AN ABSTRACT OF THE THESIS OF

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Title: A SURVEY OF CERTAIN PHASES OF SELECTED GENERAL SHOP PROGRAMS IN SECONDARY SCHOOLS WEST OF THE MISSISSIPPI RIVER

Abstract Approved: [Major Professor]

This study is directed toward summarizing certain general trends and practices in selected one-teacher general shop programs. The data were gathered by questionnaire from instructors whose departments had been recommended by department heads of teacher-education institutions.

The survey covered two areas, the junior high school level and the small schools, in which the general shop has been rendering the greatest service.

A review of the current literature about the general shop is included for comparative purposes.

The limitations of the study are rather direct effects of the War and the defense-training program, appearing principally in the high turn-over of teachers, the inadequacy of up-to-date records in teacher-education departments, and changes in teaching programs due to new personnel and limited instructional materials.

The specific purposes of the study are in part: (1) to survey the "ages" of the general shops and the manner of the original planning; (2) to tabulate the experience areas being offered, both elective and required; (3) to study the daily and weekly time allotment for industrial arts; (4) to discover trends in teaching industrial arts as a required subject; (5) to study rotation plans and methods of handling beginning classes; (6) to tabulate and to rank the methods used in starting a new general shop class.

A comparison of the findings in this survey with the reports of earlier studies of the general shop reveals the following major implications:

1. General shops appear mainly in the schools with grades 7, 8 and 9 and in the small communities, although not
limited to these areas. A major portion is in the junior-senior high schools, where industrial arts is required in grades 7, 8, 9 and 10 to a large degree.

2. The general shop plan displays its merits in the six-year high school of the small community where the combined facilities permit more instructors and a broader program of industrial arts at reduced unit costs.

3. There seems to be an increasing requirement for industrial arts courses; it is approaching the upper grade levels.

4. It is now more common to plan new general shops in preference to reorganizing old unit shops, thus implying the adoption of scientific shop planning principles.

5. The variety of separate experience areas offered is generally increasing, although terminology permits considerable overlapping of the operations included in the separate areas.

6. Different communities are unlikely to select identical combinations of experience areas, and are unlikely to organize them with the same emphasis.

7. The general tendency is for industrial arts classes to be scheduled one hour per day, five days each week; however the range is still very great. Class periods are usually longer in the upper grade levels.

8. A greater number of experience areas are offered in the lower grades, hence the length of time spent in each area is proportionately shorter as compared to the upper grades.

9. The amount of time devoted to the separate experience areas among the various schools is extremely varied.

10. Two major problems of general shop organization are: rotation of pupils among the experience areas, and methods of starting a new class.

11. Rotation is an individual problem in each general shop set-up. Each instructor must determine a procedure that will prove a useful tool in meeting the definite objectives of his general shop.

12. It depends upon the particular type of general shop whether or not an entire beginning class is kept in the same experience area for the first period of instruction.

13. It was determined that four general methods are used in starting new general shop classes. However, the majority of instructors rely upon but one method.
A SURVEY OF CERTAIN PHASES
OF SELECTED GENERAL SHOP PROGRAMS
IN SECONDARY SCHOOLS WEST OF THE MISSISSIPPI RIVER

by

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CHAPTER I

INTRODUCTION

The general shop movement is a relatively new concept of industrial arts organization based upon the modern philosophy of general education. The new organization has grown up as a definite part of industrial arts education during the recent years of rapid expansion.

Although the "general shop idea" in industrial arts is one of several recent developments which have been closely associated with the junior high school movement, its progress has in no way been confined to those grade levels. However, many writers propose that its best application can be had there.

There is a period of parallel growth between the junior high school and the general shop movement. Douglass\(^1\) reported a change of emphasis in the junior high school during the 1920's by comparing the "functions" in 1920 and in 1927. Prior to 1920 a far greater emphasis was found in current literature upon the "retention of pupils" and the "economy of time" phases of the junior high school.

\(^1\)Douglass, Aubrey A., Modern Secondary Education, p. 239.
By 1927 there had been a drastic change, favoring the two functions "recognition of individual differences" and "exploration and guidance."

There were very few general shops in existence before 1920. A significant beginning took place during this same period of the changing emphasis in the junior high schools. As these changes appeared, able supporters of the general shop movement came forward to explain its possibilities in the way of guidance, exploratory experiences, and adaptability to individual needs. Newkirk and Stoddard\(^2\) at about that time wrote:

The following characteristics are to a large degree responsible for the popularity of the general shop in presenting the industrial-arts program:

1. It is well adapted to the organization of industrial arts content in the light of the general education, exploration, and guidance aims of the junior high school.

2. It permits students to be treated as individuals with due respect for their differences in interest and capacity.

3. It enables a student to discover his abilities and aptitudes through manipulation of a wide range of materials, tools, and processes.

4. It offers an economical way to gain experience in many activities.

5. It makes possible an adequate industrial-arts program for the small school.

(6) It stimulates the setting up of a well-planned shop and a carefully organized teaching content.

(7) It increases teacher efficiency.²

A brief history of this growth, emphasizing the contribution to guidance, is summarized by Cox:

The first examples of the general shop were products of a few isolated teachers, dissatisfied with the results derived from the older form of unit shops, seeking to broaden the base of operations and to introduce more interesting projects as a means of motivating students to higher and broader accomplishments. These early cases were due entirely to the ingenuity and the untiring, devoted service of a few superior teachers. Others, notably the educational administrators and the guidance experts, seeing the splendid service rendered by these outstanding teachers, began to promote the idea because of its direct contribution to guidance and because, administratively speaking, it was the only practical means available to the smaller schools in their effort to present as broad a range of experience areas as were to be found in the larger city schools.³

To this new phase of industrial arts have been attached various descriptive names, varied means of management, and varied implications as to its function in industrial arts laboratories. These variations have not been caused alone by uninformed persons grasping eagerly at a new idea; leaders in the field of industrial arts have shown some differences in their interpretation of the application of this new concept. Others, not favorable to the plan, have offered severe criticisms.

When the movement was well under way, attention was called to the confusion within the whole problem by Newkirk:

There are several factors which are still clouding the general shop concept and causing misunderstanding on the part of some administrators and industrial-arts teachers. First, the general shop has frequently been defined in the light of its most obvious physical characteristic; namely, that it is usually taught in one room under one teacher with facilities for working the common construction materials -- wood, clay, metal, paper, and glass. Second, numerous teachers are still attempting to house a number of small unit trade shops in one room and conduct them simultaneously. Third, a failure to realize that the general shop is a modern industrial-arts concept based on fundamental objectives of modern education. Fourth, the general shop is not a special subject outside the regular curriculum.4

Similarly, Smith wrote:

The present trend seems to be toward the so-called general shop as opposed to the more or less special shops, like cabinetmaking, blacksmithing, carpentry, etc. There has been and is yet much discussion of what, when, and how to teach a general-shop course. Material available has sometimes determined what is taught, interest has been used as a criterion, whims and fancies or hobbies of instructors have often carried much weight, but seldom has a general plan of selection been followed.5

There is still insufficient careful planning, as indicated recently by Lush6: "The term general shop (italics

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in original quotation) is very broad. There are many types and varied conflicting opinions as to their practicability."

Statement of the Problem

An encouraging and broadly stabilizing statement made by Proffitt adds considerable foundation to the problem under study:

If a single outstanding trend of the present were to be used as a guide to the future of industrial arts education, it would most certainly be the trend toward the general shop. Probably nothing in industrial arts work has shown as much growth on a countrywide basis as has general shop -- especially for the junior high school level. That this will continue seems to be beyond the shadow of a doubt. The reasons for this are obvious. The general-shop form of organization (a) provides for a variety of media, and consequently of activities for pupil experience in manipulative work; (b) provides an excellent opportunity for acquiring, in a realistic way, information about industry and our industrial society; (c) offers a large variety of activities that make it more nearly possible to provide pupils with experiences in accordance with their interests and developmental levels than does the unit shop; (d) accords well with the educational objectives and principles underlying the organization of the junior high school, in which industrial arts work is now generally required for the first two years; and (e) makes it administratively possible to offer industrial arts in a larger number of communities than would be otherwise possible.7

Hence, from its inception the general shop movement has gradually gained momentum and has earned recognition,

in spite of confusion, controversial opinion, or any mis-
application of its meaning. At this time it seems de-
sirable that a study be made of outstanding general shops
with a view to discovering and summarizing certain general
trends and practices.

Purposes of the Study

The specific purposes of the study are: (1) to find
how long the cases reporting have been in operation, and
whether they were planned as new general shops or were re-
organized from unit shops; (2) to study the variety of ex-
perience areas offered; (3) to determine which of these
courses are required; (4) to determine in which grade
levels industrial arts is usually required; (5) to tabulate
the time allotted to industrial arts courses, and the
number of hours required to complete each area; (6) to
study the several plans of rotation from one experience
area to another; (7) to learn whether rotation is any dif-
ferent for junior high school and for senior high school
d grade levels; (8) to tabulate methods used in starting new
general shop classes and to rank these typical methods in
order of preference.

Location of the Study

The major service rendered by the general shop is in
the small schools and at the junior high school level. In
these areas it is a primary objective to offer an increasingly well-rounded program of industrial arts, contributing measurably to general education.

Anthony\(^8\) wrote, "There is a definite trend in all of these changes for industrial arts to contribute toward a well-rounded program of general education for all the boys and an increasing number of girls in the schools of Massachusetts." Although written about a specific state in which the general shop movement has a long, encouraging history, the statement is indicative of the national picture.

As compared to the unit shop, a greater variety of experiences can be provided at a proportionate reduction in cost. In pointing out this fact Friese\(^9\) wrote in 1926: "The general shop is decidedly of the junior high school level. It has been advocated and tried out in cities of all sizes. Because of its diversity of activities it possesses advantages over other types for small communities which can provide but one or possibly two teachers." This brief quotation is a typical cross-section of the majority of favorable reports in current literature.

The general welfare of pupils in the small community is ably supported by Struck:

The ideal industrial arts shop for the small community is the general or comprehensive shop. It is only through multiple activities carried on in such a shop that pupils can get anything approximating a satisfactory course of instruction that will provide the guidance, exploratory, and try-out experiences needed in industrial arts education.\(^{10}\)

Statements like the above definitely indicated the need to confine the study to general shops in one-teacher industrial arts departments, automatically limiting the scope to relatively small communities and junior high schools. Since the general shop has received the greatest emphasis and has rendered the greatest service in those areas, they should be the sources of information in a study of the problem.

**Methods Employed**

In order to obtain a select list of outstanding general shop programs, a contact was made with industrial arts teacher-education departments in 19 of the 22 states west of the Mississippi River. This contact was made by letter to department heads of institutions in the various states, requesting a list of 12 one-teacher industrial arts departments operating outstanding general shop programs in their state.

\(^{10}\text{Struck, F. Theodore, Creative Teaching, p. 460.}\)
A survey of these recommended programs was made by sending a questionnaire to the industrial arts instructors.

**Terminology**

1. **Industrial Arts.** The terms manual arts, practical arts, mechanic arts, industrial arts, and manual training have been variously used to mean the same thing or different things. Some one of them has been used at different times to express different meanings or degrees of meaning. For the purpose of this discussion they have been accepted as synonymous and as defining hand activities given in school for general education purposes, providing life experiences within the field of industrial activities which may serve as means of concrete expression in other school work, as opportunity for discovery of individual abilities and aptitudes, and as sources of information which may serve for educational guidance toward the later choice of a life career.

2. **General Shop.** ... one in which several types of manipulative work, such as metalwork and electric work, are carried on simultaneously under the guidance of one teacher. Other names used are multiple-activity, multiple unit, comprehensive, composite, related activities, and laboratory of industries to denote variations in the organization.

3. **Unit Shop.** ... the instruction is limited to one type of shop activity or subject matter, such as work in wood or in metal -- but not both.

4. **Work Station.** Each station represents a workbench, a machine, or other suitable equipment at which a student works a good share of his time.

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13 Struck, F. Theodore, loc. cit.
5. **Experience Area.** A more recent term for "unit" or "activity"; one division of work in the offerings of a general shop course, e.g., woodworking or electricity.

**Limitations of the Study**

The effects of World War II and the defense program constitute the greatest single limitation to this study. It has appeared in several ways. (1) The heads of the teacher-education departments have been unable to keep pace with the rapid teacher changes. This situation has become more aggravated during the past year. In a number of cases school departments which had been recommended were later reported on the questionnaire to be closed because of inability to obtain an instructor. (2) Where school shops had been operated in an outstanding manner but were now known to be handled by substitutes or by new instructors, teacher-education department heads were reluctant to recommend them. (3) Many instructors could not report their usual general-shop program due to curtailment of supplies. Thus the representation of a typical outstanding program was not possible. (4) Some lists from teacher-education departments were so extensive that it was rather improbable so many outstanding high school general shops could be operating in one section of the country. (5) The opposite condition was found in several instances where the depart-
ment head of the teacher-education institution was reluctant to recommend more than a few outstanding shops in his state or section. (6) Change in personnel in teacher-education institutions, lack of response to the initial request, and the absence of industrial arts teacher-education departments within the state were limitations which left a few gaps in the geographical area being investigated.

A further limitation of this study causes the original general plan to be affected slightly. The highest bracket for reporting school enrollment on the questionnaire (see Appendix B) was for schools with an enrollment over 401. This proved to be too low and 51 of the 127 schools used in the survey recorded an enrollment "over 401." If the top limit had been set at 600, the data would have been more certain since, according to Douglass, 14, 85 percent of the secondary schools have an enrollment under 500. Six cases are included which are known to have more than one shop; this was done where the report on the general shop was complete. Only to this extent has the original premise to restrict the survey to one-teacher departments been violated. If the presence of a one-teacher industrial arts department in a school can be used as a criterion of the relative size of that school, then the great bulk of the cases can be assumed to be small schools, or relatively so.

CHAPTER II

REVIEW OF CURRENT LITERATURE

A review of the literature, pertaining to general shop organization and covering the active period from 1920 to date, indicates that, although all phases of the problem are discussed, the major emphasis most often places the general shop in the junior high school and in the small school. This was pointed out in Chapter I. No great effort seems to have been made to offer any clear-cut separation of these two very different areas. The two are usually mentioned in the same paragraph, sometimes in the same sentence.

Progress of the General Shop

Reports have been made from time to time to trace the progress of the general shop movement throughout the United States. A biennial report for industrial education in 1924-1926 by Proffitt showed that:

The general shop, which is a recent type of organization for teaching elementary work in a number of shop activities under the direction and supervision of one individual, has been growing in favor, especially for some of the manual arts work on the junior high school level. The number of schools adopting this general shop plan has increased rapidly during the past two years. Of 1500 representative school systems furnishing information to the Bureau of Education on this point, more than 40 percent report that they have organ-
ized a general shop course. More than one-fourth of these were inaugurated during the past two years, and 10 percent of all the schools having general shops started within this period.¹

The results of two inquiries made four years apart (in 1928 and again in 1939) by Kidder give indications of the continuing growth of the general shop concept. The first was an informal inquiry made by letter to supervisors, state superintendents, and others; of this Kidder stated:

In a majority of the letters sent out the general shop was being seriously considered, or courses of study were being developed or revised.

Pennsylvania had had the general shop in force for ten years and was very pleased with its progress; Connecticut had successfully established general shop courses since 1920.²

He reported from the follow-up study:

While practically all those responding to the questionnaire of 1932 gave a report of increased numbers of general shops in their states, it has been difficult to secure reliable data in absolute figures. The situation is a little more exact in Pennsylvania, however, partly because of a more definite terminology and more adequate records, and partly because Pennsylvania has been a leader in the general shop movement since 1918.³

Summarizing his study, Kidder concluded:

Great interest has been shown in the general shop movement by all contributors, especially the

³Ibid., p. 63.
directors of industrial education who answered letters in 1928; then in 1932 nearly all expressed the opinion that a remarkable gain had been made by the general shop in their state or city. The survey of 1932 shows an unmistakable trend in the direction of the general shop.  

In the Small School

In 1922 Carman completed a nation-wide survey of shop-work for junior high schools. Upon 150 opinions from 43 states he reported:

There was . . . a decided preference for the one room, many activities, diversified shop for the small communities up to 15,000, but the preference was reversed for the large cities where the separate shops idea was just as decidedly preferred.

The conclusions are that those answering the questionnaire would desire a gradual changing from the one shop idea as the communities become larger until in the very large cities the preference for separate, more specialized shops, is marked.  

This is confirmed by Struck on the basis of certain limitations:

The general shop is particularly well suited to the smaller schools -- to those that have only one teacher of industrial arts education, or that may have only one on a part-time basis. When there is a shortage of room; when costs of equipment and of operation must be kept down; and when

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5Carman, Kenneth V., "Results of an Inquiry Concerning Certain Phases of Industrial Arts for Junior High School -- II", Ind. Arts Mag., Vol. 11, p. 373, October, 1922.
the enrollment is small, then the general shop or
a modification of it, will best serve the need. 6

Reports at a much later date repeat the same general
tendency toward enriching the program in the smaller
schools. Proffitt stated:

Administrators are insisting that woodwork
alone no longer meets the requirements of an in-
dustrial arts program, even in small schools.
Therefore, the only solution for the small school
seems to be in the development of a comprehensive
general shop. 7

From a questionnaire study, returned by 60 general
shop instructors, supervisors and teacher-trainers, leaders
in the general shop field in ten widely separated states,
Davis reported in summary:

With reference to the relation of the general
shop to the size of the school, the following
opinions are expressed: (1) General shop more
desirable, or especially desirable, in the small
school in which only one industrial-arts teacher
can be employed, 43 percent; (2) General shop
should be adopted in any case where finances and
pupil enrollment warrant, 23 percent; (3) General
shop equally desirable in schools of all sizes,
18 percent. 8

Effect of the Depression Years

The per capita cost is a consideration of prime im-
portance with any school; and in the small schools, where

6Struck, F. Theodore, "Developments in Industrial Arts Edu-
7Proffitt, Maris M., Industrial Arts: Its Interpretation
in American Schools, U. S. Dept. of Interior, Education
Bulletin 1937, No. 34, p. 51.
8Davis, Ed., "Trends in Methods, Organization and Selection
of Subject Matter for the General Shop," Ind. Ed., Vol. 39,
p. 27, January, 1937.
unit costs are greater, it is definitely difficult to provide a full industrial arts program. The economy of the general shop has been mentioned frequently, but Crowe credited the 'depression years' with having a direct influence upon the growth of the general shop:

The industrial arts laboratory had its inception several years ago under the title of the general shop. The physical arrangement was, and still is, well suited to small communities, where lack of money and pupils make it necessary to combine all shop activities in one room. It did not attract much attention until the depression came on, with its demand for economy. We then found the general shop blossoming forth under the streamlined titles of "laboratory of industry" and "industrial-arts laboratory."

In the Junior High School

Davis said in summarizing his survey:

The majority opinion is to the effect that the general shop is especially adapted to the needs of pupils of junior high school ages.10

In comparing the limited resources of the small school with the relatively extensive facilities in the larger schools, Douglass stated:

In the small junior high school such extensive provisions cannot be made, and manual and industrial arts are more limited in scope. To a considerable extent this situation has stimulated the organization of the general shop, in which

many of the activities of the special shops are found, often under the direction of one teacher.\textsuperscript{11}

\textbf{In the Senior High School}

A trend in a shift of emphasis in the upper grade levels was cited at length by Douglass:

The prevocational and general educational values of the industrial arts, which have been typical of the junior high school, are being extended into the senior high school; conversely, the vocational objectives of the special curriculums of the senior high school are becoming less sharply defined. Several reasons account for this change. There have always been sharp criticisms of the character of training provided by these curriculums, especially in the smaller high schools. It is believed that more effective agencies for vocational education might be provided. The longer stay in school, brought about by difficulties of employment, have led school administrators to regard the high-school period as one which should be devoted to general educational values. This shift in emphasis has taken place rapidly since 1930.\textsuperscript{12}

\textbf{Future of General Shop}

Ten years ago Newkirk made an encouraging report on the current situation and projected briefly into the future of the general shop. He said:

The general shop is excellent for industrial-arts work in the elementary school and the junior high school. Certain modified types are finding a place in some senior high schools and as begin-

\textsuperscript{12} Ibid., p. 551.
ning courses in trade and continuation schools. Educators and teachers may confidentially expect even better results from the industrial arts program of the future.\textsuperscript{13}

According to Leib, the teacher-education institutions are being challenged to promote the general shop and to insure its future by the proper training of general shop teachers. He has written:

Recent years have witnessed a rapid expansion of the general-shop organization in our public schools, particularly at the junior-high-school level. Not only have a large proportion of the new shop installations been of the multiple-activity type, but many single-activity or unit shops have been reorganized on the general-shop plan. The movement appears to be in its late experimental state, with its philosophy, content, and method rapidly crystallizing. Two distinct types of general shop are emerging -- the modified and the comprehensive, with numerous variations in each type. Except where state control has standardized the pattern, it is doubtful if any two cities have general shops which are identical in organization.

Those who have taught or supervised in a comprehensive general shop are quick to defend its superiority over the unit shop at junior-high-school level, although they agree that it is more difficult to organize and operate. This general agreement on educational merit leads us to believe that the comprehensive general shop will continue to occupy a prominent place in our junior high schools for some years to come. The fact that it makes greater demands upon the energy and resourcefulness of the teacher constitutes a challenge to teacher-training institutions. The preparation of industrial arts teachers now must include instruction in the

philosophy, content, and method of the various types of general shop, and, in addition, provide opportunity to work in a comprehensive general-shop environment during training.14

Teaching and Organization Difficulties

An understanding of the proper organization of the general shop program will go a long way toward justifying its existence. Fehr pointed this out by saying:

The classes in most cases are large and, since teachers experienced in this field are scarce, the general shop has come in for criticism for having failed to function as it should, whereas it should have been a model organization. A teacher may be a great success in a unit shop and still be unable to adjust himself to the new situations and the new demands of the general shop, in which he must be responsible for several groups, each doing a different type of work.15

Lindeman supplemented:

Perhaps some of the criticisms which we hear regarding the general shop are justified; but I believe that the fault lies not with the general shop, but with the methods of organization and management of the shop. While the general-shop idea is not new, by any means, its conception is yet vague to some of the men who have been placed in charge of these shops.16

Writing at a later date, Cox summarizes the situation and is able to give the teacher-education institutions credit for doing something about it; he stated:

This early hope of the general educator and the guidance expert was doomed to many years of disappointment before it began to bear fruit. While the outstanding teachers could make a success of the general shop, the main body of industrial arts teachers of that day had been trained under a system of teacher-education or in highly specialized trade pursuits quite contrary to the concepts and the methods of the general shop program. It is only in the past 10 years or less, that the general shop movement has made any pronounced headway. Within the past five years it has gained very rapidly. Much of this increase is due to the increasing attention given to professional and technical preparation of industrial arts teachers for service in the general shop.17

Need of Good Organization

Organization is a critical issue in general-shop teaching. Although writers are not usually specific about what the organization entails, they are agreed upon its necessity. Newkirk and Stoddard emphasized that the necessity for good class organization is not a peculiarity of the general shop;

To be successful a general shop must be well organized both as to equipment and instructional procedure. Occasionally this has been spoken of as a disadvantage, but it is a real advantage if educational value is to be measured in terms of results produced. Why should not a shop be organized and the instructional material carefully prepared? This condition is not unique in the case of industrial arts; good teaching in any subject makes a similar demand on the ability and preparation of the instructor. It should

no longer be a matter of surprise that a teacher must be thoroughly trained in order to meet successfully the many duties and responsibilities implied in the conduct of industrial arts courses.\(^{16}\)

Then Bedell suggests some contrasts and controlling principles, as follows:

In a single activity shop with a small class it has been possible for the instructor to muddle through, plan or no plan, system or no system. It was just a matter of seeing each pupil individually.

But the general shop has brought to our attention most forcibly some basic principles which must be observed if any subject taught in a general shop is to be successfully handled. The observance of these principles would improve the instruction in any shop, whether general or single activity. Some of these principles are:

(1) The subject matter of the course must be carefully organized.

(2) The shop must be well laid out for the specific course for which it is intended.

(3) There must be a plan of shop management which will make the work a pupil-directed activity.

(4) The class lesson and accompanying demonstrations must be carefully presented.

(5) Job sheets, instruction sheets, and other graphic aids must be available in abundance.

(6) The pupil's record must be kept up to date, accurate, and so arranged that information can be gotten easily.

(7) The rotation of groups to the different activities in the shop must be made an easy and well-organized function.\(^{17}\)

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Randel wrote:

To be at all successful in teaching in the general shop, it seems absolutely necessary to have instruction material, shop material, and equipment organized in such a manner as to enable the teacher to keep constant check on what each student is doing and on what progress he is making.20

Similarly, Cox Cautioned:

It should not be thought that the general shop plan of instruction is a "hodge-podge"; nor that it breeds carelessness and slovenliness. True, these qualities are more apt to be evident if the teacher is not equal to the job; but the teacher whose preparation includes both the subject-matter content (skills, related information, and the ability to perform satisfactorily in the several areas represented) and the philosophy (objectives, field of service, methods) of the general shop, and who can assume any reasonable responsibilities of management and leadership, will do a superior job and render a real service to youth who otherwise have no opportunity to experience the important industrial occupations and industrial problems of this era. The doors of the industries themselves are closed to youth. Where, except in the general shop, can the boys of the smaller communities gain these experiences?21

Variety of General Shop Offerings

The variety of experience areas offered through the general shops is constantly increasing. From a survey of some 28 schools Feuerstein22 stated, "... a more general

diversity of work is carried on, the principal kinds being: woodworking, metalworking, printing, mechanical drawing, electrical work, machine-shop practice, and auto mechanics, in the order named."

A more comprehensive report is given by Leaf in a study covering new one-teacher shops east of the Mississippi River. He stated that:

Industrial arts courses are combined in several ways resulting in a wide scatter of shop work experiences in the field. There is a total of 25 different industrial arts courses taught in general shops in the forty-six one-teacher departments studied.

Woodworking and wood finishing appear in all (100%) of the general shop courses, while bench metal and mechanical drawing are units of work in 93.4 percent of the shops.

Electricity is taught in four-fifths (80.4%) of the general shop courses. Art Metalcraft is taught in approximately three-fourths (73.9%) of the courses. Carpentry, home mechanics, machine shop, and forge work are taught in one-half (50%) of the general shop courses. In one-third (32.6%) of the general shop courses, a unit of work in foundry is included.

Farm mechanics, auto mechanics, architectural drafting, and printing are activities in practically one-fourth of the general shop courses.

Craft subjects, such as leathercraft, art fibre, plastics, and photography, are less frequent activities in the shops surveyed.
Plumbing, tire repairing, shoe repairing, and general repair are each reported in only one instance.23

Again from Davis:

The number of different industrial-arts subjects reported, as taught in general shops, is 24. Woodwork is reported in 81 percent of the combinations; mechanical drawing, in 60 percent; electricity in 55 percent; sheet metal in 55 percent. Then, in descending order, the following subjects were reported: general metalwork, foundry, machine-shop, forging, cement and concrete, art metal, automechanics, home mechanics, acetylene welding, woodturning, electric welding, printing, electroplating, bookbinding, plumbing, photography, upholstering, ceramics, weaving, art-fiber work.24

Required Courses

The matter of offering industrial arts as a required course is stressed by Mays25 who stated, "Industrial arts course is now a required subject in many public school systems and is more and more coming to be recognized as one of the fundamentals of a modern education."

Several studies record data showing the grade levels in which industrial arts is required. Davis summarized from reports by 60 leaders in the general shop:

Industrial arts is required (italics in original quotation) subject in 7th and 8th grades in approximately two-thirds of the schools reported; required, in 7th, 8th, and 9th grades in one-fourth of the schools; elective in one-tenth; required, in the 6th grade in a few schools.

It may be noted here that the Texas Planning Committee recommends that the general shop type of industrial arts be made a required course for all boys and girls in grades 6 and 7.26

From a survey of California junior high schools Baldwin27 observed, "Ninety-one percent of the junior high schools reported industrial arts compulsory in the seventh grade, seventy-five percent reported industrial arts compulsory in the eighth grade, thirteen percent reported industrial arts compulsory in the ninth grade."

Leaf reported from his study of 56 one-teacher shops:

Industrial arts courses are required in one or two grades so that all pupils receive some practical arts experiences. From the findings . . . it is evident that there is a lack of uniformity in shop work requirements as to grade level.

Practically one-half (48.5%) of these small schools require shop work in the seventh and eighth grade. Approximately one-fourth (26.8%) of the schools surveyed require no industrial arts work, but all offer it. Eight schools (14.3%) out of the fifty-six require shop work in all three grades (7, 8, and 9). Three (5.3%) schools have a requirement in four grades (7, 8, 9, and 10). . . one school requires seventh grade shop work; one requires eight grade shop work, and one requires ninth grade shop work.

26Davis, Ed, loc. cit.
When considering the requirements by separate grades, approximately three-fourths (71.2%) of the schools require shop work in the seventh and eighth grades. Further study shows that approximately one-fourth (21.3%) of the schools surveyed require shop work in the ninth grade. A tenth grade shop course is required in three (5.3%) of the schools surveyed.28

Time Allotment for Shopwork

Two recent studies show the reported tendencies in time allotment by minutes per week for industrial arts courses. Davis29 found, "The amount of time allotted to industrial arts in the general shop ranges from 60 to 1,100 minutes per week; 250 to 300 minutes per week seems to be the most common practice; that is, 50 to 60 minutes, five days per week."

Similarly, Leaf found:

The time allotment for industrial arts work varies from school to school because of difference in requirements, length of period, and emphasis placed upon this phase of education.

... The time allotment per week gradually increases from 138.5 minutes in the seventh grade to 323.5 minutes in the twelfth grade.

Combining the seventh, eighth, and ninth grades (junior high school levels), the average time allotted to shop work is 193 minutes per week.

In grades seven and eight, where approximately one-half (48.5%) of the schools require

28Leaf, Elmer Maynard, op. cit. p. 61.
29Davis, Ed, op. cit. p. 27.
shop work in both grades, it is found that the time allotment is 157.5 minutes per week. In grade nine, where nearly one-fourth (21.3%) of the schools require shop work, the time allotment is found to be 264 minutes per week.

When combining the tenth, eleventh, and twelfth grades the results show that 311.7 minutes are devoted to shop work weekly. In the twelfth grade where specialization may be evidenced, the time allotment (323.5 minutes per week) is the greatest.30

Work Stations

The type and amount of work stations and other bench space as found in 56 new one-teacher shops (46 of which were general shops) are reported by Leaf:

Over one-half (57.1%) of the departments are equipped with double benches, while one-third are equipped with single benches. The four-place bench appears in four (7.1%) shops.

Practically all (92.9%) of the shops are equipped for drawing, thus providing instructional planning facilities. One-fifth (20%) of the departments provide work stations for printing. One shop is equipped with fifteen combination wood, metal, and electrical benches, and so provides a work station for more than one activity.

Four-fifths (83.9%) of the shops provide work stations for metalworking, while practically one-half (48.2%) have electrical bench space.

Miscellaneous benches for other general shop activities are also indicated . . . . Wood finishing benches are most common, appearing in more than four-fifths of the shops. Benches for

30 Leaf, Elmer Maynard, op. cit. p. 63.
soldering, ceramics, automotive, machine equipment, foundry, lay-out, glue, library, leather, display, bookbinding, and welding are other bench provisions.

Where single benches are used, approximately eighteen benches are provided in the average shop.31

Rotation Plans

The matter of rotation of the students from one experience area to another embraces many variations according to the grade level, the shop set-up, and the beliefs or preferences of the instructor in charge. Authors writing about this topic do not attempt to describe more than the main skeleton of the procedures used. That there are some problems to be met is emphasized by Schell, who observed:

Any supervisor who believes that he can conduct one of these 'travel-around-the-shop-where-you-will' and 'operate-any-machine-you-wish' courses, should be made to go through such an ordeal to the tune of 20 to 25 boys in each class period, three to five periods per day, for a little while, and let us see how quickly he will say, 'It cannot be done!'

You can give the boy a chance, with the sky as the limit for the genius, by having a variety of projects worked out for each course, and at the same time include projects that are really useful, inexpensive, and interesting for the ordinary boy -- who is 99 percent of your class, and the boy you will have to reach. If you do

31 Ibid. p. 82.
this well, and aid the boy in selecting a voca-
tion, you will be able to justify the general
metal-shop before any critic.  

Reports from several sources indicate some of the
general procedures. This brief statement by Westerberg\textsuperscript{33},
"... the boy was shifted from one section to the next
every twelve weeks, so that he did some work in each of
the three sections," indicates the simple preciseness with
which some students are moved about on a group rotation
basis. Another experience area was added the following
year and Westerberg continued, "... with four sections,
the shift was made every nine weeks."

The results of a questionnaire study made by Schell,
totaling 51 filled-out returns, indicated a large major-
ity of schools using a plan of group rotation at that
time. From this study Schell listed:

Madison, Wis. The class is divided into
units but no definite rotation exists.
Cleveland, Ohio. All courses start simulta-
neously with no definite rotation followed.
Lansing, Mich. A pupil may begin anywhere
in the cycle.
Richmond, Ind. No definite order of rota-
tion as the pupil chooses his own order of courses
and has individual instruction.

\textsuperscript{32}Schell, J. W., "The General-Shop Problem as the Teacher
\textsuperscript{33}Westerberg, G. B., "Organizing and Equipping a General
The rest of the schools started the student at some specific place. From this point he progressed from one unit to another according to a definite scheme of rotation.34

Another procedure is explained by Miller:

The class is divided equally into departments. The completion of a certain number of job sheets, with answers, is required of each boy before he can pass into the next department. A seventh-grade boy, for instance, must finish five jobs in wood before he can pass to metal, electricity, or general. An eighth grader is required to do eight, and a ninth grader must complete ten in all departments before he is permitted to use a lathe, saw, jointer, or other power machine.35

A plan of group rotation with some flexible provisions for individual development is described by Marshall:

... the boys are allowed one week for each required part of the work. This leaves seven weeks, after all are supposed to have finished the required work, for those who are behind for any reason so that they may have access to the equipment to make up what they need to complete the assignment. The schedule also provides free weeks for each student in which he may elect work in any of the divisions in which work is offered, or in which he may study the related information that accompanies the required jobs.36

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There are some who suggest that the general shop organization should be carried out cautiously and warn against passing the student indiscriminately from one type of work to the next. Mulvey said:

The boy should not be forced to take a large number of activities, but after he has finished the seventh grade, he should be encouraged to devote most or all of his time to the pursuit which he likes best, such as electrical, printing, or any other of the several shop courses offered. If he wishes to execute but one project in each section, he should be at liberty to do so. Until we have had more experience in this work, it is desirable to have as much elasticity as possible.37

There are also plans for individual rotation of the student where every effort is made to meet the demands of individual differences; with this procedure there may or may not be a time limit set. Proffitt has explained:

At the beginning of the term students in the seventh and eighth grades elect one of the shop activities offered, with the understanding that they change to some other shop activity every nine weeks. However, individual differences are taken into consideration relative to the time spent in any shop activity. The more apt students complete the work in less than nine weeks and are transferred at once to another shop activity. They thus complete their rotation in less than two years and are ready to begin specialization earlier than the schedule calls for. The ninth-year students elect any shop activity in which they are most interested and spend either one-half or the entire year in this one line of work.38

Another Plan of individual rotation is outlined by Snaddon:

When a student has completed the required work in a particular group satisfactorily, he changes places with the student in another group who has satisfied the requirements there. This revolving plan provides for a complete variety of experiences for each student. Students help each other over the ordinary beginning difficulties. Requirements as to the kind and quantity of work expected from each student ordinarily must be determined by individual capacities, for slow students do not accomplish as much in each group and as a result could not get around to all groups. Additional assignments are provided for the fast students.39

Starting the General Shop Class

A definite teaching problem, unique in the general-shop plan, is that of starting a new class in the work. One solution has been the extensive use of instruction sheets. Wood mentioned and explained this basic difficulty in an exemplary way:

One of the great difficulties in a general shop is getting the class started. It is here that many a teacher finds he is not a general-shop teacher. No matter how well a teacher may know his subjects or how successful he may be in the manipulation of tools and materials, he must be efficient as an organizer to start simultaneously, let us say, 24 boys in four to six kinds of work. The solution of this problem, of course, is the individual lesson sheet which can be placed in the hands of the pupil along with materials sufficient to meet the requirements of the prob-

lem which he is undertaking. If the lesson sheet is used and a few brief demonstrations are given, the entire class can be put to work and the teacher can circulate from group to group or from individual to individual, with a criticism here, a check there, and a suggestion where most needed, leading an entire class enthusiastically into its work.

The general difficulty encountered is that of securing individual lesson sheets in sufficient quantities to carry on the work. One lone teacher in the time available cannot write enough to supply even a portion of the subjects which should be covered. True it is, there are on the market many valuable sets of lesson sheets relating to different kinds of work, but experience has proved to many who have tried to use them that not all are adapted to particular situations in different localities and, therefore, they are inadequate. 40

The most complete analysis of the various methods commonly used in starting general shop classes has been made by Yager 41. This list was adapted for use in the questionnaire and appears in that condensed form in Appendix B.

CHAPTER III

ANALYSIS OF THE STUDY

Schools in the Study

In this study of recommended general shop programs a total of 127 usable questionnaires were returned, representing secondary schools in 14 of the 22 states west of the Mississippi River. The other eight states were not reached either because they do not maintain teacher-education centers for industrial arts education or because the institutions contacted by the method explained in Chapter I did not respond to the initial request for a list of schools. Graph I displays the geographical distribution of the schools in the survey and the teacher-education institutions. By far the best representation is accorded the Midwestern and the Pacific Coast states.

<table>
<thead>
<tr>
<th>Type of School</th>
<th>No.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior High School (Grades 7-9)</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>Junior-Senior High School (Grades 7-12)</td>
<td>57</td>
<td>45</td>
</tr>
<tr>
<td>Four-Year High School (Grades 9-12)</td>
<td>37</td>
<td>29</td>
</tr>
<tr>
<td>Senior High School (Grades 10-12)</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>127</td>
<td>100</td>
</tr>
</tbody>
</table>
GRAPH I
DISTRIBUTION OF THE CASES IN THE STUDY
AND THE TEACHER-EDUCATION INSTITUTIONS

Key:
- Junior High Schools
- Junior-Senior High Schools
- Four-Year High Schools
- Senior High Schools
- Teacher-Education Institutions
The questionnaires were segregated into four groups according to grade levels to facilitate classification and analysis (see Table I). Of the 127 cases in the study, 22 are junior high schools (grades 7, 8, and 9), 57 are junior-senior high schools (grades 7 to 12), 37 are four-year high schools (grades 9 to 12), and 11 are senior high schools (grades 10, 11, and 12).

A greater number of junior-senior high schools (45\%) appear in the study than was anticipated. Table I shows that the junior high schools and the four-year high schools are more equal in number with preference for the latter (22 to 37). Combining the junior high and the junior-senior high schools gives a sum of 79 schools, or 62 percent of the total in the study. These figures indicate that the higher frequency of general shops is in schools which have the seventh, eighth, and ninth grades. However, it should be pointed out that these figures do also indicate that the major portion is born by the junior-senior high school rather than by the junior high school. The emphasis in the current literature on industrial arts has been on the junior high school and apparently little attention has been directed toward the six-year organization.

The significantly small number of senior high schools reflects the small proportional number of such schools in the area studied and indicates the decreasing frequency with
which general shops are used in the upper grade levels.

**Enrollment - School and Industrial Arts Department**

Information about a greater number of medium-sized schools was received than had been anticipated. The very largest schools have been eliminated from the study; this was done where the report had been made by a director of industrial arts and had not been restricted entirely to one typical general shop from one school in the system.

A few (6) of the schools reporting have more than one school shop -- i.e., a shop other than the one general shop about which information was requested and received. These cases have been included in the tabulations since the report of their general organization adds materially to the volume of data.

Items two and three of the questionnaire were set up to give information about school enrollment and industrial arts enrollment. A glance at the questionnaire (see Appendix B) will show that the enrollment items were blocked off by groups; this was done expressly to facilitate answering by the instructors who had simply to underline the groups within which their particular school and shop enrollment fell. This proved to be an oversight since with this form of data it is not possible to determine the percentage of students enrolled in industrial arts classes. It also pre-
vents a study of the relationship between the percentage of the industrial arts enrollment and the variety of experience areas offer in the general shop.

Table II shows the scatter of industrial arts enrollment but does not reveal any central tendency. This information was reported by 122 of the 127 schools.

**TABLE II**

A Comparison of Industrial Arts Enrollment With Total School Enrollment (122 Schools)

<table>
<thead>
<tr>
<th>School Enrollment</th>
<th>Under 100</th>
<th>101-200</th>
<th>201-300</th>
<th>301-400</th>
<th>Over 401</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ind. Arts Enrollment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 25</td>
<td>5</td>
<td>4*</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>26-50</td>
<td>1</td>
<td>9</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>51-75</td>
<td></td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>76-100</td>
<td></td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>101-150</td>
<td></td>
<td></td>
<td>6</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>151-200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>201-250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Over 250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Read: Four schools with a total enrollment between 101 and 200 had an industrial arts enrollment under 25.

Much of the writing in current literature places the general shop in the junior high school and in the small school. Earlier in this chapter it was pointed out that, in the light of the present data, the majority of the seventh, eighth, and ninth grade general shopwork is in the six-year
high school. If the data are reliable, the general shop is not confined mainly to the small schools of the 51 schools reporting an enrollment over 401, 15 are junior high schools and 20 are junior-senior high schools. In general, the larger communities are the places supporting the separate junior high school. This is not necessarily true of the six-year high school which functions equally as well in the smaller communities, and in consolidated districts, particularly where the separate three-year junior high school is not warranted.

From the information available it seems that the study is working with three general groupings:

1. The junior high school in medium-sized communities.

2. The junior-senior high school (including the junior high grade levels) in communities medium sized to small, including rural localities.

3. The regular four-year and the three-year senior high schools in small to medium-sized communities of either urban or rural nature. The three-year senior high schools, however, are located principally in the medium-sized areas and make relatively less use of the general-shop plan of organization.

Ages of the General Shops and Manner of Organization

Items four and five of the questionnaire refer to the length of time the particular general shop has been in operation and whether it was originally planned and built
as a new general shop or was reorganized from a basic unit shop. Replies to these items were made by 120 instructors. It was found that 66 of the shops had been reorganized from unit shops, while 54 were inaugurated as new general shops.

The significance of this division lies in the principles of good shop planning. Authors writing on the subject much prefer the general shop which can be planned and built in new surroundings, with floor space and facilities entire adapted to fit general shop requirements. This is the trend. Yet these figures show that up to the present more general shops have been created by revamping old shops; it means crowding the equipment for three or four or more experience areas into the same space once occupied by unit equipment.

A comparison of the relative "ages" of these shops (Table III - Part I and Part II) shows that 51.5 percent (34 of 66 shops) of those reorganized from unit shops are two to ten years old; similarly, 74 percent (40 of 54 shops) of those planned and organized as new general shops are one to ten years old. This indicates a significant preference for the shop building or space that is planned and built specifically for a general shop program. Since the requirements might be very different, it can readily be understood that not only must shop space be planned for
a general shop but for a general shop involving certain combinations of experience areas.

The period also encompasses the years of the depression. Inasmuch as educators were determined to continue expanding the offerings of general education, it is interesting to speculate that the general shop organization met both the need of broader experiences and the necessity of a close economy during this period.

Twenty-four of the reorganized shops were planned between 11 and 20 years ago. This goes back to the schools about which Proffitt\(^1\) reported in "Industrial Education in 1924-1926." Only ten of the new general shops were built between 11 and 20 years ago. Eight of these shops are 15 years old, and hence may have been planned as a result of an impetus stimulated by Proffitt's report.

Four reorganized shops and two new general shops were listed as having been put into operation 20 to 25 years ago. Beyond these dates there were also six shops in the two groups listed as being 30 to 35 years old. There are historically few shops on the general shop plan which have been operating that long. By reason of the method used to obtain the relative ages of these shop programs, it is

TABLE III (Part I)

Showing the Ages of the General Shops
Reorganized from Unit Shops (Total 66)

<table>
<thead>
<tr>
<th>No. of Years in Operation</th>
<th>No. of Shops</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
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<td>10</td>
<td>3</td>
<td>4.5</td>
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<tr>
<td>12</td>
<td>4</td>
<td>6</td>
</tr>
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<td>14</td>
<td>2</td>
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<td>15</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>1.5</td>
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<tr>
<td>20</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>35</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
TABLE III (Part II)

Showing the Ages of the General Shops Planned and Organized as New Shops (Total 54)

<table>
<thead>
<tr>
<th>No. of Years in Operation</th>
<th>No. of Shops</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
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<td>5.5</td>
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<tr>
<td>8</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
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<td>4</td>
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<td>15</td>
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<td>5.5</td>
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<td>20</td>
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<td>25</td>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
doubtful whether these cases are correct; there is little or no effect upon the present study by these numerically few cases.

**Variety of General Shop Offerings**

The data from the 127 schools show 54 different industrial arts experience areas or units being taught in general shop courses (see Table IV). The frequency with which these occur is affected somewhat by terminology and by the probable difference in emphasis as indicated below.

For example, because woodworking is still a major industrial arts subject, it may be taught as a unit shop subject and not appear as an area in a general shop course. It also must be remembered that a school listing seven or eight experience areas does not usually offer all of them in each "course." No attempt was made in this study to determine the optimum number of experience areas to offer within a given class period.

Woodworking leads the list of experience areas by appearing in 94.5 percent of the general shop courses. This is followed by mechanical drawing (88%), woodfinishing (79%), sheet metal (77%), and electricity (72%). These five areas lead the list of experience areas offered by the 127 schools.
Apparently not all instructors consider woodfinishing as a separate area which would account for the lower rank of that subject. Mechanical drawing is another subject which may be offered as a unit shop course separate from the general shop offerings. One instructor states that mechanical drawing did not work out as an area carried on simultaneously with the other activities. His compromise method is to have drawing two days a week for all, in a separate drawing room. The other three days are spent in the shop experiences.

Bench metal appears in slightly more than one-half (54%) of the schools. Machine shop, ornamental iron work, and forging are offered in slightly more than one-third of the schools. Here differences in emphasis or in terminology definitely show a variation in ranking. Many operations under bench metal might be included in machine shop, ornamental iron work, and vice versa. Also in the case of machine shop the total facilities vary from one or two metal-turning lathes to a complete line of metal-working equipment.

Art-metal work is offered in one-half of the schools. Home mechanics (46%) follows closely.

One-third of the schools offer carpentry and welding. These compare with machine shop, ornamental iron work, and forging. Leathercraft follows with 31 percent.
### TABLE IV

Experience Areas Offered
(127 Shops)

<table>
<thead>
<tr>
<th>Experience Areas*</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodworking</td>
<td>120</td>
<td>94.5</td>
</tr>
<tr>
<td>Mechanical Drawing</td>
<td>112</td>
<td>88</td>
</tr>
<tr>
<td>Woodfinishing</td>
<td>100</td>
<td>79</td>
</tr>
<tr>
<td>Sheet Metal</td>
<td>98</td>
<td>77</td>
</tr>
<tr>
<td>Electricity</td>
<td>92</td>
<td>72</td>
</tr>
<tr>
<td>Bench Metal</td>
<td>69</td>
<td>54</td>
</tr>
<tr>
<td>Art Metal</td>
<td>63</td>
<td>50</td>
</tr>
<tr>
<td>Home Mechanics</td>
<td>58</td>
<td>46</td>
</tr>
<tr>
<td>Forging</td>
<td>49</td>
<td>38</td>
</tr>
<tr>
<td>Machine Shop</td>
<td>48</td>
<td>38</td>
</tr>
<tr>
<td>Ornamental Iron</td>
<td>46</td>
<td>36</td>
</tr>
<tr>
<td>Carpentry</td>
<td>42</td>
<td>33</td>
</tr>
<tr>
<td>Welding</td>
<td>42</td>
<td>33</td>
</tr>
<tr>
<td>Leathercraft</td>
<td>39</td>
<td>31</td>
</tr>
<tr>
<td>Architectural Drawing</td>
<td>33</td>
<td>26</td>
</tr>
<tr>
<td>Plastics</td>
<td>29</td>
<td>23</td>
</tr>
<tr>
<td>Auto Mechanics</td>
<td>21</td>
<td>16.5</td>
</tr>
<tr>
<td>Foundry</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Plumbing</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Farm Mechanics</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>Ceramics</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Printing</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Art Fibre</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Concreteswork</td>
<td>7</td>
<td>5.5</td>
</tr>
<tr>
<td>Photography</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Woodturning</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Bookbinding</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Woodcarving</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Tin-can Craft</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Radio</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Harness Repairing</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Shoe Repairing</td>
<td>2</td>
<td>1.5</td>
</tr>
</tbody>
</table>

* Experience areas which were mentioned only once are not included in the table.
Architectural drawing appears in one-fourth (26%) of the cases, but in no instance in the junior high school. Plastics, a rather new material in industrial arts, is being used in nearly one-fourth (23%) of the schools.

Auto mechanics, foundry, plumbing, and farm mechanics range from 16.5 percent to 11 percent. Other areas appearing six to ten times are ceramics, art-fibre, concrete-work, and photography.

The following seven areas occur two to four times: woodturning, bookbinding, woodcarving, tin-can craft, radio, shoe repairing, and harness repairing.

Others receiving mention only once are Kenne's cement-craft, aeronautics, aero-mechanics, girls' homecraft, machine woodwork, patternmaking, masonry, brush-making, glazing, ropework, jewelry, lapidary, linoleum block-printing, metal spinning, cord-knotting, toolmaking, and beadwork. Most of the smaller areas are doubtless included by many instructors under woodworking, drawing, art metal, and the like.

The Leading Experience Areas Classified by Schools

A further study of the 22 junior high schools (grades 7, 8, and 9) shows the same five experience areas appearing with highest frequency. Woodworking is given in all of the
A COMPARISON OF THE FIVE LEADING EXPERIENCE AREAS

PART 1 - WOODWORKING

Schools:  
- Junior High
- Junior-Senior High
- Four-Year High
- Senior High
- Total Schools

PART 2 - MECHANICAL DRAWING

- Junior High
- Junior-Senior High
- Four-Year High
- Senior High
- Total Schools

PART 3 - WOODFINISHING

- Junior High
- Junior-Senior High
- Four-Year High
- Senior High
- Total Schools

PART 4 - SHEET METAL

- Junior High
- Junior-Senior High
- Four-Year High
- Senior High
- Total Schools

PART 5 - ELECTRICITY

- Junior High
- Junior-Senior High
- Four-Year High
- Senior High
- Total Schools
junior high schools; mechanical drawing, woodfinishing, and sheet metal in 86 percent; and electricity in 77 percent of the cases.

In the 57 junior-senior high schools (grades 7 to 12) woodworking ranks first (96.5%); mechanical drawing ranks a close second (95%), followed by sheet metal (81%), electricity (79%), and woodfinishing (77%).

A similar arrangement of the 37 four-year high schools (grades 9 to 12) shows woodworking ranking first again (95%), mechanical drawing and woodfinishing (86.5%), sheet metal and electricity (65%).

However, in the 11 senior high schools (grades 10 to 12), sheet metal appears foremost (82%), followed by woodworking and machine shop (73%). These are followed by mechanical drawing and bench metal (64%). Electricity is offered in slightly over one-half (54.5%) of the senior high schools.

These data are presented in Graph 2 for purposes of comparison between the four school groups.

**Industrial Arts as a Required Subject**

Industrial arts work is required in quite a high percentage of the cases so that all grades are represented in some degree. It is required in the seventh and ninth
grades in approximately three-fourths (73% and 78% respectively) of the schools reporting; slightly more than four-fifths (83.5%) of the schools require shopwork in the eighth grade. The study also shows that industrial arts is required in the tenth grade, 63 percent; eleventh grade, 50.5 percent; and twelfth grade, 49.5 percent.

The figures for the seventh grade compare favorably with a similar study made by Leaf\(^2\), using small schools east of the Mississippi River (communities under 5000 population). The figures from the present study show the eighth grade requirements to be somewhat higher. The fact that a few of the junior high schools do not require shopwork in the seventh grade but do require it in the eighth grade will account for a part of the variation. However, the two studies differ widely on ninth grade requirements.

Further data presented in Table V show industrial arts required in the seventh and eighth grades together by 62 percent of the schools. This figure represents 54.5 percent of the junior high schools and 65 percent of the junior-senior high schools. A further tabulation reveals that shopwork is required in grades 7, 8, and 9 in about half (48%) of the schools. This represents 27 percent of the junior high schools and 58 percent of the junior-

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senior high schools. In both of these comparisons the junior high grade levels have stood very high in the matter of required courses. This should account to quite an extent for the greater number of junior-senior high schools reported in the study as compared to the number of other schools.

In general, the elective classes are reserved to quite a degree for the upper grades. Yet it is interesting to find that for a combination of grades 7, 8, 9, and 10 (from junior-senior high schools), industrial arts is required in 49 percent of the cases for these consecutive years. This result does not agree with any reports found in current literature. It is very probably a direct result of the war effort and a "stepped-up" defense training program. Many schools during the past school year incorporated Pre-Induction Training courses into their industrial arts program; this effect coupled with the general impetus of defense training throughout the country during the past two or three years could have had a direct bearing upon an increasing industrial arts requirement for the higher grade levels. The high percentage of required industrial arts subjects in all of the upper grades may be a definite record of such an influence.
TABLE V

Required Courses in Industrial Arts

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>Schools Requiring</th>
<th>Total Schools</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>58</td>
<td>79</td>
<td>73</td>
</tr>
<tr>
<td>8</td>
<td>66</td>
<td>79</td>
<td>83.5</td>
</tr>
<tr>
<td>9</td>
<td>81</td>
<td>116</td>
<td>78</td>
</tr>
<tr>
<td>10</td>
<td>66</td>
<td>105</td>
<td>63</td>
</tr>
<tr>
<td>11</td>
<td>53</td>
<td>105</td>
<td>50.5</td>
</tr>
<tr>
<td>12</td>
<td>52</td>
<td>105</td>
<td>49.5</td>
</tr>
<tr>
<td>7 and 8</td>
<td>49</td>
<td>79</td>
<td>62</td>
</tr>
<tr>
<td>7, 8, and 9</td>
<td>39</td>
<td>79</td>
<td>49</td>
</tr>
<tr>
<td>7, 8, 9, and 10</td>
<td>28</td>
<td>57</td>
<td>49</td>
</tr>
</tbody>
</table>

The Selection of Required Courses Is Varied

The courses or experience areas required in the general shops are reported in considerable variety. A total of 29 separate areas are mentioned as being required at some grade level among the schools in this study. Graph 3 shows the 12 most frequently required areas and the percentage of the total schools requiring each.

The balance of the courses is here reported in descending order: plastics, welding, carpentry, architectural drawing, foundry, woodturning, printing, auto mechanics, ceramics, art fibre, plumbing, farm mechanics, bookbinding, masonry, machine woodwork, radio, and general mechanics.
GRAPH 3

THE TWELVE LEADING REQUIRED COURSES

WOODWORKING
MECHANICAL DRAWING
SHEET METAL
ELECTRICITY
WOODFINISHING
BENCH METAL
LEATHERCRAFT
HOME MECHANICS
ART METAL
ORNAMENTAL IRON WORK
FORGING
MACHINE SHOP

Per cent
0 10 20 30 40 50
Length of Class Periods Where Classes Meet Daily

The amount of time devoted to industrial arts work varies considerably between schools. The length of the class period for classes that meet daily ranged from 40 minutes to 120 minutes. Table VI shows that by far the greatest percentage of schools operate on a 60-minute period with the two extremes of negligible importance. Fifty-minute periods and 55-minute periods are used to quite an extent, particularly in the seventh and eighth grades. The spread through the grades is fairly uniform.

TABLE VI

Length of Periods for Classes Meeting Daily and the Percentage of the Grade Levels Involved

<table>
<thead>
<tr>
<th>Length of Period</th>
<th>7th</th>
<th>8th</th>
<th>9th</th>
<th>10th</th>
<th>11th</th>
<th>12th</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 min.</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>45</td>
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<td>7</td>
<td>4</td>
<td>3</td>
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<tr>
<td>50</td>
<td>15</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>52</td>
<td>*</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>53</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>55</td>
<td>15</td>
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<td>56</td>
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<td>2</td>
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<tr>
<td>57</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>60</td>
<td>52**</td>
<td>53</td>
<td>58</td>
<td>60</td>
<td>56</td>
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<tr>
<td>65</td>
<td>2</td>
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</tr>
<tr>
<td>80</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>90</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>4</td>
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</tr>
<tr>
<td>120</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Blank spaces indicate no responses.
**Read: 52 percent of the schools have 60 minutes per period for the seventh grade.
Average Length of Class Periods

Table VII shows the average length of period by grades, where the classes meet five days per week. Seventh and eighth grade classes were reported with a range of 40 to 65 minutes per period with an average of 56 minutes. The ninth to twelfth grades run the full gauntlet of 40 to 120 minutes, averaging close to 60 minutes.

TABLE VII
Range and Average Length of Period by Grades (Classes meet daily)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>40-65 minutes</td>
<td>56 minutes</td>
</tr>
<tr>
<td>8</td>
<td>40-65</td>
<td>56</td>
</tr>
<tr>
<td>9</td>
<td>40-120</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>40-120</td>
<td>61</td>
</tr>
<tr>
<td>11</td>
<td>40-120</td>
<td>61</td>
</tr>
<tr>
<td>12</td>
<td>40-120</td>
<td>61</td>
</tr>
</tbody>
</table>

A somewhat different picture is presented when the average length of period is considered on the basis of school groups. Table VIII shows the average length of period (where classes meet daily) is 52 minutes for the junior high school, 60 minutes for the junior-senior high school, 61.5 minutes for the four-year high school, and 64
minutes for the senior high school. This obvious increase in the length of the class periods from the junior high school to the senior high school indicates a greater allotment of time in the later years for specialization. In many schools throughout the states this, of course, means a longer school day for the upper grades.

**TABLE VIII**

Range and Average Length of Period by School Groups (Classes meet daily)

<table>
<thead>
<tr>
<th>School</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior High School</td>
<td>40-60 min</td>
<td>52 min</td>
</tr>
<tr>
<td>Junior-Senior High School</td>
<td>40-120</td>
<td>60</td>
</tr>
<tr>
<td>Four-Year High School</td>
<td>45-90</td>
<td>61.5</td>
</tr>
<tr>
<td>Senior High School</td>
<td>50-120</td>
<td>64</td>
</tr>
</tbody>
</table>

**Time Allotment Per Week for Daily Classes**

The average allotment per week for the study of industrial arts increases gradually from 280 minutes for the seventh grade to 304 minutes in the twelfth grade. This calculation parallels the allotment per day for classes meeting daily. In comparing these figures (Table IX) with those determined by Leaf it was found that the allotment

for the seventh grade in this study is considerably higher and for the twelfth grade is somewhat lower.

Table X shows that when average weekly time allotments are classified by school groups there is a considerable increase in time for senior high schools, involving those years rather generally devoted to some degree of specialization. By school groups the increase is from 261 minutes per week for the junior high school to 321 minutes in the senior high school.

One difference noticeable in Table X is the difference between the weekly time allotment for junior high schools and for junior-senior high schools. This difference is not apparently in Table IX. It results principally from the fact that the seventh, eighth and ninth grades of the junior-senior high schools have periods more in line with the upper grades. On the other hand, the ninth grade period of the junior high school has a tendency to be in line with the shorter period of the seventh and eighth grades. It should be safe to state that the student in the average junior-senior high school is given more time to apply upon his industrial arts work; it is in 65 percent of these schools (see page ) that the work is required in seventh and eighth grades, and in half of this group the work is required in three grades: 7, 8, and 9. This consideration is still more conclusive when it is re-
### TABLE IX

Range and Average Time Allotment Per Week for Classes Meeting Daily

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>200-325 min.</td>
<td>280 min.</td>
</tr>
<tr>
<td>8</td>
<td>200-325</td>
<td>281</td>
</tr>
<tr>
<td>9</td>
<td>200-600</td>
<td>301</td>
</tr>
<tr>
<td>10</td>
<td>200-600</td>
<td>304</td>
</tr>
<tr>
<td>11</td>
<td>200-600</td>
<td>304</td>
</tr>
<tr>
<td>12</td>
<td>200-600</td>
<td>304</td>
</tr>
</tbody>
</table>

### TABLE X

Range and Average Weekly Allotment for School Groups (Classes Daily)

<table>
<thead>
<tr>
<th>School</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior High School</td>
<td>200-300 min.</td>
<td>261 min.</td>
</tr>
<tr>
<td>Junior-Senior High School</td>
<td>200-600</td>
<td>297</td>
</tr>
<tr>
<td>Four-Year High School</td>
<td>225-450</td>
<td>308</td>
</tr>
<tr>
<td>Senior High School</td>
<td>250-600</td>
<td>321</td>
</tr>
</tbody>
</table>
peated that, according to the findings of this study, one-half of the junior-senior high schools require industrial arts work in grades 7, 8, 9, and 10.

**Time Allotment for Classes not Meeting Daily**

There are a few instances in which the industrial arts classes do not meet on a daily basis. There are cases of junior-senior high schools which hold seventh and eighth grade classes two or three times per week while grades nine to twelve in the same school meet daily. For example, the seventh grade meets twice a week, alternating with the eighth grade; the other grades meet daily during different periods in the schedule. These serve to emphasize the differences between some of the schools in various parts of the country.

Table XI shows these few cases, appearing at random among the schools studied, where classes meet only two or three times per week. The shortest class period registered in this study was 40 minutes; scheduled to meet twice a week, this means an allotment of 80 minutes per week which is quite below the junior high school average of 261 minutes per week.

In summary, the entire range in the length of class periods for the schools in the study is from 40 minutes to 120 minutes, increasing fairly gradually. The range of weekly time allotments is 80 minutes to 600 minutes per week.
### TABLE XI
Cases of Industrial Arts Classes Which Do Not Meet on a Daily Basis

<table>
<thead>
<tr>
<th>Number of Cases</th>
<th>Grades</th>
<th>Length of Period</th>
<th>Meetings per Week</th>
<th>Weekly Allotment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>7, 8</td>
<td>40 min.</td>
<td>2</td>
<td>80 min.</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>45</td>
<td>3</td>
<td>90</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>45</td>
<td>2</td>
<td>135</td>
</tr>
<tr>
<td>1</td>
<td>7, 8, 9</td>
<td>50</td>
<td>3</td>
<td>150</td>
</tr>
<tr>
<td>1</td>
<td>7, 8</td>
<td>55</td>
<td>2</td>
<td>110</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>55</td>
<td>3</td>
<td>165</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>57</td>
<td>2</td>
<td>114</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>57</td>
<td>3</td>
<td>171</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>60</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>60</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>60</td>
<td>3</td>
<td>180</td>
</tr>
</tbody>
</table>

*Read: One school schedules grades 7 and 8 for 40-minute periods twice a week, making a weekly allotment of 80 minutes.

### Time Scheduled for Required Courses

Another aspect of time allotment has to do with the amount of time scheduled in the course of study or in the general shop organization for accomplishing the courses or experience areas designated as **required**. These allotments were found to vary considerably for the various required courses. In all grades the range reported was from five hours (one hour daily for one week) to 180 hours (one hour daily for 36 weeks). The average time scheduled for all
units in all grades combined was found to be 60 hours, or the equivalent of one hour daily for 12 weeks. This figure also is the average time for the ninth grade.

The amount of time designated for a particular area depends upon the emphasis placed upon it by the instructor, the number of total experience areas being taught in the one class, the amount of equipment and work stations provided, the number of years in which shopwork is required, and the general sequence of the required courses. At any rate, the variables are sufficiently prominent that it is not surprising to find such a difference in the time allotment for required courses.

**TABLE XII**

Average Time Allotments for Required Areas in Grades 7 to 12

<table>
<thead>
<tr>
<th>Grades:</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>All Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Time in Hours</td>
<td>50*</td>
<td>40</td>
<td>60</td>
<td>54</td>
<td>78</td>
<td>77</td>
<td>60</td>
</tr>
</tbody>
</table>

*Read: The average time allowed for completing a required experience area in the 7th grade is 50 hours.*

On the basis of averages (see Table XII) it is indicated that more experience areas are required during a school year in the lower grades, providing a wider exploratory range and richer experiences by way of a variety of
contacts with tools and materials. The average for all grades is 60 hours per experience area (one hour daily for 12 weeks). Seventh, eighth, and tenth grades are below the average, 50, 40, and 54 hours respectively. Ninth grade shows an average of 60 hours. Averages of 78 and 77 hours for grades 11, and 12, respectively, indicate that longer time allotments in the upper grades give a longer concentration upon a fewer number of areas, permitting a fuller experience within each area. There was a high concentration upon 90-hour or semester units in the 11th and 12th grades, particularly.

Work Stations

Because of the variety of equipment used in general shops, it seemed necessary to investigate the types and number of work stations characteristically provided for the different experience areas.

The following definition was attached to Item 8 of the questionnaire for the purposes of this study: A work station is a workbench, a machine, or other suitable equipment at which a student works a good share of his time.

In Table XIII the percentage of shops equipped with the various work stations are shown. The woodworking bench is the station universally common to most shops as shown by this and other studies. Many activities besides woodwork-
ing are carried out on them, namely, drawing, craftwork, printing, simple electrical work, and the like with but little adaptation.

No senior high school reported using any type of combination bench. None of the junior high school shops had work stations for auto mechanics and welding. No provision was made to segregate oxy-acetylene welding equipment from the electric welding but comments by the instructors reporting indicated the ratio must be nearly 8 to 1 for gas welding.

The average number of work stations of each type in each shop is tabulated in Table XIV. In comparison with the other types listed there is generous provision for woodworking and drawing. This is distinctly a carry-over from the unit shop. It means also that the woodworking bench can be and is put to a wide variety of uses. As for drawing, however, nothing is quite as satisfactory as desks designed especially for drawing.

The last several work stations listed in Tables XIII and XIV, from suggestions made by the instructors, by no means exhaust the list of special equipment used in various general shops, any of which might qualify in this category of work stations. Particularly for Table XIV there are not sufficient cases of these miscellaneous and less common items to give a reliable figure as to the average number of work stations.
TABLE XIII
Types of Work Stations
(124 Shops)

<table>
<thead>
<tr>
<th>Type of Work Stations</th>
<th>No. of Shops</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodworking Bench</td>
<td>117</td>
<td>94*</td>
</tr>
<tr>
<td>Metalworking Bench</td>
<td>107</td>
<td>86</td>
</tr>
<tr>
<td>Combination Wood and Metalworking Bench</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Electrical Bench</td>
<td>78</td>
<td>63</td>
</tr>
<tr>
<td>Drawing Bench</td>
<td>96</td>
<td>77</td>
</tr>
<tr>
<td>Auto Mechanic Bench</td>
<td>18</td>
<td>14.5</td>
</tr>
<tr>
<td>Foundry Bench</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>Wood Lathe</td>
<td>99</td>
<td>80</td>
</tr>
<tr>
<td>Machine Lathe</td>
<td>48</td>
<td>39</td>
</tr>
<tr>
<td>Forge</td>
<td>57</td>
<td>46</td>
</tr>
<tr>
<td>Welding (gas and arc)</td>
<td>42</td>
<td>34</td>
</tr>
<tr>
<td>Shaper (metal)</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Milling Machine</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Printing Bench</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Ceramics Bench</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Radio Bench</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Bookbinding Bench</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Leathercraft Bench</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Basketweaving Bench</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Combination Bench for Crafts, Electricity</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>and Metal Work</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Read: 94% of the shops have woodworking benches.
### TABLE XIV

**Average Number of Work Stations**

<table>
<thead>
<tr>
<th>Type of Work Station</th>
<th>Av. No. of Work Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodworking Bench</td>
<td>16*</td>
</tr>
<tr>
<td>Metalworking Bench</td>
<td>7</td>
</tr>
<tr>
<td>Combination Wood and Metalworking Bench</td>
<td>4</td>
</tr>
<tr>
<td>Electrical Bench</td>
<td>6</td>
</tr>
<tr>
<td>Drawing Bench</td>
<td>16</td>
</tr>
<tr>
<td>Auto Mechanic Bench</td>
<td>4</td>
</tr>
<tr>
<td>Foundry Bench</td>
<td>2</td>
</tr>
<tr>
<td>Wood Lathe</td>
<td>2</td>
</tr>
<tr>
<td>Machine Lathe</td>
<td>2</td>
</tr>
<tr>
<td>Forge</td>
<td>1</td>
</tr>
<tr>
<td>Welding Outfit (gas and/or arc)</td>
<td>3</td>
</tr>
<tr>
<td>Shaper (metal)</td>
<td>1</td>
</tr>
<tr>
<td>Milling Machine</td>
<td>1</td>
</tr>
<tr>
<td>Printing Bench</td>
<td>7</td>
</tr>
<tr>
<td>Ceramics Bench</td>
<td>4</td>
</tr>
<tr>
<td>Radio Bench</td>
<td>8</td>
</tr>
<tr>
<td>Bookbinding Bench</td>
<td>3.5</td>
</tr>
<tr>
<td>Leathercraft Bench</td>
<td>5</td>
</tr>
<tr>
<td>Basketweaving Bench</td>
<td>2</td>
</tr>
<tr>
<td>Combination Bench for Crafts, Electricity, and Metal Work</td>
<td>12</td>
</tr>
</tbody>
</table>

*Read: The average shop will have 16 work stations at the woodworking benches.*
Rotation to the Several Experience Areas

Very little descriptive information is found in current literature regarding the methods used in passing the student from one experience area to another in the general shop set-up. It is quite definitely a problem for the individual instructor to solve satisfactorily for his particular shop situation. Item 10 -- Methods of rotating students through the units or experience areas -- contained five parts requesting information about methods of rotation.

TABLE XV
Percentage of General Shops
Using Some Definite Plan of Rotation
(107 Shops)

<table>
<thead>
<tr>
<th>School Group</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior High Schools</td>
<td>65</td>
</tr>
<tr>
<td>Junior-Senior High Schools</td>
<td>78</td>
</tr>
<tr>
<td>Four-Year High Schools</td>
<td>67</td>
</tr>
<tr>
<td>Senior High Schools</td>
<td>75</td>
</tr>
<tr>
<td>Total Schools</td>
<td>72</td>
</tr>
</tbody>
</table>

In Table XV, 72 percent of the 107 instructors reporting on this item use some form of regular rotation to the various areas during the semester. The remaining 28 percent have no regular plan or so stated.
There is some variation noted among the four groups of schools; more than three-fourths (78%) of the junior-senior high schools and just three-fourths of the senior high schools have a definite rotation plan. The four-year high school and the junior high school groups follow with 67 percent and 65 percent, respectively.

The principle back of most plans of rotation is essentially the same, but the details usually must vary to suit the needs of the particular shop situation. Part "b" of Item 10 asked: Is the rotation based on accomplishment of work assignment or a "contract"?

In a majority of the shops (68%) the plan of rotation was based upon the completion of a certain apportionment of work or upon a contract. Table XVI compares the four school groups with each other and with the total ranking.

TABLE XVI

Rotation Based Upon
Specified Assignment or Contract
(Figures indicate percentages)

<table>
<thead>
<tr>
<th>Schools:</th>
<th>Junior High</th>
<th>Junior-Senior High</th>
<th>Four-Year High</th>
<th>Senior High</th>
<th>Total Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>69*</td>
<td>67</td>
<td>73</td>
<td>57</td>
<td>68</td>
</tr>
<tr>
<td>NO</td>
<td>31</td>
<td>33</td>
<td>27</td>
<td>43</td>
<td>32</td>
</tr>
</tbody>
</table>

*Read: 69% of the junior high school general shop instructors base the rotation to various experience areas upon a work assignment or contract; 31% do not.
Group Rotation Versus Individual Rotation

The mechanical process of moving the students from area to area is accomplished either by exchanging one group with another or by moving the individuals. The decision as to who is to move must be determined beforehand in the best interests of the individual or of the group. It would be unfair to presume that rotation, whether by groups or by individuals, is carried out unmindful of those interests.

Yet, one instructor commented that his main effort is to keep all stations filled. There was no clarifying statement to reveal just how well each assignment to a different station was "related" to the previous job. The experiences of the writer in teaching general shop indicate that the mechanical part of rotation is apt to overshadow the real objective of providing the fullest training for every student. It is one thing to keep all the shop facilities in use and it is quite another problem to use those facilities so that the various steps in a boy's progress are related, if possible, in some manner that he (the boy) can understand.

The figures in Table XVII show by the totaled data of all the schools that about half (51%) use a plan of individual rotation. Group rotation is preferred by 45 percent,
**TABLE XVII**

Methods of Rotation  
(Given in Percentages)

<table>
<thead>
<tr>
<th>Schools:</th>
<th>Junior High</th>
<th>Junior-Senior High</th>
<th>Four-Year High</th>
<th>Senior High</th>
<th>Total Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Rotation</td>
<td>50*</td>
<td>44</td>
<td>62</td>
<td>56</td>
<td>51</td>
</tr>
<tr>
<td>Group Rotation</td>
<td>45.5</td>
<td>50</td>
<td>35</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td>Both Methods Used</td>
<td>4.5</td>
<td>6</td>
<td>3</td>
<td>**</td>
<td>4</td>
</tr>
</tbody>
</table>

*Read: 50% of the junior high school general shop instructors use a plan of individual rotation. The other items read the same way.

**No response in this bracket.**
while the remaining 4 percent use both group and individual methods. This latter preference appears principally in the junior-senior high schools, noted later.

The schools of the upper grades reveal a strong preference for individual rotation methods. Individual rotation is used by 56 percent of the senior high schools. None of this group make use of a combination of both methods. Three-fifths (62%) of the four-year high schools use individual rotation. Use of both plans is made by three percent. In these upper grades where there is a greater degree of specialization it is to the advantage of the student when he is permitted to change to a different area at the time his individual needs require it, without waiting for the balance of the group.

Half of the junior high schools follow individual rotation; 4.5 percent (one case) use both plans.

The data on the junior-senior high schools (covering a wider span of grade levels) show a slightly different emphasis. Less than half (44%) of this group follow rotation by individuals; half use group rotation; the balance (6%) make use of both methods. In point of numbers these cases using both methods are few, but deserve some attention. In the light of data on the other school groups it seems reasonable to expect that a school serving grade levels seven to 12 within the same organization needs a greater variety of method.
Rotation Based Upon a Time Period

A majority of the general shops use a plan of rotation based to a considerable extent upon a certain time period. This was determined by Item 10e which requested: If the rotation is based on time period, indicate the amount by number of weeks.

Use of a definite time period for rotation was acknowledged by 109 of the instructors reporting. However, there was considerable variety in the length of the time period as reported. Some indicated that no definite time has been set; others indicated the time limit as optional, depending upon the individual student and the project. This, of course, correlates with individual rotation plans. In many instances not all of the experiences are necessarily given the same emphasis so far as the length of time is concerned. These are discussed more at length later.

Another case states the time period as depending upon the number of experience areas being offered in that grade level; in this particular school the division was: seventh grade, nine weeks with four areas divided equally; eighth grade, 12 weeks with three areas; and ninth grade, 18 weeks with two experience areas.

Generally, in the lower grades of the junior-senior high school the rotation time periods were shorter than in
the upper grades of the same school. This is rather typical of the cases where extraneous comments were added to clarify the meaning of the responses. However, since no attempt was made in the questionnaire to separate the grades within the junior-senior high school, this fact does not show up in the tabulated data.

There was considerable variation registered within some school shops as to the length of the various time periods during the year. The following are examples of the varied lengths of time used to accomplish different phases of the work: one to twelve weeks, two to nine weeks, three to six weeks, nine to twelve weeks. Hence, time periods may vary from one week to twelve weeks for an area of work.

Of the 109 schools tabulated in Item 10e this "variable" and indefinite time period group accounts for 32 percent of the cases.

Where shops are organized into specified single time periods, the six-week period is followed in 28.5 percent of the total cases; 25 percent of the schools are divided into nine-week periods. Graph 4 presents the comparisons of these three major choices classified by school groups and for the total cases. Periods of three weeks, seven weeks, twelve weeks, and eighteen weeks show with lesser frequency: 1 percent, 1 percent, 5.5 percent, and 7 percent, respectively.
GRAPH 4

COMMON TIME PERIODS USED IN ROTATION

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Rotation Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior High Schools</td>
<td>Rotation period of six weeks.</td>
</tr>
<tr>
<td>Junior-Senior High Schools</td>
<td>Rotation period of nine weeks.</td>
</tr>
<tr>
<td>Four-Year High Schools</td>
<td>Rotation period of variable time.</td>
</tr>
<tr>
<td>Senior High Schools</td>
<td></td>
</tr>
<tr>
<td>Total Schools</td>
<td></td>
</tr>
</tbody>
</table>

Per cent

0 10 20 30 40 50 60
In the junior high schools time periods of nine weeks are most frequent, showing nearly half (47%) of the cases. This is followed by the group using variable time periods, mentioned above, in 32 percent of the junior high school cases. Other periods listed were: six weeks, 16 percent, and 18 weeks, 5 percent.

In the junior-senior high schools 39 percent show in the variable group. This percentage no doubt helps to account for the variation in shop organization, noted above, that appears between the upper and lower grades. The six-week period commands a majority of the cases for the specific time periods with a percentage of 31; this is followed by the nine-week period, 14 percent. Others listed are: three weeks, 2 percent; 12 weeks, 8 percent, and 18 weeks, 6 percent.

The variable time period and the six-week period appear equally (27%) in the four-year high school. These are followed closely by the nine-week period, 24 percent. Others mentioned are: seven weeks, 3 percent; 12 weeks, 6 percent; and 18 weeks, 12 percent.

One-half (50%) of the senior high schools show preference for using six-week rotation periods. The nine-week period shows a percentage of 37.5 and the variable rotation period only 12.5 percent in this instance. No other preferences were listed.
These data show a definite majority for relatively long and specific nine-week periods for rotation through the experience areas in the junior high school. The other three school groups show a decided preference for the six-week periods.

With the exception of the senior high school group, the shops using rotation periods of various lengths feature in a high percentage of the cases. Such latitude permits of planning in line with goals set up for the particular shop and in the interests of the pupils; the division of time need not be an arbitrary mathematical matter.

In the four-year high school little difference appears between the variable, the six-week, and the nine-week periods.

Other time periods have little significance in any of the groups in comparison with those mentioned.

Item 12 asked: How many weeks does the rotation period cover? It is mentioned at this time because of its similarity to Item 10e, just discussed. The inquiry was neither sufficiently explanatory nor sufficiently different to merit very many responses for tabulation; consequently, it has been eliminated from the analysis.
Participation of Beginning Classes

The matter of organization in beginning classes was taken up in Item 11 by asking the following question: Does the entire beginning class participate in the same experience area for a full period (such as a semester) without rotation?

No attempt was made to determine the length of this preliminary period; the object was simply to learn whether there is any material difference in the organization of beginning classes as compared with advanced classes.

**TABLE XVIII**

Percentage of Schools Starting the Beginning General Shop Classes in a Single Experience Area for the First Period of Instruction

<table>
<thead>
<tr>
<th>Schools:</th>
<th>Junior High</th>
<th>Junior-Senior High</th>
<th>Four-Year High</th>
<th>Senior High</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>45*</td>
<td>44</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>NO</td>
<td>55</td>
<td>56</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

*Read: 45% of the junior high school general shop classes are organized so that the beginning classes work entirely in the same experience area for a full period without rotation.*

Table XVIII shows the preferences of the separate school groups. A greater number of the junior high and junior-senior high school general shops follow this plan. This might be expected since these two school groups in-
volve the major portion of the "beginning" classes, while the senior high school would have comparatively few.

According to preferences expressed about rotation, as in the case of the junior high school, the length of this preliminary starting period is most commonly six or nine weeks.

The fact that 44 percent of the beginning classes of the junior-senior high school participate wholly in one area indicates, again, a reason for such a high preference for the "variable" rotation period illustrated in Graph 4. If the study had separated the junior and senior grades, the two pictures may have been quite different.

Opinions on General Shop Organization

Item 13 proposed a problem in the organization of a junior high school general shop with four experience areas as follows:

13. Suppose there were four areas (such as wood, metal, electricity, and drawing) in a general shop, but not enough work stations for an entire class to work at the same activity at the same time.

Which would you recommend: A or B? Check one.

A. That the seventh graders rotate each nine weeks in four groups through the four areas; Then, when in the eighth grade, rotate through the same areas again. Each pupil receives a total of 18 weeks instruction in each area during the two-year period, but in two 9-week "doses."
B. That the pupils in each of the four groups remain in the same area for a full semester. Each pupil receives continuous instruction for 18 weeks in each of the four areas, during the two-year period.

The opinions registered upon the two alternatives proposed in this problem are about even. The responses from 20 junior high school instructors show 11 favoring plan A and 9 favoring plan B. Of 55 junior-senior high schools the general shop instructors of 30 schools favor plan A. A slightly greater emphasis is placed on plan B by the four-year high schools at a rate of 19 for plan B and 16 for plan A. The ten senior high schools are evenly divided on the question.

It is shown in Table XIX that of the 120 total responses 62 favor plan A and 58 favor plan B with no indication of any major trends among any of the groups.

<table>
<thead>
<tr>
<th>Schools:</th>
<th>Junior High</th>
<th>Junior-Senior High</th>
<th>Four-Year High</th>
<th>Senior High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan 'A'</td>
<td>11</td>
<td>30</td>
<td>16</td>
<td>5</td>
<td>62</td>
</tr>
<tr>
<td>Plan 'B'</td>
<td>9</td>
<td>25</td>
<td>19</td>
<td>5</td>
<td>58</td>
</tr>
</tbody>
</table>

The responses of these instructors are purely opinion. Some of the instructors in the schools which actually have
this group of seventh and eighth graders placed brief comments with their selection of one of the plans.

Comments by those favoring or using plan A:

If there are not sufficient work stations. More work for instructor under B. plan.

... advance the work from 8th to 9th grade.

However, I am not in favor of an entire group rotation. Abilities differ so greatly that some boys can complete all required learning units in nine weeks while others will take the full amount of time. The experience is the important element so it doesn't matter to me whether the boy gets it individually or in a group.

Others commenting upon plan B.

You will find that children doing the same thing twice will lose interest.

Recommend "B" but not feasible in many shops because it requires double the equipment needed in plan "A".

One junior high school instructor whose classes do not meet daily remarks, "I would recommend A in case I had the grades daily for one hour or more -- under our setup of twice a week for 55 minutes, I recommend B."

**Methods Used in Starting a General Shop Class**

An analysis of the methods used by the various instructors in starting a new general shop class shows a good deal of uniformity in spite of the variety of conditions surrounding each shop set-up.
Five general methods, adapted from Yager\textsuperscript{4}, were listed for checking by the instructors to indicate the methods they employ in assigning a new class to its work. For convenience in the discussion the items are repeated here:

a. Demonstrate the first job in each of all the units before the entire class; then assign the pupils to respective areas.

b. Demonstrate the first job of a chosen unit, and assign a group in that area to go to work at once, using instruction sheets. Demonstrate a job in another unit to the remainder of the class, and assign a group; repeat until all have been assigned.

c. Assign the pupils directly to the various units, and start work simultaneously with instruction sheets, supplemented by demonstrations as the instructor gets around to each group.

d. Choose a leader for each unit from an advanced group to assist the others in the unit. These leaders take charge, using instruction sheets, until the instructor can get to each group with demonstrations.

e. Use two days by having one-half the class come the first day to be started by one of the above methods. Next day the remaining half is cared for.

f. Other combinations of any of the above. Please specify.

g. Other methods which you use. Explain briefly in the margin.

TABLE XX

Preferences for Various Methods of Starting a General Shop Class
(Figures indicate percentage)

<table>
<thead>
<tr>
<th>Methods</th>
<th>Junior High</th>
<th>Junior-Senior High</th>
<th>Four-Year High</th>
<th>Senior High</th>
<th>Total Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>40*</td>
<td>40</td>
<td>51</td>
<td>46</td>
<td>44</td>
</tr>
<tr>
<td>b</td>
<td>45</td>
<td>44</td>
<td>27</td>
<td>27</td>
<td>38</td>
</tr>
<tr>
<td>c</td>
<td>25</td>
<td>46</td>
<td>38</td>
<td>27</td>
<td>38</td>
</tr>
<tr>
<td>d</td>
<td>5</td>
<td>33</td>
<td>22</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>e</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>**</td>
<td>4</td>
</tr>
<tr>
<td>f</td>
<td>**</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>

*Read: 40% of the junior high school instructors make use of method 'a' in starting a general shop class.

**No data in this bracket.

The first three methods (a, b, and c) are used most frequently. The figures in Table XX indicate by percentage the instructors making use of the various methods.

Little Variety of Methods Used by Each Instructor

In a course so flexible as the general shop it is interesting to note how few use the listed methods in combinations (method 'f' in Table XIX). The following combinations were listed: b and c; b and d; c and d; c and e.
A further study of the methods employed shows that 67 percent of the 120 instructors responding to this inquiry make use of only one method, presumably for all of their classes. See Table XXI. Only 12 percent use two methods; 19 percent use three different methods; and only 2 percent use four methods.

**TABLE XXI**

Instructors Using One or More Methods in Starting a General Shop Class
(Figures indicate percentage)

<table>
<thead>
<tr>
<th>Methods</th>
<th>Junior</th>
<th>Junior-Senior</th>
<th>Four-Year</th>
<th>Senior</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85*</td>
<td>60</td>
<td>65</td>
<td>82</td>
<td>67</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>11</td>
<td>16</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>25</td>
<td>19</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>4</td>
<td>**</td>
<td>4</td>
<td>**</td>
<td>**</td>
<td>2</td>
</tr>
</tbody>
</table>

*Read: 85% of the junior high school instructors use one method of starting a general shop class. **No data in this bracket.

Additional Methods for Starting Classes

Several instructors suggest additional methods or modifications for starting a new general shop class. Part 'g) of Item 14 gave space to such other methods as are used, but they are few in number and were not included in Table XIX. The following are taken directly from the copies of the questionnaire:
1. . . . they are allowed to choose the area in which to start. If "ganging" occurs then assignments are made.

2. I assign two units book-work and demonstrate to the others, and so on until all are started.

3. At the times 'c' is used -- those waiting for demonstrations use the reference library to find information on the work to which they have been assigned.

4. Prefer 'c': Each #1 instruction sheet requires from 1/2 hour to 3 hours of study, which gives ample time for various demonstrations.

5. I use 'a' to start with until some idea of particular skills and interests are shown. Then I try to assign work and duties in accordance with these skills and interests. Demonstrations, job sheets, and workbooks are used in development.

6. Use job sheets and information sheets for each member of the class.

7. I use a portable blackboard with two writing sides instead of instruction sheets.

8. Have the class write the instructions as they observe the demonstration.

9. Start the class in one unit.

10. To start a 7th grade class I demonstrate the first job in woodwork and keep the whole class together; you can do a better job on one thing at a time. Then before all have finished and the faster workers are ready I demonstrate the metal unit to the whole class and those that are ready go on with metal on their own bench and use the four vises on the metal bench when necessary.

One stipulation in the stating of this item was that the method used in starting the class would be with "little duplication of area equipment." The last two suggestions above obviously require sufficient equipment at least in the basic unit to accommodate the full class at the beginning.
Ranking the Methods for Starting General Shop Classes

The final item of the questionnaire requested the instructors to rank in order their choice of the three best methods listed in Item 14. A tabulation of these opinions shows the considerable variety which is to be expected and desired in a flexible general shop program. The results suggest that no one method will satisfy all conditions of a general shop situation.

Taking the results as a whole from all of the instructors, method 'a' was ranked first; method 'b' ranked in second place; and method 'c' was ranked in third place. Table XXII reveals some exceptions when the data are considered by school groups.

<table>
<thead>
<tr>
<th>Schools:</th>
<th>Junior High</th>
<th>Junior-Senior High</th>
<th>Four-Year High</th>
<th>Senior High</th>
<th>Total Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank 1</td>
<td>a*</td>
<td>b</td>
<td>a</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>2</td>
<td>b</td>
<td>c</td>
<td>b</td>
<td>d</td>
<td>b</td>
</tr>
<tr>
<td>3</td>
<td>c</td>
<td>c</td>
<td>c, d**</td>
<td>b</td>
<td>c</td>
</tr>
</tbody>
</table>

*Read: Method 'a' was ranked first by a majority of junior high school instructors.  
**Methods 'c' and 'd' ranked equally in third place in four-year high schools.
It should be noted that method 'd' in which student leaders are used, received a ranking of second place by senior high school instructors; this is evidence that the method works most satisfactorily with older students whose qualities of leadership and followership, being better developed, are more easily discovered and put into practice. If this choice of the senior high school is a typical indication, the student leader method is, probably, used in the upper grade levels of other schools; the figures in Table XX show a favorable mention of method 'd' by all schools, except the junior high school group.
The general shop plan of organization is assisting the industrial arts field to meet a need of modern education. This need exists in the effort to make available to an ever-greater number of persons in our country the various industrial arts experiences areas with all of their developmental influences.

Summary

The present study is concerned with a survey and assimilation of data useful in the planning and organization of the general shop in secondary schools.

The majority of indications point to the general shop as rendering its greatest service at the junior high school level and in the small schools. Hence, the investigation is stressed in these two areas by gathering the data principally from one-teacher shops, representative of the two groups.

A selected list of one-teacher general shop programs was obtained through the recommendations of industrial-arts department heads in teacher-education institutions. These recommended programs were surveyed by questionnaire to obtain pertinent data about certain phases of general shop
practices. (Questionnaire, Appendix B)

The information from 127 cases, from 14 states west of the Mississippi River, represents 22 junior high schools, 57 junior-senior high schools, 37 four-year high schools, and 11 senior high schools.

The junior high and junior-senior high schools together total 79, or 62 percent, of the cases. On the basis that these schools were selected by the recommendations of leaders in the field, this situation definitely indicates that the predominance of general shop programs is in schools with grades 7, 8, and 9. A very significant representation is accorded the six-year high schools.

The low number of senior high schools indicates the lesser frequency with which the general shop plan appears in them.

No accurate check was made on the school enrollments. Fifty-one of the 127 schools reported an enrollment over 401. The bulk of the cases are small schools; only six cases are included which have other shops than the one general shop about which data were reported.

Three general groupings are under consideration:

1. The junior high schools mainly in medium-sized communities.

2. The junior-senior high schools in small to medium-sized localities.
3. The regular four-year and the three-year senior high schools in small to medium-sized communities. The senior high cases are located principally in the larger centers.

A comparison of the origin of the shops shows that a slightly greater number (66) had been reorganized from unit shops while 54 were planned and established as new general shops. This information is contributed by 120 of the 127 cases.

In comparing the lengths of time these shops have been in operation, it was found that about half (51.5%) of the reorganized shops were under ten years old; 74 percent of the new shops were in this age bracket, showing a significant trend in planning new shops in preference to reorganizing an established unit shop. This ten-year time unit also includes the years of great financial depression.

During the period 11 to 20 years ago, 24 reorganized shops and only ten new shops were put into operation. A few general shops were reported in operation over a longer period; the majority of these are of the reorganized type.

This series of comparisons shows the coming realization that a general shop is not merely the bringing in of a few extra tools and materials, but requires a definite planning to meet objectives peculiar to that type of organization.

The 127 general shop programs report a total of 54 different industrial arts experience areas offered. This total
is considerably larger than that reported in other earlier studies, and, although some areas are mentioned only once, it evidences a gradual increase in the variety of industrial arts offerings. As the total number of offerings increases, the list of the common offerings lengthens.

Woodworking continues to be offered more frequently than any other area (94.5% for this study). Other prominent areas are mechanical drawing (88%), woodfinishing (79%), sheet metal (77%), and electricity (72%).

Bench metal, art metal, and home mechanics appear in about half of the schools (54%, 50%, and 46% respectively). Forging, machine shop, ornamental iron work, carpentry, welding, and leathercraft are found in approximately one-third of the cases.

Architectural drawing is offered in one-fourth of the schools, with the exception of the junior high schools. Plastics is offered in nearly one-fourth of the schools, and is increasing in popularity as are some of the other crafts areas.

When the general shop offerings are considered by school groups, the same five areas are leading. Woodworking is offered in all of the junior high schools; mechanical drawing, woodfinishing and sheet metal in 86 percent; and electricity in 77 percent of the cases.
Woodworking ranks first (96.5%) in the junior-senior high schools; then follow mechanical drawing (95%), sheet metal (81%), electricity (79%), and woodfinishing (77%).

The four-year high schools show a similar selection: woodworking (95%), mechanical drawing and woodfinishing (86.5%), sheet metal and electricity (65%).

Sheet metal appears first (82%) in the senior high schools, followed by woodworking and machine shop (73%), mechanical drawing and bench metal (64%) and electricity (54.5%).

Whether it can be attributed directly to the effects of the war or not, the fact that sheet metal receives a high ranking in the upper grade levels may well be further evidence of the gradual increase in popularity of the metalworking areas. Comparisons of various reports are made difficult because of the difference of emphasis and content of the several metals areas under their respective titles.

In the matter of industrial arts as a required subject the figures in this study are in rather general agreement with earlier studies for the lower grades, but are considerably higher for the upper grade levels. Industrial arts is required for the seventh and the ninth grades in approximately three-fourths of the schools reporting; eighth-grade shopwork is required in over four-fifths of the schools. There are requirements in over three-fifths
of the tenth grades and in half of the eleventh and twelfth grades.

Three-fifths (63%) of the schools require industrial arts in the seventh and eighth grades, consecutively. This arrangement is practiced in 54.5 percent of the junior high schools and by 65 percent of the junior-senior high schools.

Shopwork is required in grades 7, 8, and 9 in about half of the schools. On the same comparative basis this represents 27 percent of the junior high schools and 58 percent of the junior-senior high schools. In both of these comparisons the junior high grade levels have stood very high in the matter of required courses. The place of the junior-senior high school in these calculations should not go without notice.

The organization of industrial arts offerings to encompass a broader sampling of industrial experiences, particularly in the lower grade levels, has increased the procedure of required industrial arts for one, two, or three consecutive years. The practice of requiring shopwork in grades 7 and 8 and offering it as an elective in the ninth grade no longer seems to be the common practice that earlier studies have suggested. These data would seem to support the statement by Douglass¹ of the increasing tendency for

general industrial arts work in the upper grade levels.

Half (49%) of the junior-senior high schools require industrial arts in grades 7, 8, 9, and 10. This may be a result influenced by the defense training program as no equivalent comparisons were found in current literature; or it may be additional evidence of the situation mentioned above.

The schools requiring industrial arts offer a selection of 29 separate experience areas. The 12 most frequently required are: woodworking (40%), mechanical drawing (38%), sheet metal (28%), electricity (27%), woodfinishing (25%), bench metal (20.5%), leathercraft (18%), home mechanics (16.5%), art metal (14%), ornamental iron work (12%), forging (10%), and machine shop (9%).

The length of class periods ranges from 40 minutes to 120 minutes, with an average of about 60 minutes. Periods for seventh and eighth grades range from 40 to 65 minutes in length, averaging 56 minutes.

The remaining grades range from 40 to 120 minutes in length with an average of 60 minutes for ninth grade and 61 minutes for grades 10, 11, and 12.

Considered by school groups, the periods range from 40 to 60 minutes, averaging 52 minutes, for junior high schools. The periods are 40 to 120 minutes in length for
junior-senior high school, and average 60 minutes. The range reported in four-year high school is 45 to 90 minutes, with an average of 61.5; and for senior high schools the range is 50 to 120 minutes, averaging 64 minutes. These data were tabulated from industrial arts classes that meet on a daily basis.

The average weekly allotment of time in the different grade levels for classes meeting daily is: 7th grade, 280 minutes; 8th, 281; 9th, 301; 10th, 11th, and 12th grades, 304 minutes.

The average weekly time allotments based upon school groups are as follows: junior high school, 261 minutes; junior-senior high, 297 minutes; four-year high, 308 minutes; and senior high, 321 minutes.

These averages are somewhat higher than similar studies and, possibly, show a trend in the scheduling of industrial arts classes.

There are a few cases where industrial arts classes do not meet daily. The most common variation is for the seventh and eighth grade classes to alternate during the week. Of these few cases the class periods are 40 to 60 minutes, making a weekly allotment of 30 to 180 minutes.

It can be seen that the complete range of time allotment reported is indeed great -- 30 minutes minimum to 600 minutes maximum, per week. Although average class periods
in the junior high school are relatively shorter, the general practice is approaching the one-hour period. Periods of less than 50 minutes are not as satisfactory when one considers the nature of the subject and the amount of time necessarily consumed at the beginning and the end of each period for the care of materials and equipment.

The majority of industrial arts classes meet daily. Classes that meet daily keep the student in closer contact with the work and permit him to enjoy more rapid progress. Since all of the cases where classes meet in alternate days are in the junior high school, the arrangement is probably justified in these particular instances in that it represents the best plan possible at present for exposing the students to exploratory and manipulative experiences with materials of industry. However, general practice dictates that these isolated cases make every effort to extend the program.

Another phase of time allotment in the general shop is the amount of time scheduled for each required experience area within the course. The complete range reported was a minimum of five hours (one hour daily for one week) to a maximum of 180 hours (one hour daily for 37 weeks). Some of the controlling factors are the number of experience areas taught in one class, the amount of equipment
provided, the number of years in which shopwork is required, the general sequence of the required courses, and the emphasis placed upon each area by the instructor. The average time from all grades is 60 hours, the equivalent of one hour daily for 12 weeks. The average time computed by separate grades is: 7th grade, 50 hours; 8th grade, 40 hours; 9th grade, 60 hours; 10th grade, 54 hours; 11th grade, 78 hours; and 12th grade, 77 hours.

Relatively more experience areas are taught in the lower grade levels at shorter periods. Longer allotments of time in the upper grade levels permit a greater degree of specialization in each of the experience areas taught there.

Considerable variety in the type and number of work stations was expressed. Woodworking benches are most common; 16 such stations are provided in the average shop. The average number of other types of work stations are: seven for metal working; four at combination woodworking and metalworking benches; six at electrical benches; 16 drawing benches; four auto mechanics stations; three welding outfits; two at a foundry bench; two each at wood and metal-turning lathes; one at forging. A variety of other less general types were reported but not in sufficient quantity to give a reliable average of the number of work stations.
Woodworking benches are provided in 94 percent of the shops. Eighty-six percent have separate metalworking benches, but only 20 percent of the cases use combination woodworking and metalworking benches, none of which were in the senior high school. Separate drawing benches and electrical stations were used in 77 percent and 63 percent of the cases, respectively. Most of the figures are comparable to those reported by Leaf\(^2\) in a similar study of new one-teacher general shops. Other stations are provided less often in line with the lesser frequency with which the several remaining experience areas are offered. In many instances the general types of work benches are used for the various craft areas without making much additional provision.

Considerable data were collected regarding the rotation of students from one experience area to the next. The requirements of each type of general shop organization are so varied and the requirements of specific shop set-ups are so different that it is difficult to arrive at generalizations which are typically descriptive. The fact that 72 percent of the instructors reported using a definite rotation plan of some type indicates the importance of the pro-

cedure as a part of general shop organization. No attempt was made in this study to find what the other 28 percent does to prevent the exploratory route of each student from being a hit-or-miss affair.

The preference for a plan of rotation of some sort, classified by school groups, are as follows: junior high schools, 65 percent; junior-senior high schools, 78 percent; four-year high schools, 67 percent; and senior high schools, 75 percent. The current literature does not attack this problem specifically enough to make any comparisons possible; however, there is room for speculation at the differences reported between the junior high schools and the junior-senior high schools, since both have the lower secondary grade levels.

One plan of rotation is to require the student to complete a specified amount of work (projects, etc.) before he is eligible to start in another area. This method is used by 68 percent of the cases as a whole. It is reported most often in the four-year high schools, 73 percent; other school groups reported as follows: junior high, 69 percent; junior-senior high, 67 percent; and senior high, 57 percent. In general it would be expected that the preference be highest in the lower grades since the major portion of the required work is done at those grade levels and a closer check
should be kept on the pupil's accomplishment of basic fundamentals.

Another variation in the rotation process is that of rotating as groups or as individuals. The less flexible plan of group rotation is based upon time periods determined for each experience area, either according to the emphasis desired upon the particular units or according to the number of areas included in the class. The simplest solution is the case where four areas are taught; the school year is 36 weeks; therefore, nine weeks are spent on each experience area. Like most plans, individuals claim advantages and disadvantages for each. The best interests of the pupil are to receive due consideration in either case, yet the "shifting" process may be done so mechanically that student interest becomes an afterthought.

No definite preferences for group rotation or for individual rotation appear in viewing the data as a whole. Only slight preferences are found when the school groups are considered separately. The junior high schools are about evenly divided, with one case making use of both methods in some manner. The greatest variation appears in the junior-senior high schools as might be expected due to the greater span of grade levels. Forty-four percent use individual rotation, 50 percent use group rotation, and six percent make use of both plans. This group of schools, in
half of which industrial arts is required in grades 7, 8, 9, and 10, registers a preference for the less flexible plan of group rotation. An example of a combination of group and individual rotation was explained briefly in one case where the instructor bases individual rotation largely upon a specific assignment. This permits the faster students to proceed into a different area when the first one is completed. However, at the end of a definite period all the others are placed in new areas even if the first assignment is unfinished. A degree of flexibility is the result.

In the upper grade levels where more electives are permitted and a degree of specialization is more common there is a preference for individual rotation; this choice is 62 percent for four-year high schools and 56 percent for senior high schools. Three percent of the four-year high schools and none of the senior high schools used a combination of both methods.

The individuality of the rotation process really becomes apparent when a study is made of the lengths of the time periods used in rotation. Instructors in 103 schools reported using a definite time period in the rotation plan. The length of this period was reported to vary from one week to twelve weeks; not only does this variation exist between schools, but, more specifically, within the same shop. Some use an optional time limit based upon the in-
individual and the project.

The different time periods in common use are -- six weeks, nine weeks, and "variable" time. The latter choice correlates with individual rotation. Further than that, it affords a greater or less concentration upon the different experience areas offered, cognizant of such factors as the extent of the facilities, the needs or current demand, and the number of students enrolled. Obviously, if a shop has, as part of its facilities, 16 bench-metal work stations but only one metal-turning lathe and one welding outfit, every boy cannot be given nine weeks experience at each.

Nearly half (47%) of the junior high schools use a specific nine-week time period in rotation; the other common choices are six-weeks, 16 percent; and variable time, 32 percent.

In the junior-senior high schools 39 percent use variable time periods, 31 percent use six-week periods, and 14 percent use nine-week periods. The high frequency of variable time period in this group is explained in part by the extra comments which appeared on the questionnaires; several instructors stated that in the lower grades the rotation time periods were shorter than in the upper grades in the same school. This necessitated an answer of "variable time" for the school.

The four-year high schools are practically evenly divided on the choices.
Of the senior high schools using a specific time period in rotation the six-week period is prominent in half of them; the other choices were: nine-week period, 37.5 percent; variable time, 12.5 percent.

A consideration of the several phases does not do justice to the complete process of rotation in the general shop class. Problems remain which are untouched either by current writings or by this study; for example, why should 47 percent of the junior high schools make most use of a nine-week time period in rotation and only 14 percent of the junior-senior high schools use the period, when both schools embrace the lower grade levels? Anything more than a superficial study of the rotation problems would have to be made about a series of "identical" shops, obtaining very specific data. In the realm of general shop organization this list would be impossible to compile. The process of rotation is just as individual as the particular shop in which it is employed. Such conditions have brought much criticism upon the general shop plan.

These phases of rotation are closely related even though they were considered separately here. An instructor favoring individual rotation may assign a definite amount of classwork to be accomplished. He will govern the amount somewhat by the average time he wishes to emphasize that area; to that extent he is employing a "variable"
time period as the emphasis upon the several areas may very likely be different.

The results of the study indicate that some definite plan should be adopted. The main problem still remains to be solved regardless of what combinations are selected. How can the plan be kept operating in the best interests of the pupils and with results that insure the greatest achievement for every boy? To this end rotation in the general shop is a problem of the individual instructor to be solved for his particular shop situation.

The handling of beginning classes in the general shop was given some attention. In all the school groups less than half of the instructors keep the entire beginning class in the same experience area for a full period. The percentages of those favoring this plan were: junior high, 45 percent; junior-senior high, 44 percent; four-year high, 40 percent; and senior high, 30 percent. The uniformity of those schools having the majority of the beginning classes would indicate a general agreement on the problem.

No statement was requested about the length of the period but from the choice of rotation periods in the junior high school this preliminary starting period is most often six or nine weeks. Such groups would be organized on what is designated a multiple unit shop with a major emphasis in some one area.
It is noted here that the majority of cases, most particularly the senior high schools, start the beginning classes, like all other classes, in several areas. Such a procedure might be carried on in a composite type or a related activities type of general shop.

For the purpose of registering opinions on junior high school general shop organization, the instructors were asked to picture a four-area composite general shop in which there were not enough work stations for all to be placed in the same experience area. Two alternatives were given: Plan A provided that the seventh graders would rotate each nine weeks through the four areas (in four groups); then, in the eighth grade, rotate through the same areas again for a total of 18 weeks in each area during the two years. Plan B proposed that the pupils be divided in the same way but remain in each area for the full 18 weeks before rotating.

The equality of the results was surprising. The opinions of the junior high and junior-senior high school instructors would be expected to be more valid since they are working with the grade levels in question. Their opinions placed slight preference (about 55%) upon Plan A. In order to bring out reasons for the respective answers each should have been asked to attach explanatory remarks. The few comments contributed were negligible and give no
clues as to the general reaction of either group. Perhaps, the problem has not been given a great deal of consideration under these conditions. However, it is surely a problem to be decided when the general shop plan is set up in a school, particularly if industrial arts work is planned as a requirement through successive years.

Another specific problem of the general shop is that of starting the class. Five of Yager's general methods were adapted for the purpose of obtaining ratings from the instructors (see Items 14 and 15 of questionnaire, Appendix B).

The most frequently used method is that of demonstrating the beginning job in each experience area before the entire class and assigning the membership afterward. This method also was ranked first of the three best methods by all except the junior-senior high school instructors.

The second most commonly used method is to demonstrate the beginning job in a selected area and assign a group to it; then jobs for other areas are demonstrated and pupils are assigned in similar manner. In the ranking process this method was placed first by the majority of junior-senior high schools, second by the junior high and four-year high schools, and third by the senior high schools.

---

The third method makes generous use of instruction sheets. The pupils are assigned directly to the respective areas, with written instructions; the instructor follows with demonstrations as the needs arise. This method was ranked third by all school groups, except the senior high schools.

Of other methods considered the plan using student leaders, sometimes from an advanced group, to assist in getting the class under way, is the second choice of senior high schools and tied at third place in the four-year high school group. It is in these groups that the leaders will be most easily located and where the most profitable emphasis can be placed upon qualities of leadership and followership.

Plans of shop management through organized personnel have not been taken up in this thesis but do form an integral part with the above-mentioned method of starting classes.

A method of handling large classes proposes that the class be divided in half and two days be used in starting the smaller groups by any of the above methods. This plan received little mention in the study, but would be worth considering in connection with an investigation of the size of general shop classes.

Two additional suggested methods are a combination of the others and modified methods developed by individual
instructors. Neither of these categories received particular mention. The "other methods" consist chiefly of supplements to the general plans.

In the light of the flexibility and individuality of the general shop plan it seems logical to expect considerable variety in methods used in starting classes. However, the study shows that 67 percent of the instructors rely upon one general method to care for all classes. Eighty-five percent of the junior high school instructors and 82 percent of the senior high school instructors depend upon this one method. The other two school groups are slightly below the average.

Twelve percent of the teachers reporting make use of two different methods, and 19 percent use three methods. The junior-senior high schools and the four-year high schools report the greatest variety in this respect. These groups, embracing both beginning and advanced classes, require a considerable variety of methods if the needs of various classes are to be met at all satisfactorily. Further evidence is the fact that four percent of the junior-senior high school instructors use a battery of four different methods in starting classes.

Methods of starting new classes rank with the procedure of rotation as major problems within the general shop plan of organization which tax the ingenuity of every general shop instructor.
Implications

A consideration of the data from the survey and of relevant reports in current literature makes the following implications seem justified:

1. The general shop organization appears predominantly in the schools with grades 7, 8, and 9 and in the small communities, although not limited to these areas.

2. A major portion of these general shops in the junior-senior high school, where industrial arts is required in grades 7, 8, 9, and 10 to a considerable degree.

3. The study shows that the general shop is performing its greatest service in the "reorganized" secondary schools and that its growth paralleled that of the junior high school. Particularly is this true when guidance and individual differences were accorded considerable attention.

4. Establishing the six-year high school in the small community appears to have some merits. Using the general shop plan with these combined facilities will permit more instructors and a broader program of industrial arts with a subsequent reduction in unit costs. It is a method of combining the services rendered by the general shop organization at the junior high school grade levels and in the small localities.

5. There seems to be an increasing requirement for industrial arts courses; this requirement is approaching the upper grade levels.

6. The "general" aspects of industrial arts, made possible through the general shop organization, are receiving more attention in the upper grade levels. This does not necessarily mean a trend away from specialization but a broadening of facilities.
7. There is a general trend toward the planning of new general shops in preference to reorganizing old unit shops on a general shop plan.

8. The trend implies both the improvement in and adoption of scientific shop planning, and, probably, a general expansion of more schools to include industrial arts in the curriculum for the first time.

9. Additional evidence of the change in planning lies in the fact that the majority of general shops established 11 to 20 years ago were of the type reorganized from unit shops.

10. The general shop is a plan for presenting industrial arts in general education as a definite part of the curriculum.

11. There is considerable overlapping of the operations included in the separate experience areas.

12. Different communities are unlikely to select identical combinations of experience areas; nor are they likely to organize them in the same manner and with the same emphasis.

13. The general shop is not be a collection of separate units but a plan of organization encompassing experience areas sufficiently related that some of the equipment is shared. One contribution is to impress upon the pupil the inter-dependability of industrial pursuits.

14. The variety of separate experience areas offered is generally increasing.

15. Woodwork still appears foremost as a general shop activity.

16. Various metals and materials other than wood may very probably enjoy a tremendous popularity after the War, when supplies and equipment are again available.

17. There is a general tendency for industrial arts classes to be scheduled one hour per day, five days each week.
18. Industrial arts class periods are usually longer in the upper grade levels. It would be a tremendous step in the right direction if every junior high school offered industrial arts a minimum of 50 minutes daily and the upper grades were scheduled 60 minutes daily.

19. The extreme variety in weekly time allotment for industrial arts does not speak well of the field as a whole.

20. A greater number of experience areas are offered in the lower grades as compared to the upper grades. Hence, the length of time spent in each area in the lower grades is proportionately shorter.

21. There is considerable variation as to the amount of time devoted to the separate experience areas among the various schools. The individual situation involves too many variable factors to result in any great degree of standardization, with the exception of the five or six more common experience areas.

22. The woodworking bench is the most common type of work station provided.

23. The combination type of bench has not yet received general acceptance. Preference still remains with benches adapted more specifically to each type of work.

24. Two specific and difficult problems of the general shop are: rotation of pupils among the experience areas, and methods of starting a new class.

25. The procedure of rotation appears with great variation and with little general agreement in any particular school group.

26. The study of rotation implies that it is an individual problem in practically each general shop set-up.

27. It behooves each general shop instructor to study the aspects of the rotation process very carefully and to adopt a procedure that
will prove a useful tool in meeting the definite objectives of his general shop. These definite objectives should evolve from a study of the general purposes and philosophy of the general shop concept.

28. There are indications that it depends upon the particular type of general shop organization being used whether or not an entire beginning class is kept in the same experience area for the first period of instruction.

29. Methods of starting a general shop class revolve rather closely around four of Yager's general methods: (a) Demonstrate the beginning job in each experience area before assigning the pupils. (b) Demonstrate the first job in one area and assign a group; then demonstrate another area, assign a second group, and so on. (c) Assign the pupils directly to the experience areas, depending upon written instruction sheets to give the necessary preliminary operations. (d) Assign the pupils to the areas and use a group leader, preferably from an advanced class, to handle preliminaries until the instructor can get around. This latter plan receives greatest use in the upper grade levels of the secondary schools.

30. The majority of instructors rely upon but one method for starting a general shop class. Yet, the nature of the general shop demands a considerably greater expression of ingenuity.
BIBLIOGRAPHY


APPENDIX A

Letter and Response Form to Teacher-Education Institutions
Dear Sir:

Your close contact with industrial arts teachers in your state or region is an immediate and valid source of information as to the location of successful general shops. Would you kindly assist in this study of general shop programs by listing the names of schools and the instructors who are operating outstanding one-teacher departments on the general shop plan? A response form is enclosed for your convenience.

The "general shop" concept in industrial arts has been established and is making its contribution to a well-rounded program of general education. However, in this present period of intensified practical education for the war industries there is considerable conflict of opinion as to just where the several types of general shop organization are most applicable. Especially there are differences as to the methods of management.

In this respect there is need for a study of successful general shop departments to determine general principles and similarity of methods responsible for success. Because there is a belief that the place of the general shop lies quite largely in the one-teacher department and thus primarily in the small community, it seems desirable to limit the investigation to one-teacher departments.

Your assistance will be very helpful and will be greatly appreciated.

Yours truly,

Harold L. Forrest
Indus. Arts Instructor

Enclosure: Response Form
Form I

Information furnished by:

(Name, title, and address of department head filled in before sending)

Please list below the names and location of schools in your state in which outstanding one-teacher industrial arts departments are being managed on the general shop plan. The present study is concerned with summarizing general principles and methods used in the successful operation of one-teacher general shop programs.

Please give the names of the instructors where known; otherwise, the principal's name.

<table>
<thead>
<tr>
<th>School</th>
<th>Address</th>
<th>I. A. Instructor or Principal</th>
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</table>

Please return to: Harold L. Forsea, Industrial Arts Instructor Union High School, Corning, California
December 15, 1942

Dear Sir:

Last month in connection with a study of "general-shop" practices I solicited your aid in compiling a list of outstanding one-teacher industrial arts departments in high schools of your region.

Many encouraging responses have been received in spite of disturbed teaching programs due to war conditions. May I count on your valued contribution to complete the geographical pattern of this study? Thanks very much.

Harold L. Forsea
Union High School
Corning, California
APPENDIX B

Letter and Questionnaire

to

General Shop Instructors
Dear Sir:

Your department has been referred to me by Professor [Head of Department] of [Name of Teacher-Education Institution] as exemplifying an outstanding general shop program of industrial arts.

The general shop movement has taken a very definite place in modern educational programs. However, there is still considerable difference of opinion as to how these shops can best be organized and managed. At Oregon State College a study is being made of several recommended programs, such as yours, to determine certain guiding principles and similarity of methods which have been found workable.

Would you assist in this study by sharing your findings with me? For your convenience in answering, the enclosed form lists specific statements in regard to your program.

Your cooperation in this will be very helpful and will be greatly appreciated. Any additional comments which you wish to offer will be most welcome. An effort will be made to publish the results in one of the professional magazines so that all interested parties may profit by the study.

Yours truly,

Harold L. Forsea
Industrial Arts Instructor

Enclosure: Response Form
Please answer each item of information as indicated. Disregard items which do not apply to your department.

1. Grade levels in your school. (Please underline) (7)(8)(9)(10)(11)(12)
2. School enrollment. (under 100)(101-200)(201-300)(301-400)(over 401)
   (151-200)(201-250)
4. How long has this shop been in operation? ______ years.
5. a. Was it reorganized from a unit shop, or (Check one) ( )
   b. Was it planned and built as a new general shop? ( )
6. Check (v) the "experience areas" or units included in your general shop program.
   | Mech. Drawing | Sheetmetal | Printing |
   | Arch. Drawing | Bench Metal | Home Mech. |
   | Woodworking | Forging | Leathercraft |
   | Woodfinishing | Foundry | Ceramics |
   | Art Fibre | Welding | Photography |
   | Carpentry | Plumbing | Plastics |
   | Art Metalwork | Auto Mech. | Others: __________ |
   | Machine Shop | Farm Mech. | |
   | Ornamental Iron | Electricity | |
7. Fill in your daily program.

<table>
<thead>
<tr>
<th>Hrs:</th>
<th>Period</th>
<th>Title of Course</th>
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8. How many work stations are provided in the different areas? A work station is a workbench, a machine, or other suitable equipment at which a student works a good share of his time.

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<th>Description</th>
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<td>Electrical stations (exclusive of above)</td>
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<tr>
<td>Combination Wood and Metalworking benches with a station for each (exclusive of above)</td>
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<td>Mechanical drawing stations (exclusive of above)</td>
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<td>Auto mechanics (exclusive of above)</td>
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<td>Wood lathes</td>
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<td>Forges</td>
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<td>Welding</td>
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<td>Others (explain)</td>
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9. REQUIRED courses in the general shop.

a. Which courses are required in the different grades? Check units.

b. Under the proper grade levels in the chart place the number of hours required to complete each course. (Example: A semester of 18 weeks, 1 hour daily, totals 90 hours.) Explain, if necessary, on margin.

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<th>Ck.</th>
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<td>Plastics</td>
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**IMPORTANT**

**PURPOSE:** To learn how you rotate the students to the different types of equipment.

10. Methods of rotating students through the units or experience areas.
   a. Are the students regularly rotated within the semester through the various units? (Yes) (No)
   b. Is the rotation based on accomplishment of work assignment or a "contract"? (Yes) (No)
   c. Is this "group" rotation, or (Yes) (No)
   d. Is rotation carried on largely with the individual? (Yes) (No)
   e. If the rotation is based on time period, indicate the amount by number of weeks. (Underline) (6 wks.) (9 wks.) (12 wks.) (___)

11. Does the entire beginning class participate in the same experience area for a full period (such as a semester) without rotation? (Yes) (No)

12. How many weeks does the rotation period cover? (___ wks.)

**PURPOSE:** To obtain your opinion. (Read Twice.)

13. Suppose there were four areas (such as wood, metal, electricity, and drawing) in a general shop, but not enough work stations for an entire class to work at the same activity at the same time.

Which would you recommend: A or B? Check one.

___A. That the seventh graders rotate each nine weeks in four groups through the four areas; then, when in the eighth grade, rotate through the same areas again. Each pupil receives a total of 18 weeks instruction in each area during the two-year period, but in two 9-week "doses."

OR
E. That the pupils in each of the four groups remain in the same area for a full semester. Each pupil receives continuous instruction for 18 weeks in each of the four areas, during the two-year period.

PURPOSE: To learn how you start a new class in a shop with little duplication of area equipment.

14. Methods you use for starting a new class. (Check)
   a. Demonstrate the first job in each of all the units before the entire class; then assign the pupils to respective areas.
   b. Demonstrate the first job of a chosen unit, and assign a group in that area to go to work at once, using instruction sheets. Demonstrate a job in another unit to the remainder of the class, and assign a group; repeat until all have been assigned.
   c. Assign the pupils directly to the various units, and start work simultaneously with instruction sheets, supplemented by demonstrations as the instructor gets around to each group.
   d. Choose a leader for each unit from an advanced group to assist the others in the unit. These leaders take charge, using instruction sheets, until the instructor can get to each group with demonstrations.
   e. Use two days by having one-half the class come the first day to be started by one of the above methods. Next day the remaining half is cared for.
   f. Other combinations of any of the above. Please specify.
   g. Other methods which you use. Explain briefly in margin.

15. According to your opinion, rank in order your choice of the 3 best methods listed above. ( ) ( ) ( )
Follow-up Postal Card to
the Industrial Arts Instructors

High School
Corning, California
February 1, 1943

Dear Sir:

How about taking "time out" just long enough to fill out the General-Shop questionnaire mailed to you several days ago?

The returns received from fellow industrial arts instructors are very gratifying. Your contribution will strengthen the results and will represent your state in completing the geographical distribution.

Thanks for your time.

Yours truly,

Harold L. Forsea
Ind. Arts Instructor

P.S. Disregard, of course, if you have already answered.
APPENDIX C

Teacher-Education Officials

Participating in the Study
TEACHER-EDUCATION OFFICIALS PARTICIPATING IN THE STUDY

Arizona:

Francis C. Osborn, Head, Department of Industrial Arts Education,
State Teachers College, Flagstaff

California:

Professor E. E. Ericson, Director, Department of Industrial Educa-
tion, State College, Santa Barbara

Professor Heber A. Sotzin, Head, Department of Industrial Arts
Education, State College, San Jose

Russell B. Kidder, Chairman, Department of Industrial Education,
State College, Chico

Iowa:

Professor T. A. Hippaka, Department of Industrial Education, Iowa
State College, Ames (Data furnished by H. W. Carmichael, State
T. & I. Supervisor, at the suggestion of Prof. Hippaka.)

Professor H. G. Palmer, Department of Industrial Arts Education,
State Teachers College, Cedar Falls

Kansas:

Professor Clark L. Jackson, Head, Department of Industrial Arts,
State Teachers College, Emporia

Professor Wm. T. Bawden, Head, Department of Industrial Educa-
tion, State Teachers College, Pittsburg

Professor Edwin Davis, Department of Industrial Arts, Fort Hays
State College, Hays

Harry W. Climan, Assistant Professor, Department of Industrial
Arts, State College, Manhattan

Minnesota:

Professor Homer J. Smith, Head, Department of Industrial Educa-
tion, University of Minnesota, Minneapolis (Data furnished by
Leonard C. Olson, State T. & I. Supervisor, at the suggestion
of Prof. Smith.)
C. H. McClintock, Head, Department of Industrial Arts Education, State Teachers College, Bemidji

Henry B. Weltzin, Head, Department of Industrial Arts Education, State Teachers College, Moorhead

R. M. Torgerson, Director, Department of Industrial Arts Education, State Teachers College, St. Cloud

Missouri:

Professor Noel E. Grinstead, Department of Industrial Arts Education, Central State Teachers College, Warrensburg

Professor H. H. London, Head, Department of Industrial Education, University of Missouri, Columbia

Montana:

O. Kay Moe, Director, Department of Industrial Arts Education, State Normal School, Dillon

Nebraska:

Professor Otto C. Olsen, Department of Industrial Education, State Teachers College, Kearney

R. A. Schreiner, Chairman, Department of Industrial Arts Education, State Teachers College, Wayne

North Dakota:

Stanley Mythaler, Head, Department of Industrial Arts Education, State Teachers College, Valley City

M. W. Heckman, Director, Department of Industrial Arts Education, State Normal & Industrial School, Ellendale

Oklahoma:

Professor DeWitt Hunt, Head, Department of Industrial Arts Education & Engineering Shopwork, A. & M. College, Stillwater

Professor Hugh Norris, Department of Industrial Arts Education, East Central State Teachers College, Ada

Professor M. E. Franklin, Head, Department of Industrial Arts Education, Northeastern State Teachers College, Tahlequah
E. A. Miller, Director, Division of Industrial Arts, C. A. & N. University, Langston

Oregon:

Professor George B. Cox, Head, Department of Industrial Arts Education, Oregon State College, Corvallis

South Dakota:

Henry P. Gerber, Chairman, Division of Fine & Industrial Arts, Northern Normal & Industrial School, Aberdeen

L. N. Pease, Department of Industrial Arts, Eastern State Normal School, Madison

Texas:

Homer U. Miles, Head, Department of Industrial Arts Education, Southwest Texas State Teachers College, San Marcos

Professor Joseph G. Grove, Head, Department of Industrial Arts Education, East Texas State Teachers College, Commerce

Professor E. L. Williams, Head, Department of Industrial Education, A. & M. College, College Station

Washington:

George L. Sogge, Assistant Professor, Department of Industrial Arts, Central Washington College of Education, Ellensburg

H. C. Ruckmick, Department of Industrial Arts, Western Washington College of Education, Bellingham
APPENDIX D

General Shop Instructors
Participating in the Study
GENERAL SHOP INSTRUCTORS PARTICIPATING IN THE STUDY

Arizona:
R. A. Ramage, Junior-Senior High School, Prescott
Glenn N. Olmsted, Junior-Senior High School, Winslow
Wm. Cieszel, High School, Safford
Wilbur S. Nay, Union High School, Tempe
B. E. Black, High School, Williams
J. B. Easley, Union High School, Mesa
R. A. Genoung, Senior High School, Tucson

California:
Edward A. Fingado, Hoover Junior High, San Jose
Richard Fox, Willow Glen Junior High, San Jose
Gordon L. Hoffman, Burnett Junior High, San Jose
Noel Glasgow, Central School, Chico
H. L. Worshe, Union High School, Corning
Paul Cradler, High School, Pacific Grove
Ralph Pisor, Union High School, Salinas
R. L. Farley, High School, Live Oak
C. F. Bjorlie, Union High School, Santa Clara
Russell Kerr, Union High School, Durham
Geo. Atmore, Union High School, Santa Paula
Howard J. Warren, Abraham Lincoln High, San Jose
W. C. Miller, San Jose High School, San Jose

Iowa:
L. F. Simmering, Junior High School, Ames
Paul C. Evans, Anson School, Marshalltown
R. D. Sellhorn, City High School, Iowa City
G. A. Wolfe, High School, Merrill
A. M. Shearer, High School, Spencer
J. E. Guffel, Wilson High School, Cherokee
Donald H. Nutting, High School, Cedar Falls
C. L. Page, High School, Ottumwa

Kansas:
Harry E. Ruff, Junior High School, Coffeyville
J. E. Ashley, Junior High School, Independence
Joe M. Mahoney, High School, Russell
E. J. Schrag, Junior-Senior High, Wellington
W. E. Jones, High School, Garden City
Alvin Goering, High School, Neodesha
Earl C. Dragoo, High School, Hays
Dale L. Duncan, Decatur Community High, Oberlin
Donald Zeigler, High School, Hoisington
W. R. Pfenninger, High School, Salina
H. A. Starkey, High School, Great Bend
R. R. Reed, Salina High School, Salina
Wm. R. Alair, Senior High School, Dodge City
J. W. Truax, High School, Manhattan
Robert Jensen, Roosevelt High School, Emporia

Minnesota:

Alvin J. Wagner, High School, Verndale
W. H. Mattson, Morgan Park High School, Duluth
D. K. Wildgrube, Tower-Soudan High School, Tower
Wm. Brockemeier, High School, Cass Lake
T. W. Lutter, High School, Worthington
Ervin B. Butler, High School, Detroit Lakes
Q. C. Wood, Public High School, Crookston
N. E. Weiss, High School, Melrose
Fred J. Rehor, Central High School, East Grand Forks
Norman K. Bailey, Independent Dist. #44, High, Vertile
Wesley Concidine, Public High School, Wabasha
Gordon B. Gray, Public High School, Sleepy Eye
Emery A. Johnson, High School, Warren
Frank Fabro, High School, Little Falls
Otto Ursin, High School, Pequot
Ray J. Zosel, High School, Glencoe
J. H. Beadle, High School, Staples
L. R. North, Junior-Senior High School, Olivia
Raymond R. Poland, High School, Benson
John J. Bucholtz, High School, Elbow Lake
A. E. Pagliarini, High School, Warroad

Missouri:

Myers R. Eggert, Junior High School, Moberly
Ralph E. Doty, Jarrett Junior High, Springfield
C. D. Smith, Central Junior High School, Hannibal
Sam F. Hall, High School, Clayton
Kenneth Powers, High School, Knobnoster
Raymond Palm, High School, Sikeston
Glenn Lotspeich, High School, Harrisonville
R. M. Cochran, High School, Raytown
Duane Cole, High School, Hannibal

Montana:

M. C. Aahl, High School, Cut Bank
Marjorie Decker, High School, Nashua
Cleve O. Westby, Granite County High, Philipsburg
George L. Beadle, High School, Plentywood

Nebraska:

L. F. Stewart, Walnut Junior High, Grand Island
A. G. Williams, Prep Training High, Wayne
Lenn T. Loken, High School, Albion
R. R. Tolly, High School, Ord
Henry Menke, High School, Wayne
Joe E. Wagner, High School, Johnstown

North Dakota:

G. O. Pfeifer, Junior High School, Ellendale
Stanley Mythaler, College High School, Valley City
Foster L. Bucher, High School, Hatton
A. E. Howell, Public School, Grand Forks
M. R. Sheppard, Valley City High, Valley City
O. E. LeMay, High School, Jamestown
C. H. Rodewald, High School, Tioga
John E. Schmidt, High School, Oakes
R. A. Humphrey, High School, Lakota
E. D. Murdoch, High School, Lidgerwood

Oklahoma:

Lawrence N. Reynolds, Junior High School, Ada
L. J. Crawford, Douglass High School, Bartlesville
Arch Courtney, Junior-Senior High School, Britton
M. E. Franklin, Training High School, Tahlequah
Carl E. Rosser, Whitaker State Home, Pryor
Zebedee Hunter, Attucks High School, Ponca City
A. C. Miller, South High School, Stillwater
Jones I. Wathington, Dunbar High School, Okmulgee
M. E. Dobbins, High School, Osage
Bill Forkner, High School, Fairfax
J. L. Parker, High School, Ochelata
Joe E. Large, High School, Alluwe

Oregon:

Theo. W. Olson, Leslie Junior High School, Salem
Wm. Joe Nee, Woodrow Wilson Junior High, Eugene

South Dakota:

Bill Welsh, High School, Webster
M. L. Reynolds, High School, Draper
A. F. Mattice, Central High School, Madison
Wm. Higgins, High School, Winner
Texas:

R. C. Lee, Junior High School, Henderson
A. C. Andrews, High School, Anahuac
Leo Clark, Union Grove High School, Gladewater
E. W. Whitney, High School, Overton
G. D. Haywood, High School, Commerce
Virgil Kidd, East Mountain High School, Gilmer
John M. Garrison, White Oak High School, Longview
Preston Hutchinson, High School, Cumby

Washington:

James Bolman, West Woodland School, Seattle
A. L. Leonard, Ravenna School, Seattle
Guy Cable, Frank B. Cooper School, Seattle
W. T. Tierney, Beacon Hill School, Seattle
Harry H. Brown, Seward School, Seattle
David Osterberg, High School, Montesano
Harold Shelton, High School, Ferndale