit 25			
A. Blueprinting.		99,61-64	88
B. Use of blueprints in industry.			
C. Make tracing and blueprint of floor plan of unit 21.			
Unit 26			
A. Bar graph making.	187-189		
B. Purpose and use of bar graphs.	189		

A COURSE OF STUDY FOR INDUSTRIAL DRAWING II (Cont.)

Outline of Instructional Units	McGee :Sturtvt:	French :Svensen:	Hunt
C. Prepare a bar graph showing number of persons gainfully employed in the ten types of occupations as listed in the 1930 United States census.			
Unit 27			
A. Line graph making.	51		
B. Purpose and use of bar graphs. Purpose and use of line graphs.	189 51		
C. By use of a line graph, compare the annual yield (in bushels) of wheat in Oklahoma for a period of five years.			
Unit 28			
A. Map making.	169 172 175		
B. Use of chain and scale in map making.	172		
C. Make a scaled map of the block or farm on which you live.			
Unit 29			
A. Contour map making, use of pantograph.	178-179		
B. Mountains, grades, and terraces. Use of level and elevation rod.	180		
C. By use of the pantograph, enlarge a contour map.			

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LEATHERCRAFT

Leathercraft not only provides the boy the opportunity to make the things he sees and wants, but it provides pleasurable experiences that fascinate youth at the junior high school age. The course is inexpensive to set up, and may well be included in the seventh grade and made elective in the eighth and ninth grades. The course of study which follows was prepared by Ames, Emerson and Spivey.

A COURSE OF STUDY FOR ONE SEMESTER OF LEATHERCRAFT

By: Leon W. Ames, James C. Emerson, and Calvin C. Spivey.

Leathercraft is one of the best crafts for beginners. It is very easily handled, and requires but a small amount of equipment. Many useful and beautiful articles can be made from leather; therefore the work is well worth while as a part of the school curriculum. Leathercraft is not only being taught widely in our schools today and is mainly in the art departments where it is being offered.

Special Value and Specific Objectives. 1. To develop in each pupil an appreciation of good material and good design in leatherwork.

2. To give opportunities for satisfying the desire to do things with tools and materials using leathercraft as a median of expression.

3. To present a field of possibilities for worthwhile leisure time pursuits.

4. To develop in each pupil the attitude of pride and interest in his ability to do useful things through the habit of an orderly procedure in the making of useful projects.

Grade Placement. Due to the ease in working leather, with a graduated degree of difficulty, this unit may be offered from the seventh grade through the twelfth grade.

Teaching Methods. The work in this course of study is divided into units of instruction which are supplemented by textbooks, lectures, or demonstrations. Each unit represents the complete lesson or lecture demonstration.

Recommended Texts. The three texts listed below are recommended for general school use in both the junior and senior high schools.

1. Snyder, W. E., The Leather Craftsman.
2. Dannenhauer, C. W., Leathercraft.
3. Griswold, Lester, Handbook of Craftwork.

A COURSE OF STUDY FOR 1 SEMESTER OF LEATHERCRAFT

Outline of Instructional Units	Snyder	Dannen-hauer	Griswold
Unit 1			
A. Plotting patterns and designs.		1-2	52
B. How to use supply cabinet, library, tools, and tool drawer.		1-2	
C. Suggested projects: comb case, knife, or axe sheath.			30
Unit 2			
A. Cutting out leather, transferring of pattern, dampening surface, tooling and stamping.		1-6	32-37
B. Sharpening tools, description of decorating tools, methods of decorating, effect of water on leather.		1-6	
C. Design, etc., of project started under Unit 1.			
Unit 3			
A. Skiving edges, glueing lining, and coloring.		2-6	63-71

A COURSE OF STUDY FOR 1 SEMESTER OF LEATHERCRAFT (Cont.)

Outline of Instructional Units	Snyder	Dannen-hauer	Griswold
B. Types of leather suitable for linings. Glues used with leather trimming knife and board.		1-4	41-42
C. Perform the above manipulations on project begun in Unit 1.			
Unit 4			
A. Marking holes, punching and lacing, setting snaps, buckles, etc.			63
B. Using the marking or pricking wheel. Different punches and laces, use of different types of lacing.		2-4	67-71
C. Lace and prepare to finish project started in Unit 1.			
Unit 5			
A. Finishing of leather, coloring design, polishing finished project.		7	53-60
B. Leather dyes and colors, methods of polishing leather.		6-7	62
C. Complete project as started.			
Unit 6			
A. Embossing or Repousse, carving.		3-4	54-57
B. How to roise leather higher than ordinary tooling allows. Holding embossed design in raised position for permanency.		2-6	
C. Suggested projects: book ends, bill fold, card cases, keycases, brief cases, coin purses, etc.			32-7
Unit 7			
A. Braiding and knot tying projects in leather.		1-4	92-94

A COURSE OF STUDY FOR 1 SEMESTER OF LEATHERCRAFT (Cont.)

Outline of Instructional Units	Snyder	Dannen-hauer	Griswold
B. How to make flat, square and round braids. Special knots.		2-4	94-103
C. Braided belts, dog leash, whistle lanyard, quirt, watch fob and chain, etc.			99

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2. Decker, Maurice H., Working with Leather, Webb Book Publishing Co., St. Paul, 1934, 63 pages.

3. Dannenhauer, C. W., Leathercraft Instruction Folders A, B and C, C. W. Dannenhauer, 143 N. 4th St., Philadelphia, 1930, 16 pages.

4. Griswold, Lester, Handicraft, Simplified Procedures in Projects, Revised Edition, Lester Griswold, 623 Park Terrace, Colorado Springs, Colo., 1937, 424 pages.

5. Griswold, Lester, Design Series D, Craftwork Project Service, 623 Park Terrace, Colorado Springs, Colorado.

6. Hoefer, Louise C., Designs for Tooled Leather, Books I and II, Osborn Brothers, Chicago, 1938, 36 plates.

7. Lapcheske, Leathercraft, Lapcheske Leathercraft Co., 1717 23rd Street, Des Moines, Iowa, 1939, 40 pages.

8. Mickel, Adelaide, Leather Work, The Manual Arts Press, Peoria, 1927, 48 pages.

9. Mochrie, Elsie, New Leather Work Decorations, The Dryad Handicraft, 42 St. Nicolas St., Manchester, New York.

10. Osborn Bros., Leathercraft, Osborn Brothers Supply Co. Inc., 223 Jackson Blvd., Chicago, Ill., 1939, 66 pages.

11. Roehl, Louis M., Harness Repairing, The Bruce Publishing Co., Milwaukee, 1921, 53 pages.

12. Snyder, W. E., The Leather Craftsman, The American Handicraft Co., 193 William Street, New York, 1938, 176 pages, $1.50.

PRINTING

Printing is one of the nation's major industries. For centuries, it has played an important part in world history. When activities in printing are included in the industrial arts program, the boy is provided with an opportunity to make the contacts that are so necessary for a clear understanding and appreciation of the graphic arts. Printing provides a fine opportunity to develop in the boy a broad occupational intelligence. Contacts are made with electricity, machines, materials, and designs which develop boyish inquisitiveness through their attempt to find what, why, and how things work.

The course of study for printing that follows was prepared by Shingleton and Breeden.

A COURSE OF STUDY FOR ONE SEMESTER OF WORK IN PRINTING

Among the industrial art subjects there are none more appropriate to the elementary school than printing. The pupil is introduced to books and all through his life he is what the economists call a "consumer" of printing. He is influenced without knowing the reasons why, by the artistic arrangements of the pages of his books and by the perfection of presswork and binding. To deprive the pupil of this information would be to cut him off from one of the most interesting lessons which school can teach.

Objectives.

1. To provide exploratory experience in several representative occupations, for the development of interest and discovery of aptitudes.

2. To develop mental and physical coordination through the use of hand tools, machines, and materials.

3. To provide forms of activity within the school which will appeal and interest the adolescent boy.

4. To contribute to the development of avocational activities and interests which may be followed outside of school in later life.

5. To develop ability in consumers' knowledge.

6. To give an understanding of and develop a favorable attitude toward industrial pursuits and the men who work in industries.

7. To give each pupil a knowledge of good workmanship.

8. To develop a health and safety consciousness in relation to manufacturing conditions and the general use of tools and machines.

9. To contribute to the development of leadership by giving the boy an opportunity to assume responsibilities in the shop.

10. To train in skills and abilities technically correct which may serve as a foundation for later vocational training.

Grade Placement. This course of work is most desirable in the junior high school, but could also be used very satisfactorily in the senior high school for beginning students.

Teaching Methods. The methods of administering this course are suggested as follows:

1. Demonstration.
2. Illustration
3. On the job.
4. Lecture.
5. Experiment.
6. Recitation.
7. Class instruction.
8. Problems.
9. Laboratory practice.
10. Job planning.
11. The project method.
12. Charts and pictures.

Recommended Texts. The three texts listed below are recommended for this course.

1. Hague, C. W., Text Book Printing Occupation.

2. Polk, R. N., The Practice of Printing.

3. Ringle, C. V., Elementary Printing Job Sheets.

Units of Instruction. The work in this course of study is divided into units of instruction. Each unit represents the complete lesson or Lecture Demonstration.

A COURSE OF STUDY FOR PRINTING

Outline of Instructional Units	Hague	Ringle	Polk
Unit 1			
A. To learn the lay of the California Job Case.	22	Job No. 1	26-30
B. Names of parts of type. 1. Type height. 2. Ingredients of type material. 3. Type sizes.			
C. Secure card with layout of case. Practice filling in the letters in blanks. Learn the position of lower case letters most frequently used.			
Unit 2			
A. Learning to read composed type.	11		42
B. Printers system measure. 1. Spaces and uses of quads. 2. Composing rule. 3. Roller Brayer, its use.			43
C. Printers read type up-side down, and begin at bottom and read left to right. Read a paragraph through once and the second reading write on paper. Give paper to instructor to grade. Be prepared to read any portion of the paragraph.			

A COURSE OF STUDY FOR PRINTING (Cont.)

Outline of Instructional Units	Hague	Ringle	Polk
Unit 3			
A. How to set type.	29 39		Chap. 6
B. 1. Holding the stick.	28 29		
2. Placing type in stick.	30		
3. Spacing and justifying lines.	32		
a. How to center a line.			
b. Dividing words.			
c. Quad lines in a paragraph			
C. Set the paragraph on page 40 in Hague's text. Take proof print of work. Correct all errors. Set name at top of paragraph. Present to instructor for grading.			
Unit 4			
A. The setting of type and proofing type in stick.	41	Job 5	Chap. 8
B. How to pull proof on a proof press.			
1. How to ink type matter.			
2. Position of galley on proof press.			
3. Placing of paper on inked type.			
C. Set a paragraph and take a proof reading. Correct all mistakes. Place name at bottom of paragraph. Return type to case. Copy job number 5 in Ringle.			
Unit 5			
A. Removing of type from stick.			51
B. Handling type.			Chap. 7
1. Position of fingers on type.			
2. Method of rolling type from stick.			
3. Position of stick and galley on cabinet.			

A COURSE OF STUDY FOR PRINTING (Cont.)

Outline of Instructional Units	Hague	Ringle	Polk
4. How to tie up matter type. a. Method of holding. b. Printer's knot. c. Tying of knot.		No. 6	Chap. 6
C. Copy Job No. 6 in Ringle. Prepare the same as work done in units 3 and 4. Tie up a group of sentences with string in the same manner. Take a proof, correct, and present to instructor for grading. After return of work from instructor, distribute from galley. Clean up the shop.			
Unit 6			
A. The locking of simple forms.		No. 17	13 88
B. The use of the press.			89
1. The operations.			115
2. Care.			116
C. Set up some small job for yourself or the school--letter heads, envelopes, return addresses, name cards, Christmas cards, etc. When completed, distribute type, press, and all other equipment used.			Chap. 4
Unit 7			
A. The use of quotation marks.			
B. The use of quotations to enclose direct quotations.			76-80
1. Invert two commas for the beginning mark.			
2. Use two commas in normal position for enclosing marks.			
C. Copy Job No. 17 in Ringle. Set stick at referred picas. Set all titles in capitals. Each example must have paragraph indentations. Follow punctuation carefully. Present		No. 17	40

A COURSE OF STUDY FOR PRINTING (Cont.)

Outline of Instructional Units	Hague	Ringle	Polk
to instructor when completed. Wash type and distribute. Clean shop			
Unit 8			
A. Reviewing for final examination.			
Unit 9			
A. Final examination.			

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9. Selvidge, R. W., And Witt, H. A., Instruction Manual for Young Printers, The Manual Arts Press, Peoria, Ill., 1926, 176 pp., price $1.40.

SHEET METAL WORK

The universal use of sheet metal is well known. Sheet metal includes not only tin, but copper, galvanized iron, aluminum, pewter, brass, zinc, monel and many other metals. Boys are anxious to explore and exploit their points of strength in this kind of work. Many useful and inexpensive projects may be made that will cause the boy to become acquainted with material, tools and processes. Sheet metal work is well adapted to the junior high school age and need not be an expensive course to install. The course of study which follows was prepared by Jack Shell and Clifford Green.

A COURSE OF STUDY FOR ONE SEMESTER OF SHEET METAL WORK

By: Jack Shell and Clifford Green

Introduction. Since metalwork is commonly taught in Oklahoma schools, it seems necessary to make separate courses of study for each half year of recognized and accredited courses. In some schools as many as two or three one-semester courses in various metal working subjects are taught. The purpose of this course of study is to provide a uniform plan for high schools to follow in teaching one credit of sheet metal work.

Objectives of a Course in Sheet Metal Work. 1. To give boys a first-hand knowledge of sheet metal work--wire, rivets, sheet metals, solders, etc.

2. Problems involving mathematics, work-order procedure, and the following of directions provide practical experience in problem solving.

3. Home mechanics abilities in the maintenance and repair of sheet metal products in the home are developed.

4. Sheet metal work is a basic trade, different from all others. Every boy should explore it by working with its tools and materials.

5. A degree of skill in the basic operations involved in working with sheet metals is attained.

6. Valuable knowledge about sheet metal products--gage of metal, finishes, soldering, riveting, etc., are gained. This knowledge is helpful in selecting and utilizing sheet metal products.

7. Skills gained in the sheet metal course may be of use in an avocational activity or hobby.

8. Certain planning abilities or mechanical alertness may be discovered in this course. Guidance values will thus be realized.

9. For any boy who will work in metal working establishments, experience in a sheet metal course will have a definite vocational education value.

10. Cooperation in producing work and using equipment, working together on group projects, etc., provides socializing values for boys in sheet metal work courses.

11. Boy interests cannot often be discovered without try-outs. Many boys like this work very much after a few hours of experience in it.

12. The practical application of mechanical drawing to sheet metal pattern drafting will provide a basic understanding of one of the industrial uses of this subject.

13. Safety in the use of hand tools, fires, acids, and sheet metals, and general attitudes toward safety first will be developed.

Teaching Methods. Sheet metal, being a manipulative subject, has many ways in which it may be presented. Listed below are twenty "methods and devices" which have been selected for teaching sheet metal.

1. Demonstration.
2. Examination.
3. Lecture.
4. Experiment.
5. Recitation.

6. Discussion.
7. Individual Instruction.
8. Group instruction.
9. Reference materials.
10. Talks by business and professional men.
11. Moving pictures and slides.
12. Class excursions and trips.
13. Individual instruction sheets.
14. Problems.
15. Student reports.
16. Laboratory practice.
17. The use of models.
18. Job planning.
19. Assigned reading during class time.
20. The project method.

Recommended Texts. The three texts listed below are recommended for high school use. Page references to these numbers assigned to the texts.

1. Graduate Students of Oklahoma A. & M. College, Problems in Sheet Metal Work.
2. Selvidge and Christy, Instruction Manual for Sheet-Metal Workers.
3. Welch, Elements of Sheet Metal Work.

A COURSE OF STUDY FOR 18 WEEKS IN SHEET METAL

Outline of Instructional Units	A & M Workbook	Selvidge Christy	Welch
Unit 1			
A. Make a bill of material. Check materials when received. Transferring patterns to metal. (3 methods)	16	27-28 18-20	11-12 9-20
B. Cost, quality, size, and page of material. Methods of transferring patterns to metal.	10 18	27-28 18-20	11-12 9-20
C. Make a rectangular or square box.	29	71-73	49-57
Unit 2			
A. Cutting sheet metal with shears and with machines.	17	29-32	29-32

A COURSE OF STUDY FOR 18 WEEKS IN SHEET METAL (Cont.)

Outline of Instructional Units	A & M Workbook	Selvidge Christy	Welch
B. How and when to use the various kinds of shearing hand tools and machines.	17	29-32	29-32
C. Make a rectangular tray for use in the kitchen, or a similar project using various shears.	30	36-37	51-53
Unit 3			
A. Tinning the soldering copper. How to tin and clean the copper.	18		21-22
B. Know the process, tools, and materials used in tinning the soldering copper. Know the different kinds of soldering coppers.	18	69-70	19
C. Tin soldering copper using correct procedure.	18	69-70	21-22
Unit 4			
A. The soldering process, using the soldering copper.	19	71-73	21-23
B. Know proper tools, size of tools and materials suited for the work. Know the proper temperatures for different soldering processes.	19	71-73	21-23
C. Practice with scrap metal using lap-joing, lock-joint, and tacking process.	19 21	71-73	21-23
Unit 5			
A. Riveting and punching holes. Setting rivets with correct tools.	20	67-68 81-82	21-42
B. Know the kind and size of tools, rivets, and methods of riveting.	20	67-68 81-82	20
C. Make a dust pan or a project where rivets are used.	20		109

A COURSE OF STUDY FOR 18 WEEKS IN SHEET METAL (Cont.)

Outline of Instructional Units	A & M Workbook	Selvidge Christy	Welch
Unit 6			
A. Seams commonly used is sheet metal construction.	21	57-58	
B. Know the tools used in making the several kinds of seams. Know the purposes of, and how to make each of the seams.	21	57-58	
C. Make the various seams using scrap metal.	21	57-58	
Unit 7			
A. Folding with and without brake and folder.	23-25		69-74
B. Know the hand tools and the machines used in folding metal and their correct use.	23-24		69-74
C. Make a funnel using hand tools.	23-25	55-56	43-48
Unit 8			
A. Wiring and burring, crimping, and beading. The placing of wire in the edges of pans, buckets, etc.	22 36	64-66	21-42
B. Know the purpose of and the currect procedure of wiring, burring, crimping and beading. Know how to make each by hand and machine.	22 36	64-66	21-42
C. Make each exercise using scrap metal. Make a joint of stove pipe.	22 36	46-60 60-66	21-42
Unit 9			
A. Piercing and hammering sheet metal for surface and decorative treatment.	26 27	76-77	
B. Know the purpose of piercing and hammering sheet metal and the correct tools and how and when to use them.	26-27	76-77	

A COURSE OF STUDY FOR 18 WEEKS IN SHEET METAL (Cont.)

Outline of Instructional Units	A & M Workbook	Selvidge Christy	Welch
C. Do an exercise of each of the following: Piercing, planishing, penning, raising, paneling, chasing, and interlacing.	26-27	76-77	
Unit 10			
A. Finishing sheet metal projects.	28		
B. Know the kind of finish most appropriate for each kind of sheet metal. Know the proper care of the equipment used in finishing sheet metal. Know how to apply finish.	28		
C. Finish projects that have been completed.	28		

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WOODWORK I

All down through the ages, wood has played an important part in human progress. Even today, it centers directly or indirectly into as many manufactured articles as any other material. It plays an important part in all construction work. Wood is one of the best materials for the adolescent youth to use in making his acquaintance with tools and processes. The course of study which follows was prepared by Lee L. Brians, Everett Ensminger, and Gene Grove.

A COURSE OF STUDY FOR ONE SEMESTER OF WORK IN WOODWORK

By: Lee L. Brians, Everett Ensminger, Gene Grove

Since woodworking courses are so commonly taught in Oklahoma schools, it seems necessary to make separate courses of study for each half year of recognized or accredited courses. In some schools as many as four, five, or six one-semester courses in various woodworking subjects are taught. The following information is concerned with the general program of woodworking courses in the junior and senior high school. It is hoped that the arbitrary divisions established by this committee will be acceptable to industrial arts teachers in Oklahoma, so that when a student has completed one semester of woodworking in one school and moves to another school, he will enter upon a new and interesting work instead of repeating something he has already done. The new teacher will have a better understanding of what the pupil has covered.

High school credit for woodworking should be based upon the amount of time spent in class, the equipment used, the reference materials available, the efficienty of teaching methods employed, and upon other factors which improve

industrial arts teaching. High school accrediting of industrial arts courses should be based on the amount of equipment in the shop. Minimum tool and book lists will be included in each course description.

Special Values and Specific Objectives. The special values and specific objectives have been pointed out in the Tulsa and A. & M. College objectives. In stating these specific objectives, their values will be given in their respective relations.

Major Objective. The major objective of the junior high school industrial arts is to develop desirable habits of thinking in terms of material things through analyzing, planning, and performing mechanical tasks within the ability and interest of the student.

1. To help vitalize and give meaning to, and in a measure fulfill the purpose of, academic knowledge, especially in the fields of art, science, and mathematics.

2. Exploration into basic woodworking trades will result in general educational values of a broadening nature.

3. To provide opportunity for the exercise of the creative urge in terms of material things.

4. To develop mental and physical coordination through the use of hand tools, machines, and materials.

5. A vocational training consisting of detecting and developing interests and abilities leading to a woodwork hobby may be a product.

6. To develop ability in the consumer to judge and appreciate qualities of industrial products and their values.

7. To give an understanding of and to develop a favorable attitude toward industrial pursuits, and the men who work in industry.

8. To contribute toward the development of self-confidence through having successfully completed a shop project.

9. To contribute to the development of leadership by giving the boy an opportunity to assume responsibilities in the shop.

10. Home mechanics is developed so that a boy can make ordinary repairs to things constructed of wood in and around the house.

11. To train in skills and abilities technically correct which may serve as a foundation for later vocational training.

12. To develop a health and safety consciousness in relation to manufacturing conditions and the general use of tools and machines.

13. To give to each pupil a knowledge of good workmanship.

14. To contribute to the development of self-confidence in the individual to enable him to meet unusual or unfamiliar situations regarding material things.

15. Health values are apparent in the opportunity provided for physical activity.

Grade Placement. The course which is designated as "Woodwork I" is planned to meet the needs of students just starting in junior high school, or high school woodworking classes. It is a course that introduces the boy to many different branches of the industrial field, and it should be offered somewhat as a finding course in the eighth or ninth year.

Recommended Books. The three books listed below in bibliographical form are recommended for junior high school use. Page references to these books are assigned to the texts.

1. Douglas and Roberts, Instructional and Informational Units in Hand Woodworking.

2. Fryklund and Laborge, General Shop Woodworking.

3. Hunt, Hand Woodworking.

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK

Outline of Instructional Units	Douglas Roberts	Fryklund Laborge	Hunt
Unit 1			
A. 1. Shop rules and regulations. A tour of the shop to learn where tools and materials are kept. Care of tools. 2. Assembly and dis-assembly of plane. Planing working face and working edge. Whetting plane.	39	11 13	14 16

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK (Cont.)

Outline of Instructional Units	Douglas Roberts	Fryklund Laborge	Hunt
3. Planing ends, planing to width and thickness to approximate size.	40	13 15	9 10
4. Chamfering, edge and end chamfers, laying out and cutting.	41 42	23 25	18 19
5. Stain, applying ready mixed or bought stains on finished projects.	96 100	105 106	177
B. 1. Personnel organization; foreman, safety director, tool room foreman, etc.			
2. Sizes, kinds, and uses of different kinds of planes. Stanley Chart.	4 13	3 11	5 182
3. Care and use of vise and bench, bench hooks, stops, dogs, brush, etc.			
4. Oilstones, kinds and uses. How to Sharpen, booklet from Behr Manning Corp., Troy, N. Y.			
C. 1. Squaring lumber, no definite dimensions, (within $\frac{1}{8}$" or so of predetermined size.)			
2. Cutting board, chiseling board.	7	50	
3. Hot pad, paper file, game boards.	113		
4. Match striker, paper file.			
5. Coat and hat hook boards.		7 & 111	
Unit 2			
A. 1. To read a working drawing and make a bill of material. Making a sketch.	17 23	81 83	189 53
2. Sandpapering, finishing surfaces preparatory to assembling and finishing.	93 94	45 47	46 47
3. Nails, sizes and kinds. Driving and drawing nails.	55 58	31 33	64 65
4. A lesson on measuring and the uses of laying-out tools.	25 26	7 9	36 38
5. Laying out curves, making paper patterns, enlarging design drawings, or making original designs.	43 44	22	92 94

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK (Cont.)

	Outline of Instructional Units	Douglas Roberts	Fryklund Laborge	Hunt
B.	1. Use of miter box in shop.			
	2. Comparative cost of flint, garnet, wet-or-dry, etc.	8 92		
	3. How nails are made, nail charts for the classroom bulletin board.			
	4. Veneer and plywood.	8		
	5. How the inch is divided. Fractions used in the woodworking shop.	51		
C.	1. Projects with parts worked to size and fastened together with nails.			
	2. Silverware trays, boxes.		10-26	12-69
	3. Wall and corner shelves.	11	2-121	12-48
	4. Nail box, door stops, mail box.	45	10 19	
	5. Window and porch box, trellises.			12
	Unit 3			
A.	1. Shellac, its use over stains, applying, rubbing down with steel wool.		91	
	2. Grinding plane irons. Hand grinders and power grinding machines.	37 38	17 18	13
	3. Kinds and uses of hand saws and back saws, sizes, number of teeth, etc.	31 32	16 7 8	5 28
	4. Cutting and smoothing curved edges. Coping and other saws, edge tools, files, sanding.	43 46	39 44	94 96
	5. Use of screws as fastening devices, boring holes with drills.	51 54	33 35	71 74
B.	1. Origin and preparation of commercial shellac, white and orange.	2 103		
	2. Kinds of grinders, bench and machine, grindstone, emery, and oilstone.	94 3		

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK (Cont.)

Outline of Instructional Units	Douglas Roberts	Fryklund Laborge	Hunt
3. History of saws, Disston, Saw, Tool, and File Manual. Stanley Charts.			
4. Information about steel wool.	9-95		
5. Recognition of 20 kinds of woods. Start a collection of wood samples for the shop.			
C. 1. Projects consisting of several parts, planed to size, decorated with curves.			
2. Tie rack, sconce, waste basket.	9-27		
3. Book rack or trough, book ends.	7-14	11-16	92-94
4. Magazine basket, magazine racks.	12 71	9-141	
5. Table lamp, towel holder.	7 121	7 72	
UNIT 4			
A. 1. Designing and making the dado joint as used in book racks, shelves, etc.	67	48	77 80
2. Chisels, kinds and sharpening, uses and safety first rules.	60 62	36 37	54 57
3. Applying and using glue to make dado and butt joints rigid.	79 80	92	201 202
4. Laying out regular polygon, hexagon, octagon, etc. Polygon table on the square.		19 21	21 28
5. Shop sketching, adapting a design found in a book to personal needs.			
B. 1. How screws are made and how they are sold.	5 54		
2. Process of hardening and tempering edge tools for wood-working.			
3. Kinds and prices of glue sold locally, prepared, coldwater, flake, etc.	8 84		
4. Information about floor wax.			
5. Designing and transferring curves.			

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK (Cont.)

	Outline of Instructional Units	Douglas Roberts	Fryklund Laborge	Hunt
C.	1. Projects involving dado joint.			
	2. Step ladder, plant stand.	4-5		
	3. Book rack.	9-44	4-241	
	4. Wall shelves for books, bric-a-brac.	11 41	12 49	7 137
	5. Floor stands for books, magazines, etc.	3 126		
	Unit 5			
A.	1. Safety in the school shop, use of tools, housekeeping, fire prevention, etc.			
	2. Boring holes with auger bits. Kinds and uses of boring tools.	47 50	27 29	39 45
	3. Furniture and floor wax. Its use over shellac.	100		172 173
	4. The pocket knife, its uses and how to sharpen it.			
	5. Enameling, finishing woods with solid color pigment paints.	99 100	78	159 166
B.	1. Safety in the home, on the highway and on the job.			
	2. Trip to a local industry, lumber yard, planing mill, ice factory, light plant.			
	3. Lumbering practices, talks or moving pictures of forests and lumbering.		8 30	
	4. Pocket knife (continued)			
	5. Kinds of pigment paints suitable for inside work.		3 110	
C.	1. Suggested problems and projects for faster students.			
	2. Clocks, sled.	9	9	
	3. Lawn chair, trellis.	117, 91	105	
	4. End tables, hall tree.	10, 42	9, 135	
	5. Ironing board, towel holder.		7, 72	4, 222
	Unit 6			
A.	1. Figuring cost of projects. The bill of material.		84	189,191

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK (Cont.)

	Outline of Instructional Units	Douglas Roberts	Fryklund Laborge	Hunt
	2. Towel rods, kinds, sizes and uses in the shop and about the house.			199 200
	3. Varnishing. Use of varnish as a finishing material. Care of brushes.	105 106		89 91
	4. Wood and lumber. How lumber is produced and distributed.	10-12		
	5. Occupational opportunities in the woodworking trades.	110-112		
B.	1. Accident statistics, poster maintaining poster boards in the shop and in the halls.			
	2. Conservation of the forests of the United States.	3, 7	8, 17	
	3. Information about varnish.			
	4. Cost per board foot of several of the more commonly used woods.			
	5. Fire prevention, in the shop, in the home, in the forest.		8, 20	
C.	1. Extra-curricular or recommended club activities. Merit badge work.			
	2. Model-making, boats, airplanes etc.			
	3. Kite-making, and kite-flying tournaments.			
	4. Bird house.			
	5. Play equipment, playground equipment.	7 100	10 28	12 15

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WOODWORKING II

In planning an industrial arts curriculum, one should provide for boys to elect an advanced course in woodworking. This type of a course gives the boy an opportunity to plan and make more advanced projects of wood, thus stimulating his confidence in himself to attempt more difficult jobs. This arrangement for additional contact with the materials, tools, and processes often has the effect of making the woodworking experiences more functional. The course which follows was planned by J. Joplin Rogers and George T. Ross.

A COURSE OF STUDY FOR ONE SEMESTER OF ADVANCED WOODWORK

By: J. Joplin Rogers and George T. Ross

Introduction. Woodwork II is an eighteen weeks course designed to follow the completion of Woodwork I, as outlined in the course of study. This course is to further the

students' knowledge and skill in the use and care of tools and equipment, and to develop a higher degree of efficiency in their use.

Methods of Teaching. The methods of teaching this course are the same as those suggested in Woodwork I.

It is suggested that the students be allowed to use only the Scroll Saw as this is a course in hand woodworking.

Reference Texts. The reference texts for Woodwork II are the same as those listed for Woodwork I.

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK II

Outline of Instructional Units	Brown Tustison	Douglas Roberts	Hunt
Unit 1			
A. 1. Mortise and Tenon joints as applied to tables and other furniture.	201	64	99
2. Use of the back saw, marking gauge, brace and bit, and mortise chisel.	29	26-30	35-43
3. Marking for mortise and tenon joints.	207	69	99
4. Proper methods of fastening the mortise and tenon joints.	206	69	124
5. Use of the mitre box.	169	76	24
B. 1. How to lay out and make a mortise and tenon joint.		69	99
2. To saw a straight line.	29	27	35
Methods used for gauging. How to bore holes. Removing waste from mortise.	33 204	29 49	39
3. Making different kinds of joints and how they are used.	202	63	100
4. Kinds of glue and their use.	205	79	124
5. Mitre box in contrast to the bench method.		76	25
C. 1. Making a project where the use of the mortise and tenon joint is involved.			
2. Footstool.			237

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK II (Cont.)

Outline of Instructional Units	Brown Tustison	Douglas Roberts	Hunt
3. Center table.			240
4. Oval table.			242
5. Radio bench			
Unit 2			
A. 1. The woodworking lathe.	1 & 11	2 & 5	
2. Woodturner's tools.	15	7	
3. Cylinder turning.	19	11	
4. Face-plate turning.	41	29	
5. Finishing and polishing.	36	46	
B. 1. Parts, operation, care and speed.	12	5	
2. Tool sharpening, kinds of tools.	15	8	
3. Centering, roughing, and cuts.	19-22	12-13	
		15	
4. Centering, roughing, and cuts (face-plate).	41	29	
5. Sanding, staining and filling shellacing or varnishing, polishing with wax.	36	46	
C. 1. Straight cut, shoulder cut, taper cut, V-cut, concave cut, convex cut, combination cut.	58-79		
2. Turning handles.	87		
3. Drawer pulls.	88		
4. Mallets.	112		
5. Match box, pin tray.	120-133		
Unit 3			
A. 1. Preparation of surface of wood.	91	93	89
2. Staining and filling.		87, 101	89
3. Natural finishing.		103,105	
4. Paints and enamels.		99	
5. Polishing.		100	89
B. 1. Planing, scraping and sanding.			
2. Coloring with oil and water stains. Paste and liquid fillers.			

A COURSE OF STUDY FOR 1 SEMESTER OF WOODWORK II (Cont.)

	Outline of Instructional Units	Brown Tustison	Douglas Roberts	Hunt
	3. Applying hot linseed oil, varnishes and shellac.		103,105	89
	4. Applying by brush and spray gun.		104-108	161
	5. The use of pumice as a polishing agent.		104	89
C.	1, 2, 3, and 5 can be applied to projects in Unit 1.			
	4. Panel Board. Paint and enamel to be applied with brush and spray gun.		104 108	89
	Unit 4			
A.	1. Picture framing.	167		203
	2. Drawer construction.		73	136
	3. Glueing and fastening table tops.	142	74,72 117	130 217,253
	4. Designing.	97	113	
	5. Simple upholstering.			
B.	1. Moulding, rabbetting, mitering and fastening.	167	65	203
	2. Making and fitting a drawer.		73	136
	3. Construct a table top and fasten to frame.	142	74	133
	4. Designing and cutting patterns for projects.	87	117	217-253
	5. To upholster a small footstool.		113	
C.	1. Picture frames.	167		213
	2. Bookrack and end table. Study table.		119	
	3. Designing and making small projects.	97	117	217 237
	4. Footstool, radio bench.			241
	5. Taboret or flower stand.			

Lists of equipment and prices of each article were omitted purposely from these courses of study, because of the additional space necessary to include them. However, lists of equipment may be found in supply catalogs that will answer the purpose. The cost of the equipment necessary for organizing a program as proposed need not be a limiting factor. A program of several activities can be developed and equipment provided by most schools over a period of a few years if plans are formulated and efforts of the shop teacher or teachers are so directed. A floor space of at least the area of two classrooms should be provided for each shop. This writer is grateful for the opportunity to include these courses of study in this report and has endeavored to incorporate them as prepared by the respective committees, except for minor changes for uniformity.

CHAPTER VII

CONCLUSIONS AND GUIDING PRINCIPLES

It is evident as developed in the course of this report, that the industrial arts activities should have an important place in the junior high school. These activities should be promoted to the extent that they will make a major contribution to the development of youth, toward the type of citizenry the modern industrial world demands.

GUIDING PRINCIPLES

Further conclusions of this study can best be stated in the form of criteria, or guiding principles that should serve to direct the efforts of those responsible for planning, organizing and administering an industrial arts program in the junior high school. These principles may be classified as to their application. Principles that should guide one's efforts in planning and organizing, and those principles that the teacher should keep in mind in developing and administering an industrial arts program, will follow.

Planning and Organizing. The extent that industrial arts should be organized in a school depends upon local school conditions. In schools employing two teachers for industrial arts teaching, a diversified program should be provided for through the organization of two general or composite shops. Industrial drawing, leathercraft and printing may be taught in one shop. Woodwork, subjects in metal work and electricity

may be taught in a second shop. Where only one teacher is available for industrial arts teaching a general shop should be organized and equipped for teaching four to six activities. Guiding principles in regard to planning and organizing the industrial arts program for maximum contribution to general education, may be summarized as follows:

1. There should be activities provided in as many occupational areas as school conditions will permit. Woodwork and drawing subjects are not considered adequate to meet modern demands.

2. Where only one or two teachers are employed for industrial arts teaching, a diversified or general shop, or shops, should be organized.

3. The activities selected should be of a type that connect up with the boys past experiences and that stimulate their present interests.

4. These activities selected should be of a type that will provide opportunity for an understanding of machines, tools, materials and processes, that will have a broad application.

5. The whole shop environment should be organized to stimulate the pupil's interest and challenge his imagination. Machines, tools, instructional materials and supplies, should be arranged for maximum pupil contact. A library must be provided in the shop and the books and magazines arranged so as to encourage their use. Provisions should be made for a functioning, democratic personnel organization.

The Industrial Arts Teacher. The contribution that industrial arts makes toward the development of adolescent youth and the realization of the aims and functions of the junior high school depends to a great extent on the ability of the teacher to plan, organize and direct the activities of the industrial arts shop. He must have a broad industrial knowledge and experience, in addition to a thorough understanding of the aims and functions of the junior high school and secondary education. The industrial arts teacher has at his command two of the basic necessities for learning: (1) the pupil's interest, and (2) the project method of teaching, which calls for whole-hearted purposeful activity in a natural lifelike setting. Guiding principles that may be of help to the industrial arts teacher follow.

1. Objectives are guiding goals that are essential to the industrial arts teacher as beacons to airplane pilots and to navigators at sea. The objectives formulated should be those which the teacher can assume responsibility for achievement. In all cases they should make a contribution toward the realization of the aims and functions of the junior high school and secondary education. Industrial Arts instruction must not be confused with vocational education.

2. The industrial arts teacher should guide the pupil in the selection of his project. Successful completion must be anticipated.

3. The industrial arts teacher should capitalize on the opportunity for the discovery of individual traits. Pupils should not be encouraged to take shop activities because they are likely to work under similar conditions in later life, but because of their immediate interests.

4. The industrial arts teacher should popularize his work through successfully completed projects and happy, interested youths, working in a minature industrial environment, not characterized by mass production and competition, but arranged for the maximum development of youths-education-citizenship in modern America.

5. The industrial arts teacher must strive to make his work so interesting and so integrated with general education, that the place of industrial arts in the junior high school and secondary education will be accepted as a self-evident fact.

6. Industrial arts subjects that are recommended for the average junior high school in Oklahoma are: woodwork, industrial drawing, ornamental iron work, sheet metal work, printing, leathercraft, art metal work and foundry.

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