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Title of Study: A Proposed Course of Study for the Jewell High School, Jewell, Oregon

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Scope of Study: This report consists of a proposed course of study of industrial arts subjects for the Jewell High School. The selected courses include leather, plastics, mechanical drawing, and woodworking. An outline of projects and procedures are presented. Also, a list of tools and equipment and their uses is included.

Findings and Conclusions: The program of industrial arts in high school has been undergoing a change in the last thirty years. A careful study of the history and development of industrial arts indicates that the general shop idea has developed since World War I. Undoubtedly it is best suited to the high school level and has become popular because of its flexibility and exploratory nature. The general shop is a shop equipped to teach more than one subject at the same time under one teacher. Its chief purpose is to provide exploratory experiences and industrial information. The courses offered here were chosen after a close study of community needs and the facilities of the school.

Adviser's Approval John B. Tate

A PROPOSED COURSE OF STUDY FOR THE JEWELL HIGH SCHOOL, JEWELL, OREGON

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The writer of this report wishes to express his appreciation to John. B. Tate, Assistant Professor of the school of Industrial Arts Education, Oklahoma State University, for valuable assistance in the planning and completion of this report.

M.H.G.

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CHAPTER I

THE PROBLEM AND SOURCES OF INFORMATION

The material contained in this report presents a period of development in manual instruction. It is hoped that some definite program of organization can be reached. Selected phrases and definitions will be given in this report in order that a better understanding and definite conclusions may be reached with the proper clarity to all concerned.

The Purpose of the Study. This study was made by the writer because of his interest in this field. The study was also undertaken because of the need, both of the present and of the future. The present course of study is not adequate for the number of subjects offered. The course of study was originally formulated for woodworking only, and since then leather, drawing, and plastics have been added to the curriculum. It is hoped that this study might help someone else who is teaching in a small high school, as well as the writer.

Delimitations of the Study. This report does not contain the various methods of teaching the general shop in a small high school. The writer believes that no two people teach the same way and that each teacher should teach the way he is best suited.

Research Technique. The information obtained on this

subject was obtained principally from the magazines, pamphlets, and books found in the Oklahoma State University library. Books and articles written by recognized educators were used as reference in the history of industrial arts.

Definition of Terms. In order to assure a better understanding of what is presented in this report, it is necessary that some terms be defined. These definitions selected from various sources are:

> General Education. General education aims to develop general intelligence, the power of appreciation in all common fields of utilization, and the ability to use languages, mathematics, scientific methods, etc., without reference to any specific calling. (8, page 2).

> Manual Training. Any form of constructional work that serves to develop the powers of the pupil through spontaneous and intelligent self-activity. The power of observation is developed through exacting demands upon the senses, the reason by constant necessity for thought before action, and the will by the formation of habits of patient, careful application. (19, page 15).

> Manual Arts. A term used to describe such subjects as woodworking, mechanical drawing, metal work, printing, leather work, jewelery making, clay work, bookbinding, etc., when taught as a form of general education having its chief purpose that of developing within the pupil, through work in the school shops, manual skill and an appreciation of good design and construction by practice with a variety of exercises and practical projects of personal value. (28, page 29).

> Industrial Arts. A phase of general education that concerns itself with the materials, processes, and products of manufacture, and with the contribution of these engages in industry. (22, page 15).

> Industrial Education. A generic term including all educational activities concerned with modern industry, its raw materials, products, machines, personnel, and problems. It therefore includes both industrial arts and vocational industrial educa-

tion. (11, page 7).

> General Shop. Shops that are planned and equipped to teach two or more distinct types of shopwork at the same time under one teacher are general shops. (22, page 15).

> Sloyd. A system of hand training which gratified more fully the child's creative impulses and seemed in other respects better adjusted to the nature of the child. (1, page 178).

Review of Similar Studies. Three similar studies, or studies concerned with the general shop, which the writer found to be of significant help in preparing this study are reviewed in the following paragraphs.

Gibson, Hubert R., A Proposed General Shop Program for a Small High School, a master's report completed at Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. The purpose of the study was to determine a good program for a small high school. This study was made in 1955.

Berry, Oscar B., The Development of a General Shop Program for a Small High School, a master's report completed in 1955 at Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. The purpose of this report was to present information that should be followed in devoping a general shop program for a small high school.

Carr, Thomas C., A Proposed General Shop Course for the Junior High School of Sapulpa, Oklahoma, a master's report completed in 1948 at Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. This report is to set up a general shop program for a specific school.

Organization of Remaining Chapters. Chapter two is con-

cerned with the history of the general shop; the development and background from its concept to the present time. Chapter three is devoted to the history and philosophy of industrial arts. Chapter four consists of the different types of school shops, selected courses, and the equipment for the general shop course at the Jewell High School, Jewell, Oregon. Chapter five consists of a summary and recommendations.

CHAPTER II

HISTORY OF INDUSTRIAL ARTS

The beginning of industrial arts as one of the courses of the public school is not known by writers of educational history. However the future of industrial arts is a great one. In this present time when time and distance means nothing to man, it is important that the student learn not just one trade as was wise fifty years ago, but many trades to keep up with the vast industrial empire in which we live today. As education expands and moves forward, so must the general shop courses offered in our high schools and in our grade schools.

Part A

Early History

The primitive man found it necessary, in unorganized form, to seek food, build shelter, and make clothing for himself and his family. He learned to use the things around him and his hand to produce the things that he wanted. At first it was a crude art, then it became a skilled art, to be handed down from generation to generation. Thus we have the beginning of industrial arts.

Egyptain Civilization. It is a known fact that the people along the Nile River in Egypt were one of the first to leave their savage ways and become civilized. It was here

that members of the Egyptain race began to specialize in the different trades such as carpenter work, ship building, and baking. At first it was a trade handed down from family to family, then young people agreed to work for several years for other individuals to be taught a trade. This was the beginning of apprenticeship. Struck in his, Foundations of Industrial Education, restates a definition of an apprentice taken from, Wisconsin Statues of 1917. The definition is: (27, page 2).

> The term apprentice shall mean any minor, sixteen years of age or over, who shall enter into any contract of service, expressed or implied, whereby he is to receive from or through his employer, in consideration for his services in whole or in part, instruction in any craft or business.

The Russian Plan. Though there were several outside influences which affected education in the United States, the first probably was the technical and trade instruction started by Della Vos, of the Imperial Technical Institute of Moscow, Russia, in 1868. This method of training is sometimes called the Russian System of manual training. The courses instituted by Della Vos were just formal courses in tool instruction. Bawden in his, Industrial Arts in Modern Education, said the Russian course of study was arranged on the following three levels: (2, page 84).

1. Care and use of tools.
2. Elements of construction, such as typical joints used in the woodworking industries.
3. Application of these tools, processes and elements of construction to actual projects.

The influence is still felt in the present day teaching

of industrial subjects. These influences are summarized in the following statement by Friese. (11, page 44).

1. The course of study was based upon occupational analysis.
2. Courses were built on the principle of working from the simple to the complex.
3. Subject matter was organized for teaching purposes.
4. Teaching methods were developed.
5. Pupils were trained in groups rather than singly.
6. Progress of the pupil could be determined at any time.
7. Both individual tool sets and benches and general tools were included in the equipment.
8. Pupils worked from drawings they had previously made.
9. Separate shops were established for the different equipments or trades.
10. Models and charts were hung on the walls of the shops.
11. The time required for learning a trade was shortened from that required under apprenticeship.
12. The accuracy required increased as the course progressed. One model was completed before another was begun.

The outstanding fact about the Russian system is that it was the first to use scientific principles in analyzing the mechanic arts and basing courses of instruction on these analyses.

Sloyd. Otto Salomon was the father of educational sloyd in Sweden. It was he who took advantage of the movement for instruction in the manual arts as a part of common-school education and established schools at Naas in 1872. In discussing the aims of educational sloyd, Bennett stated: (5, page 67).

> The Swedish system...was worked out by an educator whose primary interest was the enrichment of the education of all children during the elementary school period, recognizing individual capacities and individual speeds in learning: it was an indiv-

idual-production system, not a mass-production system of general education.

All the objects made in educational sloyd were to be useful. The main purpose was to train working men's children to love work, and to teach these children to use their hands as they would need to do in the future.

Development of Manual Training. In France educational manual training evolved from an early type of shopwork instruction which was mainly economic in its purpose. It had no system of education and ignores the industrial condition of the country.

Clauson-Kaas, of Denmark, was invited to Berlin to lecture and from this lecture a society for the promotion of industrial work in the home was established in 1876. This organization sent a teacher to a course under Clauson-Kaas and upon his return to Germany he started a boy's work school where brushmaking and several other shop subjects were taught.

In England manual training was started to help the lower classes of people. The Industrial Revolution, by working the lower class of people and their children, brought about the need for training these workers.

The educational movement that influenced the early development of manual training most was that which established art and technical schools. This was done in order to provide skilled workers for the industries. This movement grew out of the vast industrial competition between all of the major countries of the world.

Manual Training in the United States. The development of manual training in the United States was influenced by the important changes that took place in Europe.

Industrial training in the form of industrial drawing was introduced by law into the public schools of Massachusetts in 1870. It reached its greatest period of growth between 1880 and 1890. During this period shopwork courses were introduced in many public schools. Bennett gives the following dates as being significant in the development of manual training in the United States. (5, page 558).

1880 St. Louis Manual Training School opened.
1880 Workingman's School opened in New York City.
1881 Woodworking Tools, How to Use Them, America's first textbook on school shop woodworking, published.
1881 New York Trade School opened.
1882 Dwight School Experiment in Boston.
1882 Montclare, New Jersey, began to teach manual training in the elementary schools at public expense.
1884 First publicity supported manual training high school opened in Baltimore.
1887 The Manual Training School, by C. M. Woodward, published.

Next came the "Manual Arts". In the manual arts schools more emphasis was placed on designing problems to be made in the school shop rather than to follow through with a series of set exercises. This was the first effort made to recognize individual differences and a beginning was also made in the extension of school shop in other trades.

Part B

Development of Manual Arts in America

Around 1900 there was seen a gradual change taking

place. The emphases was placed on manual training and in the point of view held toward it. It was during this time that the individual pupil began to choose and design his own projects. The first apparent organization of industrial arts instruction on a general shop basis was accomplished by Boner and Russell at the Speyer School of Columbia University in 1910.

Twentieth Century Development. The newer "manual arts" point of view there developed four outstanding plans of shop-work. These methods are found in the book Reconstruction of Industrial Arts Courses, written by Snedden, Warner, and others. They are: (26, page 4-5).

1. The Ettinger Plan (Dr. William L. Ettinger formerly superintendent of schools in New York City) was the unit shop plan, where a student was routed through a series of special or unit shop.

2. The Gary Plan, (developed under superintendent William Writ of Gary, Indiana) provides for industrial experiences in a form of productive work under the direction of an experienced tradesman.

3. The Russell-Boner Plan (of Teachers College, Columbia University) provides for a series of general contacts with industrial materials in a "general" or "composite" shop.

4. The Pittsburgh Plan is a combination of the Ettinger and Bonser plans, where a student during the first year is placed in a general shop to discover his interests and aptitudes and then spends the rest of his time in a unit shop.

It took several years to develop these plans. In each of these plans there is more emphasis on educational and guidance values than on the occupational training values which had been stressed in earlier manual training.

In the article Forty Years of Vocational Education on the Pacific Coast, by Bert Lawer, he gives a general discription of the development of manual training in Oregon. He says: (32, page 299).

> About forty-five years ago, as one of the first teachers of manual training in Oregon, I recall how primitive our methods and equipment were compared with to-day. Even in high school, practically no machines were in use, and in the grades the work generally followed the Swedish Sloyd system. In Portland, Oregon where the work started about 1902, the department was under the supervision of Mr. Standley, a highly trained English craftsman. Mr. Standley put the work on a splendid basis, and his work grew wide attention. What a change is found in the schools of to-day, where high schools are equipped with machine shops and woodworking machines equal to those used in small manufacturing industrial plants.

The Development of the General Shop. The general shop was originated a few years before World War I, and has progressed rather rapidly since. Newkirk and Stoddard in their book, The General Shop, gives this definition: (21, page 11).

> The general shop is a broad group of educative industrial arts activities embracing technics of shop organization and teaching method which enables a community, whether large or small, to present a unified core of content based on life needs as summarized in these aims: developmental experience interpretative of the major phases of the world's industrial work, handy-man activities, consumer's knowledge and appreciation, guidance, hobbies, social habits, and (for a very small per cent) vocational preparation.

Later Newkirk in his book, Organizing and Teaching the General Shop, defines the term thus: (22, page 15).

> Shops that are planned and equipped to teach two or more distinct types of shopwork at the same time under one teacher are general shops.

The Present Day General Shop. The general shop permits students to work with many different tools and materials,

which is the reason for its popularity in the schools. A well organized shop program will be successful and effective in any size school; on any level whether junior high school or senior high school. Students need to explore in order to understand, appreciate, and learn to manipulate tools, materials, and products.

School administrators are becoming aware of the great need of general shops in the schools. Thus we have more and better equipped shops with each passing year.

CHAPTER III

HISTORY AND PHILOSOPHY OF INDUSTRIAL ARTS

Before one can reach any degree of attainment in any field of endeavor he must have a creed or belief in the thing he wishes to accomplish. In establishing any type of industrial arts program, one must be familiar with the history and philosophy of industrial arts. In this chapter a brief history and philosophy of industrial arts will be presented along with a list of objectives and definitions of industrial arts and the general shop.

Part A

Basic Philosophy of Industrial Arts

The basic philosophy of industrial arts is and always has been the welfare of the common man. The first important discovery of man was probably fire. The discovery of fire brought about many discoveries and occupations grew, so learning how to do things became more and more necessary in order for man to compete with his fellowmen. The man who could make the best implements became richer and so was set apart from others as a skilled and well informed man.

The philosophy of manual activities has been included in writings from the beginning of written history. One of the most important purposes in the educational life of man has been how to make a living. Early man had to learn to

hunt and to fight. How to build houses and how to cook were later accomplishments.

Current Viewpoints of Industrial Arts. A person may formulate the idea that industrial arts is a new area in education, but this is not true. Industrial arts is one of the oldest forms of education known to man. However it did not become a part of what was later called formal school education, because, education for many centuries was not for the masses but for the upper class of people. Discoveries and the progress of man through the years has depended greatly on the common man and the use of his hands.

Industrial Arts in the United States. The first attempts to promote industrial arts in the United States came around 1870. It had been for groups only. Then Della-Vos planned and devised his work so that it could be taught in an orderly manner. Wendt in his article, "A Brief History of Industrial Arts and Vocational Education", in the April 1946 issue of the Industrial Arts and Vocational Education magazine lists these aims as follows: (34, page 153).

1. By furnishing an outlet for the constructive impulses, it supplied what so far had been lacking in general education.
2. It made school training more purposeful. People could recognize a more definite relationship between school and industry. Leaders in the movement, however, never did believe that it would replace vocational training.
3. The cultivation of habits of industrial training was felt to be very important.
4. Manual training in the schools was expected to develop a respect for the manual labourer and so raise the status of the working class.

One can readily see that those aims are somewhat related

to the objectives that are used as guiding principles in industrial arts.

The four most important figures in the development of manual training in the United States were John D. Runkle, Calvin M. Woodward, Frederick G. Bonser, and Charles C. Richard. These four gentlemen, and many others, made great contribution toward the development of the present day industrial arts program.

Calvin M. Woodward. In 1873, Woodward, who had been experimenting with manual education in a secondary school associated with Washington University, recommended the introduction of instruction in handwork into all secondary schools as a part of the general education of all boys. In 1879 he established the Manual Training School of Washington. This was probably the first time shopwork was ever offered without any direct or immediate motive.

Woodward in his book, Manual Training School, had this to say about the contribution of Russia: (30, page 277).

> To Russia belongs the honor of having solved the problem of tool instruction. Others had admitted that practice in using tools and testing materials should go hand in hand with theory; but Russia first conceived and tested the idea of analyzing tool practice into its element and teaching the elements abstractly to a class. In their hands, manual tool instruction has become a science. Here is the point where the best manual training schools differ radically from the ordinary system of apprenticeship. In the latter, the learner acquires the arts involved in a piece of work incidentally, and generally without a conscious analysis; in the former, the arts are made the direct object of his study and attention. Their subsequent combination (which may or may not follow in his school experience) is a very simple matter.

American leaders in industrial education had not discovered a systematic method of presenting tool instruction. Therefore the Russian system was welcome.

John D. Runkle. Runkle had become conscious of a problem similar to the one that had confronted Woodward. He had formed some ideas as to solving these problems. Then in 1876, Runkle visited the Centennial at Philadelphia and saw his ideas in the Russian system. He had noticed that the small number of students who had entered the mechanical engineering course and who had a knowledge of shopwork readily secure positions upon graduation, while others with no shop experience were rather slow in getting employment. Runkle believed it was best not to train a person to master any particular trade in school, but to cultivate skill in "the elements which underlie all industrial pursuits". In referring to his experience at the exposition Runkle said: (30, page 3).

> At Philadelphia, in 1876, almost the first thing I saw was a small case containing three series of models, one of chipping and filing, one of forging, and one of machine-tool work. I saw at once that they were not parts of machines, but simply graded models for teaching the manipulations of those arts. In an instant, the problem I had been seeking to solve was clear to my mind; a plain distinction between a mechanic art and its application in some special trade became apparent.

It was through the recommendations of Runkle that the school of Mechanic Arts in Boston was established. This school was opened to boys who had graduated from grammar school or to those who could pass examinations in arithmetic, geography, and English composition and who were less than

fifteen years of age.

Frederick Bonser. In 1913, Bonser, professor of education at Teacher's College, Columbia University enlarged the conception of industrial arts in the elementary school. He believed that elementary education needed reformed. He insisted that industrial arts, as a school subject, should rank along with other subjects offered. To emphasize his philosophy he wrote the following in his book, Life Needs and Education. (6, page 109).

> From this standpoint, it will at once appear that primary emphasis will not be placed upon production of industrial commodities, but rather upon intelligence and cultivated taste in their choice and use. In no single field will all of the children function as producers, but from every field worthy of study they will all function as consumers. The latest problems are those of developing as appreciative understanding of industry as it is at the present time, realizing its social problems and cultivating intelligent judgment and appreciation in the selection and use of industrial products.

Bonser's conception of industrial arts expanded the ideas of Dewey. He believed that the choosing and consumption of industrial commodities was more important than their production.

Charles Richards. Richards is probably known best by an editorial in a 1904 publication the Manual Training Magazine in which he suggested that the term industrial arts be used in place of manual training. He based his contentions on the fact that the prevailing trend was to stress the elements of industrial fundamentals to civilization rather than the outmoded disciplinary thought of

manual training. The following condensation of Richard's editorial quoted from William Bawden's book, Leaders in Industrial Education, will serve to give his viewpoint: (3, page 23-24).

> As evidence of a change in our point of view we are leaving behind the purely disciplinary thought of manual training. As long as constructive work represented an instrument to train the mental powers through the hand, manual training constituted a workable and fairly suggestive title. But now we realize that there is no such thing as a training of general powers through special exercises, and at the same time we are beginning to perceive the immense content meaning of our field.
>
> We are beginning to see that the scope of our work is nothing short of the elements of the industries fundamental to modern civilization. Instead of devoting our attention to miscellaneous and more or less meaningless projects, we seek in an orderly way to develop insight into the basic industries of our times, and knowledge of some of the steps through which these have reached their present form.
>
> Behind every other subject in the curriculum is a body of ideas of fundamental meaning and importance. The industrial arts stand for one of the most vital and important phases of modern civilization. We should discard the term, manual training, as both inappropriate and misleading.
>
> In the hope of enlisting consideration and discussion the writer proposes the term, industrial arts, which indicates a definite field of subject matter. The word arts is inclusive of both the technical and esthetic elements, and the qualifying word points specifically and comprehensively to the special field of our material.

Richard's suggestion was favorably recieved. Teachers began to use the new term and today "industrial arts" has almost completely replaced the former term "manual training". Although he was not the first to conceive the idea, he was

one of the first to include a design course intended especially for teachers of manual training.

Part B

A Philosophical Idea of Industrial Arts

A person must have a clear idea of the subject to establish a philosophy. To completely understand the term "industrial arts", one must carefully consider its definition and objectives.

Definition. The term "industrial arts", has been defined several different ways by many leaders and writers. Although the words may differ, in general the meaning and interpretations are similar. The Industrial Arts in Oklahoma, Bulletin in 1951 gives this definition of industrial arts. (33, page 1).

> Industrial arts is a group of school subjects that contributes to the attainment of the goal of general education by furnishing guided experience in the use of tools, materials and machines, and insight into those phases of industry that have become an important part of our social culture.

The definition quoted indicates that industrial arts is a subject designed to provide the student with a knowledge and some experiences in the modern advancements of an industrial world. Industrial arts is a course that is helpful in preparing students for life in an industrial democracy.

Objectives of Industrial Arts. Industrial arts, as a part of general education, does not have a set of objectives which industrial arts alone supports, but it does make un-

ique contributions to objectives which are common to the entire school program. In the report, Improving Instruction in Industrial Arts, it gives the following objectives of industrial arts. (31, pages 51-9).

1. Interest in Industry. To develop in each pupil an active interest in industrial life and in the methods and problems of production and exchange.
2. Appreciation and Use. To develop in each pupil the appreciation of good design and workmanship and the ability to select, care for, and use industrial products wisely.
3. Self-discipline and Initiative. To develop in each pupil the habit of self-reliance, self-discipline, and resourcefulness in meeting practical situations.
4. Cooperative Attitudes. To develop in each pupil a readiness to assist others and to join happily in group undertakings.
5. Health and Safety. To develop in each pupil desirable attitudes and practices with respect to health and safety.
6. Interest in Achievement. To develop in each pupil a feeling of pride in his ability to do useful things and to develop worthy leisure-time interests.
7. Orderly Performance. To develop in each pupil the habit of an orderly, complete, and efficient performance of any task.
8. Drawings and Design. To develop in each pupil an understanding of drawings and the ability to express ideas by means of drawing.
9. Shop Skills and Knowledge. To develop in each pupil a measure of skill in the use of common tools and machines, and an understanding of the problems involved in common types of construction and repair.

Objectives are very good, but are meaningless unless they are put into practice.

In the Industrial Arts in Oklahoma, Bulletin, the policies committee formulated the following objectives for industrial arts. (33, page 24).

1. Industrial arts is complementary to other school

subjects and provides opportunities to apply knowledge learned in other school subjects.
2. Develop an appreciation of applied knowledge and skills.
3. Provides a knowledge of industrial drawing, the language of industry, and methods of expressing ideas by means of drawings.
4. Contributes to later vocational efficiency.
5. Stimulates students' knowledge and appreciation of good design.
6. Instills a satisfaction in personal creative achievement.
7. Develops the ability to analyze a job into its processes and organize them into correct procedure.
8. Contributes to consumer knowledge and induces an application of the value of industrial materials and the need for their conservation.
9. Trains in industrial and home safety (including fire prevention).
10. Acquaints students with industrial information and induces a recognition of the standards of industrial attainment.
11. Develops avocational interests.
12. Trains individuals to be more resourceful in dealing with the material problems of life.
13. Stimulates correct attitudes toward an orderly shop and home and their environment.
14. Aids in making vocational choices.
15. Develops qualities of leadership.
16. Develops cooperative attitudes in work habits.
17. Develops an appreciation of the dignity and importance of the occupation of one's neighbor.

Part C

A Philosophical Idea of the General Shop

The general shop was originated a few years before World War I, and has progressed rather rapidly since the war. It differs greatly from traditional one activity shop in that several areas of work are covered by one teacher at the same time. It is the solution for the small town industrial arts program.

Definition. In the book Organizing and Teaching the General Shop, by Newkirk he defines the term general shop

Thus: (22, page 15).

> Shops that are planned and equipped to teach two or more distinct types of shopwork at the same time under one teacher are general shops.

"One teacher" and "at the same time" are phrases that are emphasized in Newkirk latest definition.

Objectives of the General Shop. The principle objectives of manual training was the development of a high degree of skill through manipulative processes with one kind of material. This aim is not as important as that to be realized through the general shop, namely, the acquiring of knowledge of a variety of materials and processes rather than the development of a high degree of skill using only one material.

The policies committee, for the American Vocational Association Bulletin, lists the following objectives: (31, page 44).

1. Construction of useful products.
2. Problem solving through pupil plan sheets.
3. Figuring cost and following logical procedure.
4. Drawing, sketching, design, and color.
5. Pupil personnel management system.
6. Safety and health.
7. Good housekeeping.
8. Maintenance of tools and machines.
9. Conservation and utilization of resources.
10. Nomenclature of tools, machines, and technical terms.

CHAPTER IV

A PURPOSED COURSE OF STUDY

An attempt has been made to formulate a tentative program for the industrial arts classes of the Jewell High School, Jewell, Oregon. As our society is always changing from year to year so must the industrial arts program change to keep pace. The tentative plan is perhaps more than can be done in one year, however, one must plan more than can be accomplished thus giving maximum possibility for change.

An adult class is held one night a week during the school year. This makes it necessary for a broad and inclusive program. The program must include the beginning student as well as the adult. The interest is good among the patrons in the district and with some added features in the industrial arts program, there should be even more interest. The interest the patrons take in the industrial arts program tends to help the interpretation program of the school.

It is believed that although such a program is not the ideal one, but it does go far toward producing a much more comprehensive program than has been in effect in the community. It is felt that this is the beginning. The real test comes with the results of a working program and the changing of those parts which do not work out as planned. It will be a continuous program being continued from year to year.

Figure I

PROPOSED SCHEDULE OF GENERAL SHOP CLASSES FOR THE INDUSTRIAL ARTS COURSES IN THE JEWELL HIGH SCHOOL

Ind. Arts Subjects	Grades 7&8	Grades 11&12	Periods per week	No. Students per class
Woodworking I	18 wks		5	4
Woodworking II		18 wks	5	8
Industrial Drawing I	6 wks		5	4
Industrial Drawing II		6 wks	5	8
Leather	6 wks	6 wks	5	4 & 8
Plastics	6 wks	6 wks	5	4 & 8

Leather, plastics, and mechanical drawing will be offered to the seventh and eigth grades. Each of these subjects will be offered for a period of six weeks. The remaining eighteen weeks will be devoted to woodworking. The same schedule is established for the high school, only the requirements of the courses will be different from that of the seventh and eighth grades. None of these courses have been offered before so both groups will be beginners. Next year a second course of study will have to be established to take care of the advanced groups.

Part A

Leather

Earliest authentic historical records go back nearly 5000 years. From the carved stone tablets left by the Egyptians of those times, we learn that these people knew about leather and valued it highly.

Raymond Cherry, in his book, General Leather Craft, says: (7, page 9).

> The first American explorers found that the Indians were quite skillful in the art of tanning leather. It is not known just how or when they gained their knowledge and skill.

Leathercraft is one of the best crafts for beginners as well as for advanced students. It is easy to provide the material and requires 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 not only provides the students the opportunity to make things they see and want, but it provides pleasurable experiences that fascinates all students. From the standpoint of appreciation of design and color harmony leathercraft can well be incorporated into any school program. Much of its value lies in its leisure time activities. Accuracy and application may be learned through handicraft of which leatherwork is one of the most fundamental. The major objective of art leather work is to develop desirable habits of thinking and manipulating material things through analyzing, planning, and performing

general and artistic work in leather craft within the ability and interest of the student. It affords opportunities for job planning and producing and the development of artistic abilities and appreciation.

Kind of Craft Leathers.

1. Tooling Leather
   A. Calfskin
   B. Cowhide
   C. Steerhide

2. Non Tooling Leather
   A. Alligator
   B. Lizard
   C. Ostrich

Dyes and Stains.

1. Water Dyes	Anitine Dyes	Mix with water.
2. Oil Dyes	Oil Dyes	Mix with turpentine.
3. Spirit Dyes	Powdered Dyes	These are soluable in alcohol.

Tools and their Use.

Tools	Use
1. Skiving knife	Skiving and cutting.
2. Fid	Open thonging slits.
3. Drive punch	Punching holes where revolving punch will not go.
4. Revolving punch	Punching holes.
5. Thonging chisel	Make thonging slits.
6. Tracers	Tracing designs on leather.
7. Modeler	Embossing and background.
8. Deerfoot	Putting down background of designs.

Tools	Use
9. Snap attaching set	Setting buttons and bag plates.
10. Eyelet setting punch	Setting eyelets.
11. Edge creaser	Creasing belt edges.
12. Mallet	Striking thonging chisel.
13. Steel square	Layout and cutting leather.

Fundamental Operations.

1. Design making
2. Layout
3. Cutting leather
4. Preparing leather for tooling
5. Transfering design
6. Outline tooling
7. Flat modeling
8. Embossing
9. Stipple background
10. Punching holes
11. Lacing
12. Eyelet and snap buttons
13. Leather sewing
14. Cleaning
15. Cement
16. Finishing

Projects.

1. Car key case or book marks
2. Comb case or coin purse

3. Belt or billfold

4. Book cover or ladies purse

Plan of Procedure for Leather Projects.

With the aid of tracing paper you may trace a design from a picture or outline. The design can be natural or abstract, but be sure to keep the design in one-fourth of an inch from all edges of your project.

Cut the leather to shape using a metal or heavy paper templates with a leather knife. Be sure to cut the leather on a cutting board.

Dampen the leather with water. When the leather comes back to its natural color, place the tracing paper over the leather and trace the design with a tracer tool. Be sure to tape the tracing paper to the leather to prevent the paper from slipping around and making a bad design.

Remove the tracing paper and deepen the design on the leather with the tracer until the design on the leather is deep brown in color.

Apply glue around the parts to be laced one quarter of an inch from edge. Trim the corners to be round using a leather knife and the template.

Lay off a line 3/16" from edge with a straight edge or dividers to locate the lacing holes. Be sure to keep the line light. Punch lacing holes or slits with a thonging chisel. Use a three or four prong thonging chisel or a thonging punch.

Clean the leather with a prepared mixture of oxalic

acid and water. Be sure to use a clean rag to keep from discoloring the leather.

To apply a leather finish use Neat Lac. To apply use a clean cloth and allow to dry about ten minutes before applying second coat.

When lacing be sure to keep the outside or grain side of the leather toward you. After the project has been laced, use a rawhide mallet and tap lightly all the way around to set the lace. Install snaps, buckles, etc.

Part B

Plastics

History and Development. In this era of many astonishing industrial developments, probably no industry has under gone such a rapid growth and development as the plastics industry. The plastics industry really began in 1868. John Wesley Hoyatt was searching for a new material to be used as a substitute for ivory in the making of billiard balls. Celluloid was the first known plastic, since then hundreds of types have been produced. The American Vocational Association Committee in the 1946 bulletin, Improving Instruction In Industrial Arts, states the following concerning plastics: (31, page 44)

> Plastic craft is becoming important in the list of industrial-arts offerings. It will be observed that many of the operations involved in plastic craft are basic in other areas. Woodworking, turning, and metalworking, elements are represented in this new field. Changes are taking place rapidly in the development of plastic materials and in the number of applications and uses that can be made of them. The usual general shop equip-

ments will serve for this work, and it is recommended that instructors seek to increase the use of these additional materials and experiences.

Terminology. A dictionary of technical terms defines the word "plastic" as "capable of being molded or modeled". The term "plastic" is a commercial rather than a scientific phraseology, because rubber and glass are easily formed into any desired shape during processing and retain that shape after cooling. The word "plastic" now generally applies to the synthetic products of chemistry.

Classification. Plastics, depending on their physical properties, may be classified as thermoplastics or thremo-setting material. Thermoplastic materials can be formed into desired shapes under heat and pressure, and becomes solid when cooled. You can change the form in any desired shape or form by reheating and applying pressure.

Plastics may be classified also according to their chemical sources. The twenty or more known basic types fall into four general groups.

1. Cellulose plastic
2. Synthetic resin plastic
3. Protein plastic
4. Natural resins

Cast phenolic resin plastic is used in all school shops and craft work. They are especially brilliant with unusual beauty of color and depth of lustre.

Tools and their Use.

Tools	Use
1. Steel square	Used as a guide in laying out lines.
2. Try square	Used to lay out and to test squareness.
3. Dividers	Used to lay out circles and divide spaces.
4. Scratch awl	Used to mark lines and center holes for drilling.
5. Hack saw	Used to cut rods, special shapes, sheets and grooves.
6. Jewelers saw	Used to cut out irregular shapes and to pierce.
7. Chisels	Used to help square ends of rods.
8. Firmer chisel, 1/8"	Used for cutting grooves.
9. Drills; carbon straight shank	Used for drilling holes for screws.
10. Taps and dies	Used for cutting threads.
11. Countersinkers	Used for countersinking holes.
12. Auger bit	Used for drilling holes.
13. Hand drill	Used for holding twist drills.
14. Ball pein hammer	Used to set drive screws.
15. Chain nose pliers	Used to cut wire and drive screws.
16. Small screw drivers	Used to set screws.

Tools	Use
17. Steel bench rule	Used as a straight edge and ruler.
18. Files	Used for rough finish and square ends.
19. Hand screws	Used for clamping, for holding, cementing, and sawing.
20. Buffing and polishing wheels	Used for finishing projects
21. Carving tools	Used for carving

Fundamental Operations.

1. Designing
2. Lay out stock
3. Cutting
4. Squaring
5. Drill, bore, countersink holes
6. Tap holes
7. Thread plastic rods
8. Cut grooves
9. Veining
10. Carving
11. Inlaying
12. Overlaying
13. Rough finishing
14. Polish
15. Cement
16. Finish

Projects.

1. Letter openers

2. Shade pulls
3. Belt slides
4. Rings
5. House numbers
6. Dress clips
7. Paper weights
8. Ash tray
9. Candle holder
10. Letter holders
11. Lamps
12. Picture frame
13. Cigar box
14. Powder box

Plan of Procedure for Plastic Projects. In beginning plastics, the instructor should select the first project so the student will learn the fundamental operations. The project should be small and have form as well as functional purpose.

Lay the template on a plastic sheet, and trace with a pencil. Do not remove the paper from the plastic until the project has been cut out and filed down to the pencil line. Remove the paper from the plastic and sand with a wet or dry garnet paper. After all mill marks have been removed by sanding, the next step is polishing. All pieces are polished before work is assembled. Edges which are to be joined together with cement, drive screws, or some other means are not polished.

A polishing head with two cloth buffing wheels will aid greatly in bringing out the beauty found in plastics. The speed on a polishing head with 6 inch buffing wheels should be about 2500 R. P. M. The buffing wheels should turn toward the work. Apply some buffing compound to one of the wheels while it is running.

Hold the plastic against the wheel on the lower part of the wheel with light pressure. Move the plastic back and forth as you polish. The first compound used should be coarse enough to cut or remove all scratches left by the 7/0 wet or dry garnet paper.

Remove all scratches and finish the polishing on the other wheel to bring out the color and beauty found in the plastic. This last operation will take only a few seconds if all scratches were removed by the first buffing.

Surfaces to be cemented must be perfectly flat and the joints must fit tightly. For a good joint the edges should only be sanded smooth, not polished. Cemented parts will tend to creep if clamps are used. To prevent this creeping and to insure perfect alignment of all parts when the cement has set, small metal dowels may be used. It will take a cemented joint from four to ten hours to set at room temperature.

Part C

Mechanical Drawing

Definition. The term "mechanical drawing" is properly applied to work involving the use of instruments. Mechanical drawing develops the power of visualization, trains in exact-

ness of thought and if taken to a higher degree teaches the student to read and write the language of the industries.

Mechanical drawing is a universal language of drawing. French and Svensen in their book, Mechanical Drawing, says: (10, page 1).

> Thus when words fail to give a complete or accurate description, we find books, magazines, and newspapers using pictures, diagrams, and drawings of various kinds.

Words alone cannot explain in detail how a house or building should be built. In order to omit human visualization of construction a universal language of mechanical drawing is used.

Tools and their Use.

Tools	Use
1. Drawing pencils	Drawing lines.
2. T-square	Horizontal guide lines.
3. Triangles 45, 30, and 60 degrees	Vertical guide lines inclined lines varying by 15 degrees.
4. Drawing board	Hold paper and a smooth working surface.
5. Scale	Measuring lines and proportional feet and inches
6. Compasses	Drawing arcs and circles.
7. French curve	Drawing irregular curves.
8. Dividers	Dividing lines into spaces.

Tools	Use
9. Tape	Holding paper to drawing board.
10. Ames lettering guide	Make guide lines for letters and numbers.

Plan of Procedure for Drawing. The first step of drawing is the squaring of the drawing paper on the drawing board with the aid of a T-square, and taping the paper to the board. Mark off the paper in one inch squares, with the aid of the T-square and 60 degree angle. Divide the sheet into four equal squares, to accommadate each of the four drawings on one plate.

Using only a pencil, free hand the orthographic projection to scale. Then change the orthographic projection to isometric drawings.

Mark off the drawing paper into four equal sections. With the aid of a T-square, scale, and pencil, draw the orthographic projection and dimension. Hale, McGinnir, and Hill, in their book, Introduction to Applied Drawing, says: (15, page 25).

> In placing dimensions on the drawing, it should be remembered that they are written instructions to a workman to make a project. Therefore, they must be clear, distinct, and placed where the workman can readily find them. As a rule, dimensions are placed outside and between the views. However, they are sometimes placed directly on the views, if it tends to make the drawing more easily understood. As a final check to your drawing, see that enough dimensions are given so that each number of the project is defined clearly as to shape, size, and position.

Demonstrations.

1. Center lines
2. Cutting plane lines
3. Dimension lines
4. Section lines
5. Invisible line
6. Extension lines
7. Weight of lines

Part D

Woodworking

History of Woodworking. All down through the ages, wood has played an important part in human progress. Wood was first used by man as a weapon to defend himself against animals. He then learned to use it for heating his home and for cooking his food. Wood was also used for shelter, tools, and furniture. Man's first chair or table was a log he pulled into his cave.

Hunt and Tate in their book, Hand Woodworking, says: (17, page 8).

> There have been many different styles or periods of furniture design since man first began to construct furniture for his home. In early days, furniture was used only by rich or noble people of the land, while the masses used only crude benches and stools. It is important for the beginner to realize that classification of furniture styles at best is imperfect. The earliest styles are designated by names that cover many centuries, such as Egyptain, Greek, or Roman. The dates of these styles overlapped from each other. Later these styles were designated by names of ruling monarchs, such as Louis XVI, Queen Anne, William and Mary, and Victoria. In the eighteenth century, names of designers or cabinetmakers were used to indicate a particular or independent style. During the eight-

eenth century, the Georgian period, developed in England, was brought to America. This period was composed of many styles, developed by men whose names became associated with these styles--Chippendale, Adams, Hepplewhite, and Sheraton.

Kinds of Wood. There are over 15,000 different species of trees, but not all of these are used for lumber. Trees are divided into two classifications, hardwoods and softwoods. The hardwoods are called deciduous, meaning that they lose their leaves every year. The softwoods are canifers, they are cone or needle bearing trees.

The most common types of woods found in our school shops are cedar, oak, walnut, maple, and phillipine mahogany.

Another classification of wood is made in according to the closeness or openness of the grain. Wood is either open grained, medium open-grained, or close grained. A very good example of open-grain is oak. Maple is a good example of close-grain. An example of a medium open-grained wood is birch.

Stains, Fillers, Sealers, and Finishes.

Stains.

1. Water stains	Dissolve aniline dyes in hot water.
2. Spirit stains	Dissolve aniline dyes in alcohol.
3. Oil stains	Oil soluble colors in linseed oil.
4. Chemical stains	Dyes with chemicals.

Paste Wood Filler.	Twelve parts boiled linseed oil six parts Japan drier one part turpentine.
Sealer.	Shellac.

Finishes.

1. Shellac	Resinous substance.
2. Varnish	Resin or gum in linseed oil.

Tools and their Use.

Tools	Use
1. Pencil	Marking lines.
2. Knife	Marking lines.
3. Rules	Measuring.
4. Try Square	Measuring and squaring.
5. Marking guage	Laying parallel lines.
6. Dividers	Circles and arcs.
7. Miter square	Marking 45 degree miters.
8. Crosscut saw	Cutting across grain.
9. Rip saw	Cutting grain.
10. Back saw	Cutting to fine line.
11. Planes	To plane board smooth.
12. Router plane	Cutting dado joints.
13. Grind stone	Sharpening tools.
14. Oil stone	Sharpening tools.
15. Cabinet scraper	Scraping wood.
16. Hand scraper	Scraping wood.

17. Chisels	Cutting wood.
18. Drills and bits	Boring holes.
19. Screw drivers	Setting screws.
20. Countersink	Taper holes for screw heads.
21. Depth guage	Boring holes to depth.
22. Wood rasp	Inside curve where scrapers will not go.
23. Clamps	Holding.
24. Hammer	Driving nails.
25. Mallet	Tapping on metal.
26. Glue pot	Glueing wood.
27. Brushes	Painting.
28. Nail set	Setting nails below surface.
29. Band saw	Sawing curved edges.
30. Universal saw	Cutting boards.
31. Jointer	Jointing boards smooth.

Fundamental Operations.

1. Function of project.
2. Standard in size.
3. Design.
4. Sources of project.
5. Sketching.
6. Types of joints to be used.
7. Scale drawing.
8. Type of wood.
9. Tools needed.

10. Type of fasteners to be used.
11. Sanding.
12. Finishing.

Projects.

1. Cutting board.
2. Book ends.
3. Tie rack.
4. Kitchen shelves.
5. Bird house.
6. Magazine rack.
7. End table.
8. Corner shelves.
9. Cedar chest.
10. Chest of drawers.
11. Night stand.
12. Candle sticks.
13. Lamps.
14. Chair.

Plans of Procedure for Woodworking. The cutting board is to be made with the use of hand tools. The finished size of the project will be; thickness 3/4 inch, width 7 1/2 inches, and length 13 1/2 inches.

Select a straight close grained board and cut to rough size, 7/8, 7 3/4, and 14. If the board is warped, place the convex side up and plane with the grain.

First plane a working face and test it three ways with a framing square, (1) with the grain, (2) across the grain,

and (3) diagonally across the corners. Mark the working face with a single pencil line. Select the best edge, and plane a working edge. Test for straightness and for being square with the working face. Mark the edge with two pencil lines. Guage to width, using the marking guage. Chamfer corners opposite the work edge, but do not chamfer over guage line. Plane the working end and test for straightness and squareness with working edge and face. Measure and mark to length using a sharp knife and try square. Saw off waste stock, leaving 1/16 inch for planing to true size. Chamfer corner on second end and plane to the line. Plane second side and face, testing for squareness.

Measure a 1 1/4 inch arc on both corners of one end. Saw off waste stock and round with a chisel.

Using a 1/4 inch chamfer stick lay off round top of board and chamfer. Check angle with a 45 degree T-bevel.

Bore a 5/8 inch hole in the center of the board 1 1/2 inches from end on rounded corners.

Sanding the surfaces and edges smooth with sand paper. Wax the board and allow ten minutes to dry. Put second coat of wax on after drying, polish with a clean soft cloth.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The program of industrial arts in high school has been undergoing a change in the last thirty years. A careful study of the history and development of industrial arts indicates that the general shop idea has developed since World War I. Undoubtedly it is best suited to the high school level and has become popular because of its flexibility and exploratory nature. The general shop is a shop equipped to teach more than one subject at the same time under one teacher. Its chief purpose is to provide exploratory experiences and industrial information.

Summary. The study includes the progress of industrial arts from the time of its beginning to the present time. Also presented is the European development and the American development and their influence on the present status of industrial arts.

Six weeks periods, one for plastics, one for leather, and one for drawing will be offered to both the high school and the grade school students. Since there has not been an industrial arts program before, the first year all the students will be beginners. Eighteen weeks will be devoted to woodworking.

Another course of study will be established next year

when there will be both advanced and beginning students. There will be many problems and points to be changed. With the constant work of the industrial arts teacher a more perfect program can be established.

The Industrial Arts Teacher. The industrial arts teacher must possess the same culture and refinement that is expected of teachers in other branches of the school system. The industrial arts teacher needs as much shop training as is practical in the usual four-year undergraduate courses and some advanced study. It should be pointed out that the industrial arts teacher should not be expected to teach a vocation, but a course rich in opportunities for exploration and guidance.

Recommendations for Further Study. In making this study it was found that there was an inadequate amount of concentrated published information available for persons who are interested in industrial arts. The writer realizes that this contribution is concerned with problems of a certain school and would not be adequate for all high schools, even the small high schools, for every school is different. It is hoped, however, that this study will help others in similar situations.

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