PROBLEMS OF PURCHASING, ISSUING AND ACCOUNTING RELATING TO SUPPLIES USED IN INDUSTRIAL ARTS CLASSES IN OKLAHOMA

PROBLEMS OF PURCHASING, ISSUING AND ACCOUNTING RELATING TO SUPPLIES USED IN INDUSTRIAL ARTS CLASSES IN OKLAHOMA

By

JAMES C. EMERSON, JR.

Bachelor of Science

East Central State Teachers College

Ada, Oklahoma

1934

Submitted to the Department of Industrial Arts

Education and Engineering Shopwork

Oklahoma Agriculture and Mechanical College

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

1940

APPROVED:

DeWitt Hunt
Head, Department of Industrial Arts
Education and Engineering Shopwork

Philip S. Donnell
Dean of School of Engineering

D. G. McIntosh
Dean of Graduate School

ACKNOWLEDGEMENTS

The writer wishes to extend his appreciation to the many shop teachers who assisted in this study by answering the questionnaire and to those who gave further assistance by giving forms which they use in their own systems.

Grateful acknowledgement is extended to Dr. DeWitt Hunt, Head, Department of Industrial Arts Education and Engineering Shopwork, Oklahoma Agricultural and Mechanical College, and to Associate Professors C. R. Wood and H. P. Adams for educational leadership and guidance through my training at this college, and especially to Dr. Hunt for his personal guidance and assistance through the completion of this thesis.

Gratitude is extended to my wife, Lucille Emerson, for inspiration and encouragement throughout the preparation of this study.

J.C.E.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

CHAPTER I

A STATEMENT OF THE IMPLICATIONS AND EXTENT OF THE PROBLEM

The educational values of industrial arts have long been recognized as having their place in the general scheme of education in America. Industrial arts, as a required part of the curriculum, has become a subject taught in all accredited junior high schools under the present educational program of the state, it is also found in a large percentage of the high schools as an elective subject.

The content of the industrial arts program should be thought of as filling three needs, it should be practical in order to serve the purposes of industry, it should be general in that it should give a wide variety of experiences at a time of life when they are most needed, and it should be informational to help perform one of the fundamental precepts of general education.

Differences as to methods and procedures in industrial arts instruction will continue to exist, and because of differences of opinions, standardized methods may never be put into practice, yet the aims and objectives of the industrial arts field will be more or less standardized in that each teacher will recognize a common need regardless of the methods of presentation or management that he may use.

The administration of the industrial arts department rests largely upon the instructor. The manner in which the content of the course is presented depends upon the ability and knowledge of the instructor and upon his desire to do a thorough job. The instructional facilities available govern the content and processes which may be included in the program to a great degree. As supplies make up the bulk of the materials

used for instructional purposes, their management represents a problem which takes up a large percent of the teacher's time not otherwise used in teaching. There is need for accurate, businesslike methods in the administration of the shop supplies management program.

A great deal of the worthwhile information gained in the industrial arts class by the student is the knowledge gained pertaining to the materials and products of industry of which he is a consumer and it is an aim of the industrial arts instructional program to make him a better chooser and user of these products. This aim is partly realized by presenting information and making experiences available with choosing, using and accounting for these materials in school shop classes.

Origin of the Problem. In organizing the Industrial Arts Department of the Ada Junior High School, the writer was faced with the problem of selecting the tools and equipment needed, arranging these in a relatively small shop and preparing to teach extremely large classes. The many problems concerned with the purchasing, storing, issuing, accounting for and collecting for the supplies used in the classes have challenged the writer to attempt to find adequate methods. When it came time to select a problem for investigation during the course of graduate study, this general subject suggested itself.

When the Ada Junior High School classes were organized it was found that six sections of an average of forty students each were to be provided for and with limited space and resources the problem became one of vital importance to the program.

Description of the Problem. The problem is one which should be of interest to all industrial arts teachers because, in some way or other, it is their

problem. Every shop teacher should have some knowledge of the methods and practices as carried out by his fellow teacher as a check on his own practices.

It was decided that the title of the thesis, as a record of the investigation, should be: Problems of Purchasing, Issuing and Accounting Related to Supplies Used in Industrial Arts Classes in Oklahoma.

It is proposed in this investigation to find out and evaluate the different methods of supplies management used in a group of selected school shops in Oklahoma for the purpose of recommending a system which will be adequate as well as one that will interfere in the least possible way with other instructional responsibilities of the teacher. Paine expresses his thoughts on the subject of records, which is perhaps universally agreed with, when he states: (16, pages 195-197)

> In organizing and managing a school shop so as to effectively teach a trade or to conduct shop work with more diverse objectives in mind, the problems of exhibits, bulletin boards, tools and checks, assignments, records, lesson plans, etc., must not obscure the fact that we are teaching boys and not keeping records and looking after equipment.
>
> .... The instructor who becomes so involved in sheets, record keeping and other activities of a similar nature that he has no time to really teach or to remember his true reason for being, will defeat his own effort.

With this thought in mind, the problem may be summed up as a search for a reliable system of managing materials in a shops department which will be adequate as to information needed, be educational in that it will help to teach consumers knowledges, and yet will require a minimum amount of time on the part of the teacher.

Need for the Study. When the problem first confronted the writer, in planning an Industrial Arts Department, a search was made in available

methods books for an answer. Needless to say, very little information could be found dealing with the purchase of supplies, some suggestions were found in these books as to the storage of materials and as to the arrangement of equipment, but practically nothing was found suggesting fair and businesslike methods for issuing to and charging the pupils for the supplies used. It was because of this lack of any definite information dealing with this subject, that the writer chose this subject, believing it to be a worthwhile subject for the thesis.

Delimitations. This study is limited to a review of the practices now in use in certain Industrial Arts Departments in Oklahoma, a study of suggested practices as found in methods books on teaching industrial arts subjects, methods as suggested by high school texts on shop work and a review of articles found in professional magazines.

The thesis limits itself to a discussion of the handling of supplies. It does not enter into a discussion of the quality of different brands of materials, or sources of materials or tools.

The purpose of this study is to use this material as a basis for proposing a system of accounting for use in the administration of the Industrial Arts Department of the Ada Junior High School.

Similar Studies. If any studies of a similar nature have been carried on locally, the writer was unable to find any information pertaining to them. Only one thesis written in the last few years was listed in the standard lists.

Stephan, (21) at Ohio State University, in 1936 made a study of eight schools in that state which dealt with a problem of a similar

nature but was limited in its scope in that the practices and methods of only eight schools were studied. The thesis was secured by the writer through the Oklahoma A. and M. College Library on an inter-library loan. Stephan found a wide divergence as to types of records and administrative practices.

It was his purpose to devise and propose standard forms to be used in all eight schools. This thesis was too limited to be of much use to the present writer in the preparation of this study.

Research Technique Used. Perhaps the questionnaire is the most used and abused of all research methods, but as the information needed in this study was not available from any other source, this method was used. A study of the technique revealed its good and bad points, which are summed up by Reeder in this manner: (18, page 63)

> Although the questionnaire method of securing information and of conducting research has probably been over-worked during recent years, the fact remains that there are some types of problems -- problems which are worth attacking -- that cannot, and should not, be abolished; but, it should be more intelligently used than is now the case.

Other methods of collecting material included an extensive library study of magazine articles, textbooks on methods of industrial teaching and administration, textbooks dealing with shopwork in high school, and many personal interviews with teachers of college and high school shopwork.

Outcomes to be Expected. By use of the experiences of others, gained through a study of their methods, as expressed in the returns of the inquiry forms, the writer hopes to achieve the following outcomes.

1. Give a picture of the situation as it now exists in the schools of Oklahoma.

2. Devise a suitable program of shops supplies management, suitable for use in the average Oklahoma high school.
3. Recommend, as a result of this study, methods which will be of use to other teachers in the industrial arts field.

The recommendations found at the conclusion of this study, are general in nature and the writer hopes they will be put into operation in many Industrial Arts Departments.

Conclusion. In this chapter the writer has described the nature of the problem as well as its limitations. The method of attack has been indicated and the outcomes to be expected have been predicted.

In the following chapter a review and analysis of literature dealing with management of supplies in the school shop will be made as a basis for future suggestions and practices and to show briefly the trend of developments toward better means of supplies management.

CHAPTER II

A REVIEW AND ANALYSIS OF LITERATURE DEALING WITH MANAGEMENT OF SUPPLIES IN THE SCHOOL SHOP

New ideas as to the aims and purposes of education are being advanced continually by leading exponents of progress in education. Among the writings of those responsible for expediting modern changes in industrial arts content and program, may be found the concepts and principles which govern the thoughts and actions of progressive industrial arts teachers.

The movement toward broadening the scope of the industrial arts program leads up to the all purpose shop which has its counterpart in the general shop. An able proponent of the general shop concept is Dr. William E. Warner of Ohio State University. It was under the sponsorship of Bonser, that Warner developed the "Laboratory of Industries," the principle of which is much the same as that of the general shop. The laboratory, in this instance, is to be the center about which the study of industry revolves. Delegation of power to the student by the teacher corresponds to the type of organization as used in most general shops. Warner's plan of organization and method, as well as the name, was recently adopted by the state of Texas in its state industrial education program, thereby acknowledging Dr. Warner as a leader in the field of industrial arts education. It is toward leaders in the field that we turn for guidance in proposing new programs in our own departments.

Every shop department, like a well run business, must have its organization. Definite methods of carrying out the routine of the organization must be established and adhered to if any degree of efficiency is

to be reached. We learn much by reviewing what others have done toward coping with a problem or difficulty, so it would seem necessary to make a study of the material which has been written on the subject of purchasing, issuing and accounting for supplies in industrial arts shops. With this in mind, theses, magazines, methods books, and high school textbooks dealing with industrial arts subjects were examined to ascertain the methods and practices advocated by others.

Theses of a Similar Nature. An investigation was made to ascertain the extent of previous research on the problem and after all lists of theses titles available were examined, it was found that only one study concerned with this problem has been made in the last ten years. In 1936, James Otto Stephan, at Ohio State University, made a comparative study of eight schools in the State of Ohio, in which he dealt with the problem of shop records and forms. (21) It was his purpose to determine the methods of accounting for supplies, that were being practiced and to recommend standard forms to be used in all eight schools. He suggested the following forms: Supplies Requisition, Supplies Purchased Record, Individual Project Cost Analysis Sheet, Individual Project Receipt, Permanent Accumulative Record of Individual Student Work and Work Order Form.

Many other theses were examined to find if any part of them dealt with the subject but none were found to include a discussion of this subject.

Magazine Articles. One principle source of information was from a study of articles found in the Industrial Arts and Vocational Education Magazine which were contributed by teachers and supervisors of industrial arts subjects throughout the country.

The industrial arts department, like modern business organizations, must have its records and forms. The extent and usefulness of the record forms and report blanks in the average system depends largely upon the teacher and it is generally one of his responsibilities to draft these forms.

In considering the needs of records and reports and their keeping, as well as the making of forms, Stephan suggests in a recent magazine article these criteria: (21, page 180)

1. The form should have a title suggesting its purpose.
2. Following the title should be the name of the institution in which the form is used and the name and location of the school.
3. This should be followed by a printed outline of instructions or methods of caring for a special process.
4. The idea of organization and administration demands that the form itself be arranged in a neat and attractive manner.

Magazine Articles on this Subject. It is the belief that in some systems too much of the instructor's time is demanded for the keeping of records and the making of reports which are needed, yet the forms used are so made that they require more time than it would seem necessary to gain the desired information. Metz (13, page 365) gives a discussion of the problem of records which ably describes the situation:

> "I wonder whether I was engaged as a teacher or a bookkeeper" has been the plaint of more than one teacher when confronted with the task of filling in one or more of the numerous records and reports that are now part and parcel of the educational system. This record keeping, tiresome and troublesome as it may seem, is however a vital factor in making industrial arts and vocational work effective.
>
> Of course, records must justify their existence. They must satisfy some real purpose and the teacher who is confronted with gathering the data must know the purpose for which they are collected.
>
> Reports and records, to be of any use, must be carefully and conscientiously kept. Unless this is done, they may lead

> to erroneous conclusions. Ordinarily the teacher himself is interested only in those records which he himself can use. However, there are other records, equally important, which must be kept for administrative purposes and which may take much time and effort to gather. A little thought and planning may establish a routine method which will enable the teacher to relieve himself of this work by allowing students to take care of part or all of the job. In each case, however, the instructor should be sure that he himself knows for what purpose the records are to be kept so that he can properly supervise the recording and reporting of them.

In the better industrial arts departments, the annual requisition is one of the major reports to be made. Many different systems are in use by which this problem is attacked. In searching for information dealing with the requisition, a great many suggestions were found and several forms examined. In most cases the supplies requisitioned are classified into groups according to the purpose for which they are to be used, as, "Supplies Furnished By the Board" and "Supplies for Resale." Ordinarily the supplies for all of the common activities found in the shops are listed on the same form while some exceptions to this are found. A notable exception of this is suggested by Hooper (10, pages 181-183) when he recommends the use of a separate form for each unit of the general shop, thus the instructor would keep separate the records of each type of supplies used. It is believed that this would help in the ordering of supplies for the future.

In defining supplies, Taylor (26, page 183) states that supplies are:

> All those consumable materials used by the shop teacher and pupils for experiments, demonstrations and the building of projects.

In the same article, Taylor also advocates the use of standard forms in dealing with supplies, of this he states:

> Standard forms for supplies should be had and used at all times. Where a central supply store is kept, only supplies which are used in large enough quantities to warrant same, should be handled. Special or occasionally used supplies to be purchased and handled by each school. ....Each student to make out a complete requisition for all supplies needed and used, to be presented to the shop supply room clerk. (Page 184)

On the subject of purchasing supplies for the industrial arts department, Van Duzee (27, page 147) suggests the following methods:

1. Supplies may be bought locally as needed and delivered to the shop.
2. Buy semester needs and deliver to the shop.
3. School purchase and supply department.

These methods may be evaluated, as to their place, in the different sized industrial arts departments. The method of buying when the material is needed is perhaps the most generally used due to the lack of funds and storage space in the shop. Where sufficient funds and storage space are available, the method of buying the whole semester needs is perhaps the most practical, due to savings gained by large orders. The central supply store system will be found only in the larger school systems.

In preparing the supply budget, much care should be exercised to fill adequately the need and yet not overstock. Experience in specifying kinds and qualities of materials is one of the requirements for economical and effective buying. A poorly stated requisition or order gives too many opportunities for substitutions which are not always satisfactory. Much criticism may fall upon the shop teacher who submits poorly stated orders for bids of local merchants. Regarding this phase of the supplies problem, Van Duzee (27, page 147) expresses in effect, that the preparation of the supply budget should take in past experience and plans for the future, as well as enrollment. Development of the ability to write clean cut, clear, complete requisitions is a

a necessary ability of the successful shop teacher.

Methods Book Suggestions. As a means of estimating the supplies needed for the coming year, Ericson (6, pages 27-28) gives the following methods:

> Records of work, enrollment, and other details of previous years, as well as those indicating possible enrollment for the coming year, furnish the most satisfactory basis upon which to act. Some school systems are demanding that supplies be specified for the entire semester, while others offer the opportunity of ordering many items as needed from time to time. If the former system prevails, the teacher can do nothing but anticipate the maximum need and act accordingly.
>
> There should be careful analysis of the problem, however, rather than a blind guess at the demands.

Schweickhard has this to say about consumable supplies ued in the shop program: (19, page 208)

> Supplies and materials which are used up in the course of the work are often a serious problem and unsatisfactory provisions for storage and handling interferes with the success of the work. It is sound practice for the school to purchase and stock the necessary supplies and materials for all regular shop courses, and then allow the pupil to pay for what they use in the construction of articles which become their own property. Such a plan makes for economy of time and money, and provides materials for use when needed. .... By means of a good system of individual pupil account, and an accurate record of all expenses and receipts of the department, the entire scheme can be operated on a business-like basis. If there be added to this a detailed inventory at the close of the year, the department can show evidence of economical and systematic operation, and the work will carry additional values for the pupils besides those which can be attributed directly and specifically to the shop course.

The storage of supplies and unfinished projects constitutes a major problem in the average shop department and few shop rooms are planned with provisions for adequate storage space. Newkirk and Stoddard (15, pages 85-86) recommend that the smaller, consumable supplies such as solder, glue, screws, brads, sandpaper and the like be kept in a supply cabinet which may be locked when not in use and that the larger materials are to have a definite location in the shop where they will be most convenient

to the area where needed most. Struck (23, page 100) suggests storage bins as a means of storing the unfinished projects. Where the shop department is large enough to require a large general store room other than in the shop, it is recommended that it be placed in a position which is easily accessible to the shop.

In writing on the subject of shop supplies and materials, Bonser expresses the need of cooperation between the teacher or supervisor and the superintendent, by the understanding of each others needs. Bonser's views on the purchase of supplies are summed up in the following statements: (2, page 29)

> The teacher or the supervisor working with the teacher, should determine, as nearly as possible, a list of supplies for which they are sure there will be a need; those which can be secured only by purchase should be bought in advance. However, needs for many materials will arise which cannot be accurately foreseen, and each teacher should have an available cash fund upon which to draw at such times. A teacher may be greatly handicapped if unable to secure certain things when they are needed. For work that is most educative, not all needs can be seen in advance. A contingent or petty cash fund for each school is a legitimate and proper provision and can be so administered as to avoid abuse and waste. The superintendent should recognize this need and make provisions for it.

High School Texts. In searching for suggested plans of shop management, all the available textbooks of high school subjects, dealing with industrial arts, were examined. It would seem that much more information, dealing with supplies management, would be included in these texts, than is found to be the case.

A very good outline of the care of materials and finishing room needs is given by Hunt: (11, pages 107-108)

(a) A list of what the shop should have in the finishing room.
   1. Varnish in quarts
   2. Shellac (white) in quarts
   3. Orange flake shellac in pounds

4. Silex 10 pounds - dry.
5. Pumice Stone 4 or 5 pounds
6. Rotten Stone, 2 pounds
7. Linseed Oil, 2 gallon can
8. Alcohol, 2 gallon can
9. Benzine, 1 gallon can
10. Turpentine, 2 gallon can
11. Japan Dryer, 1 quart
12. Colors in oil, 2 pounds each of van dyke brown, burnt amber, burnt sienna, turkey red, drop black, etc.
13. Asphaltum, 2 quarts
14. One-half dozen 1 1/2" chisel point rubber set brushes.

(b) Care of Brushes.
1. Varnish brushes must be suspended in turpentine.
2. Shellac brushes in shellac or denatured alcohol.
3. Spirit stain brushes in the spirit solvent or dry.
4. Oil stain brushes in linseed oil or turpentine.
5. Filler brushes in linseed oil or turpentine

(c) Keep all liquid finishing materials in covered can containers.

(d) Save your tin cans at home and bring them to school to use for mixing stains.

The problem of finding adequate methods of storing the finish materials and brushes, in the finishing room, seems to have been well answered in this outline. For use in the small shop, the suggested amounts and containers, would seem to be an amount approaching the yearly needs.

Although very little could be found on the administrative phase of the shop program, several texts included methods of figuring the amount of board feet in cutting lists and also suggested forms and methods of making the complete bill of material for use of the pupil. Nothing was found as to how to arrive at the cost of the student-made project other than what to include in the bill of material. Brown and Tustison do mention that from 15 to 25 percent is added to the cutting list to find the approximate cost of the material. (3, page 12) They also recommend the use of three forms to be filled out by the student in the beginning

of the project; these are: Stock bill, which includes the rough and finished size of the material, the board feet in the unit and in the total, and the unit and total cost, the Lumber Bill and the Complete Bill of Materials. It is from the last named form that the actual cost is figured.

One of the best individual project forms is suggested by Douglass and Roberts (5, page 23). This form includes space for the number of pices, thickness, width, length, description, kind of wood, number of board feet, cost per board foot, and total cost. The hardware, and finish, are listed at the bottom of the form by the student. (See Appendix C)

The Chapter Summarized. The authors of the many books and articles on the management of supplies used in industrial arts make many recommendations but very few definite statements as to the best practices. Because of the general nature of the suggestions gained from the review of magazine articles and methods books, this chapter cannot end with definite recommended practices. However, many helpful suggestions relating to the administration of departmental supplies have been noted and will influence final recommendations when they are made.

Before entering into a discussion of possible techniques of purchasing, distributing and accounting for supplies, it will be helpful to make a statement of the controlling philosophy of industrial arts in Oklahoma and to consider the present status of the work in our state. Information concerning the financial support of the program and prevailing practices of financing departments will also contribute to a final solution of this thesis study. These subjects will form the next chapter.

CHAPTER III

INDUSTRIAL ARTS IN OKLAHOMA, ITS PURPOSES AND PRESENT STATUS

Industrial Arts, as a regular subject of the school curriculum, is gaining its rightful place in the esteem of the school superintendent and of the public. It has become as important a part of the school program as other more established subjects and its ability to remain in such a position depends, to a great degree, upon the industrial arts teacher, his ability to maintain an economical department and his willingness to better fit himself to meet the demands of the situation.

The industrial arts program in Oklahoma has shown advancement with the installation of each new shop. The aid and guidance of competent advisers on shop planning and organization are being sought by the progressive superintendent in planning and equipping new shops and it is through this leadership that the movement will continue to reach a higher degree of efficiency. Expert shop planning will, to a great extent, lessen the problem of supplies management for the industrial arts instructor. The planning of shops containing adequate and easily accessible storage facilities makes easy the problem of issuing supplies and permits the purchasing of larger amounts and a greater variety of supplies because storage facilities are available. Through better shop planning and increased training, the industrial arts supplies management problem in Oklahoma will be better handled in the future. The technique of handling supplies can be said to contribute to the achievement of the objectives of the program. What are these objectives?

INDUSTRIAL ARTS, ITS MEANING AND VALUES

In discussing the objectives of Industrial Arts, it would seem necessary to give a statement as to what is to be included by the term. The following terms and definitions of Industrial Arts are those recognized.

Definition of Industrial Arts. Any creative, worthwhile field of endeavor must have goals which it strives to attain. In industrial arts a clear, comprehensive view of what is to be done is needed. Progress will be made in proportion to the clearness of the aims and objectives of industrial arts. Perhaps the best recognized definition of industrial arts is the one by Bonser: (2, pages 1-2)

> In the world of practical life, the industrial arts are the activities by which man changes or transforms the raw materials of nature to make them more usable and satisfying in meeting his needs for material supplies.
>
> .... Industrial arts as a school subject may be defined as: A study of the changes man makes in materials to increase their values to meet needs, of the appropriate usage of products made and of the social advantages and problems resulting from the making of these changes and products.

In defining the term Industrial Arts the State Advisory Committee for Industrial Arts in Oklahoma Schools formulated the following statement:

> The term Industrial Arts refers to all classes and courses of shop work and industrial drawing taught in junior or senior high school for general education and guidance purposes. Its purposes are primarily to orient the student in our current industrial civilization by means of experiences in working with as many of the materials common to everyday life as possible.

Through the participation of the pupil in the handling of supplies used in the industrial arts shop, an opportunity for acquiring knowledge of the raw materials is gained. It is through the study of the changes which occur in the materials during the process of completion of a

project that the appreciation of workmanship of the finished product of industry is gained by the student.

Objectives of Industrial Arts. Many sets of objectives have been written covering the industrial arts field. These objectives do not always stay within the bounds of the program which is now in use. Complete agreement cannot be found when any two or more complete sets of objectives are compared, but there are several individual aims which may be found on every list.

Every industrial arts teacher has, or should have, the objectives which he believes to be those most important to his program so well in mind that they become a part of the aims of his daily plan. His program should be so well planned as to include these objectives without having to have them printed and displayed in the shop room to justify his methods or procedures.

The following objectives are those which the writer believes to represent the values in the well rounded industrial arts program.

1. Consumer Education. Consumers' knowledge as a means of making better choosers and users of the products of industry is perhaps as important as any other one aim of the industrial arts course. Few courses in the general educational program have the opportunity or the place in which consumers' knowledges can be taught as are provided in the shop department. The inclusion of consumer education is perhaps needed as much as, or more than, other subjects now being taught in our schools. Its importance as an aim of the industrial arts program cannot be stressed too much.

2. Exploratory and Findings Values for the Detection, Discovery and Tryout of Interests and Aptitudes. This objective is found to be of

greatest value in the junior high school industrial arts course. One value of the general shop in the junior high school is that it provides opportunities for the pupil to gain experience in several fields, whereas, in the unit shop, only those materials and processes used in the type of course offered are at the disposal of the student.

3. Educational Guidance. The instructor of industrial arts, through democratic methods of conducting his shop classes, has a continuous opportunity for both educational and personal guidance. This guidance depends largely upon the instructor, in that if he is well liked by the pupils, problems of every type which pertain to the difficulties of youth will be presented to him for assistance.

4. Desirable Personal and Social Habits. Good personal habits may be assisted in development by the teaching of orderly and systematic methods of procedure in the shop.

The pupils of the industrial arts classes have many opportunities to work together. This experience, if properly supervised, may result in the development of good social habits.

5. Handy-man Abilities. Perhaps one of the greatest satisfactions of the boy or man is the ability to do useful jobs around the home. This is a part of the industrial arts work that the individual will appreciate throughout life.

As a visable means of showing the values derived from the school work, to the parent, this objective is well worth its inclusion as one of the aims of industrial arts.

6. Vocational Guidance. Every shop program should have a place for informational knowledge concerning occupations either through actual class work, from the showing of motion pictures or from display material

on the bulletin board.

7. Avocational Purposes. The worthy use of leisure time through the development of hobbies and the ability to perform the manipulations necessary in the fulfillment of the processes needed can be termed a worthwhile objective of the industrial arts program.

8. A Degree of Skill. Coordination of thinking and doing abilities and the development of a reasonable degree of skill in any shop activity should be a definite aim of industrial arts. This is implemented by the student actually producing one or more projects of considerable complexity and difficulty.

9. Appreciation of Good Workmanship. The mark of the student who has completed several courses in industrial arts is in his ability to recognize and appreciate the work of others, as well as see the opportunity for improvement. Few pupils in the shop class will ever become skilled in any of the trades, yet they will through their shop experience be able to recognize good work and appreciate it.

10. Safety and Health Practices. These habits are developed to a certain degree in industrial arts courses through practice of safety rules and in learning of the conditions under which work must be carried on in regard to light and ventilation.

11. Ability to Make and Read Industrial Drawings. This objective is included for its practical value to the individual. Many people, in every walk of life, need this ability and in no other place in the school program can it be taught other than in the shop department.

The Objectives of the Oklahoma State Advisory Committee. This committee, which is composed of twelve teachers, supervisors, college professors and

state employees engaged in educational supervision, formulated a statement of objectives in a recent meeting. These objectives are quoted here to show the consensus of opinion and as a comparative check of the aims of the investigator. These aims are:

1. Academic knowledge is applied practically.
2. Interests are developed and aptitudes are discovered.
3. Opportunity is provided for creative activities.
4. Integration of physical and mental processes is achieved.
5. Avocational interests may be cultivated.
6. Consumers' knowledges concerning the products and services of modern industry are acquired.
7. Appreciation for work and the worker are made possible.
8. Personal qualities of self-control, self-confidence, industry, cooperation, leadership and follower-ship are developed.
9. A knowledge of home mechanics and some skill in the maintenance of the home and its furnishings are gained.
10. Basic knowledge and skill usable in a later vocation are acquired.
11. Desirable attitudes toward health, safety, and accident prevention are developed in industrial arts courses.
12. Definite experiences in good workmanship are provided through the production of a project of considerable complexity.
13. Practices in making and reading working drawings result in a good understanding of industrial drawings.

The guiding principles as stated by the committee are expressed as:

> Industrial arts, as a school subject, may be defined as a study of the processes, tools and machines by means of which the forces of nature are utilized and the raw materials of

nature are changed by man to make them more valuable and pleasing. It includes an understanding of the native qualities of raw materials and of the natural forces, together with a knowledge of the methods and practices of utilizing and changing these materials and forces. It is also concerned with the social and economic problems incident to these changes.

The term industrial arts should be used in Oklahoma schools to describe all non-vocational shopwork and industrial drawing courses, thus displacing the older term Manual Training. (Manual Training implies hand training with little corresponding intellectual achievement.)

Many experiences with and much knowledge about industrial products, materials, equipment, and processes are the primary objectives of industrial arts, with expert manipulative skill being a secondary aim.

The Kind of Program Necessary to Achieve These Objectives. A program which would achieve each of the objectives would through necessity include several types of shop work and industrial drawing. The plant would have to be a general shop if it gives experience needed in the different fields and vocational guidance through a study of many of the materials used in industry. A personnel system which would include the participation of all the students would be an essential need. The shop program would have to include demonstrations, lectures, actual participation in as many shop subjects as possible, individual guidance and assistance. Does the existing industrial arts program in Oklahoma schools meet these broadly diversified aims? Are problems of administering supplies and materials different in this type of program? A survey will show the present practices and give a basis for making recommendations and suggestions.

THE INDUSTRIAL ARTS PROGRAM IN OKLAHOMA AS SHOWN BY THE SURVEY

As a part of this study, a survey was made to include material on the

present practices in shop supplies management and of the curriculum content of industrial arts in order to show the general status of the program at the present time. Class size and courses offered have much to do with determining the type of supplies management program which will be suitable. A detailed discussion of the survey will be found in Chapter IV where the development of the inquiry form, its distribution and the returns are described in full.

Courses Offered. A wide variety of courses was found to be offered in the schools but the subjects offered, other than woodwork, were in the minority. Of the sixty-seven schools studied in the survey, forty-nine schools offered woodwork alone or a combination of woodwork and drawing, while eighteen schools had three or more industrial arts subjects included in their departments. This would indicate that the average department is too narrow in scope to fully realize the complete purposes of the program as advocated today. The average school includes in its industrial arts program two units of woodwork and one year of mechanical drawing.

The list of subjects in TABLE I include all those courses listed as being taught in the schools studied. The names given in the table are identical to those given in the returned inquiry forms.

An examination of the table shows that woodwork, mentioned in several different ways, is listed as being taught in one hundred and ninety-three classes, while other subjects are mentioned only in a few instances.

TABLE I

TERMS APPLIED TO INDUSTRIAL ARTS CLASSES AND THEIR FREQUENCY OF APPEARANCE

Name Given to Class	Number of Cases*
1. Woodwork I	60
2. Woodwork II	43
3. Junior High Woodwork	19
4. Eighth Grade Woodwork	14
5. Woodwork	10
6. Junior High General Shop**	9
7. High School General Shop**	7
8. Seventh Grade Woodwork	7
9. Ninth Grade Woodwork	7
10. Junior High Metalwork	6
11. Woodwork III	6
12. Junior High Electricity	6
13. Metalwork	5
14. Shop	5
15. Senior Woodwork	5
16. Trade Shop	4
17. Trade Wood	4
18. Junior High Shop	3
19. High School Shop	3
20. Manual Training I	3
21. Manual Training II	3
22. Junior High Mechanics	3

Table I Continued

Name Given to Class	Number of Cases*
23. Industrial Arts I	3
24. Printing	3
25. Advanced Woodwork	3
26. Woodshop	2
27. Woodwork IV	2
28. Industrial Arts	2
29. Industrial Arts II	2
30. Hand Woodworking	2
31. Farm Shop	1
32. Woodturning	1
33. Machine Shop	1
34. Girls Home Crafts	1
35. Vocational Metal	1
36. Vocational Woodwork	1
37. Welding	1
38. Foundry	1
39. Machine Woodworking	1
40. Home Mechanics	1
41. Electricity and Mechanics	1
42. Bench Woodwork	1
43. Eighth Grade Industrial Arts	1

* Some classes were in combination and were listed under each subject named.

** Part of the subjects named only once in this table were listed as subjects taught in general shops.

The need for a more broadened program of Industrial Arts was recognized and reported in an article in the Research Bulletin of the National Education Association, on "Vitalizing the High School Curriculum." (14, page 234) A portion of the report follows:

> According to the last United States Bureau of Education Biennial Survey, the variety of work offered in the great majority of schools is still so limited that the values which should accrue from this type of work cannot be realized. Woodwork is commonly the only shop activity offered, or else it receives a larger portion of the time, relative to other activities, than its value warrants.

There is a trend toward a change to the general shop plan, but this program is still to be found in a very small per cent of our schools. This slowness can be attributed to the cost involved in the change from the present woodshop to a broader program. In the average case the school authorities believe they have too much invested in tools and machinery to warrant the change. The practice of installing general shops in the new school programs is recommended.

Activities Included. A summary of the industrial arts subjects included in TABLE I shows the following shop courses.

1.	Several Types of Woodwork	193
2.	Metal Work	12
3.	Leather Craft	12*
4.	Art Metal Work	10*
5.	Electricity	7*
6.	Printing	3
7.	Machine Shop	1
8.	Home Mechanics	1
9.	Home Crafts	1
10.	Welding	1
11.	Foundry	1

* These subjects were included in general shop courses.

No doubt some shops include variations of the types of activities such as may be included in the term metalwork which could include several

forms as, sheet metal, bench metal, wrought iron, etc.

Names as Applied to Shop Classes. It was noted that many names were applied to the classes including the antiquated term, "Manual Training." TABLE I gives the names applied to the classes and the frequency of their appearance.

It is suggested by the State Advisory Committee for Industrial Arts in Oklahoma Schools that Industrial Arts course titles be chosen from this list:

Industrial Arts Courses for Oklahoma High Schools.

Art Metal Work	Industrial Drawing IV
Automobile Mechanics I	Leather Work
Automobile Mechanics II	Machine Shop I
Electricity I	Machine Shop II
Electricity II	Printing I
Foundry	Printing II
General Metal Work	Sheet Metal Work
Home Mechanics	Woodworking I
Industrial Drawing I	Woodworking II
Industrial Drawing II	Woodworking III
Industrial Drawing III	Woodworking IV

In explanation of the extent of the work, the committee recommended that: "Each course of study will be made for one semester of work and will consist of a list of the units of work to be included". It was further recommended that each accredited high school offer at least four separate industrial arts subjects.

Projects Produced. A study of the projects listed as produced in the different shops indicates the nature of the program to a certain extent. In most of the schools the making of simple forms of furniture seems to be the medium of expression. In the schools listing a general shop, a great variety of projects, involving many materials, were reported. There seems to be freedom of project choice, with the degree of difficulty decided by the instructor, in most of the schools studied.

Class Size. The class size would naturally have some bearing upon the problem of supplies management. In large classes, a personnel program which included provisions for student help in issuing materials in the industrial arts shop is considered a necessity.

As an indication of the comparative enrollment of the junior and senior high schools, as well as an estimate of teacher-class load, TABLE II was tabulated and included in the thesis. The table gives the enrollment of two hundred and forty-five shop classes, showing distribution as to size and the per cent of the total enrollment.

TABLE II

DISTRIBUTION OF TWO HUNDRED AND FORTY-FIVE SHOP CLASSES ACCORDING TO SIZE

Class Size	All Classes	Percent of Total	High School Classes	Percent of Total	Jr. High Classes	Percent of Total
5 or less	3	1.2	3	1.9	0	0
6 -10	17	6.8	14	8.7	3	4.0
11-15	43	17.2	40	24.8	2	2.7
16-20	76	30.4	51	31.6	19	25.3
21-25	44	17.6	28	17.4	16	21.4
26-30	35	14.0	17	10.5	15	21.3
31-35	11	4.4	4	2.5	7	9.3
36-40	13	5.2	3	1.8	10	13.0
Over 40	2	.8	0	.0	2	2.7
	245*		160		75	

*Note: This column contains ten college classes.

It may be observed by examining TABLE II that twenty classes have ten or fewer pupils. On the other extreme, fifteen classes have thirty-six or more pupils, thirteen of these being in the junior high school. Two classes have more than forty and three classes have fewer than six pupils. The average size of all classes was found to be twenty and a fraction. The junior high average was almost twenty-seven and the average class in high school industrial arts was found to be a fraction over eighteen.

Criticisms of the Program as Shown by the Survey. In general, the program that is now being offered in a large per cent of our schools is too limited and narrow in content to realize the accepted aims of industrial arts. There is, in the average case, only one subject in the school shop where a variety of activities are needed. Woodwork is dominant.

It is believed that the system, as now in use, could be changed at a small cost to include other activities as important as woodwork.

In the light of suggestions, as found in methods books studied, it would seem that a better plan of organization is needed, more complete records kept and at least a part of the materials cost could be handled by the school. This plan would allow more demonstrational and experimental activities in the shop class.

The suggestions and recommendations found in the writings of leaders in the field of industrial arts should be examined and considered in making changes in the administration of the industrial arts departmental program.

MAINTENANCE

Many schemes are employed for the maintenance of the school shop. Actual monetary support of the program, once it is established in the

system in furnishing supplies does not seem to be a wide spread practice. Most schools have a policy of paying for tools and tool replacement but this is not always the case.

Amount of Money Appropriated by the School for Departmental Support. In a review of the sixty-seven inquiry forms returned, it was found that only 37.5 per cent of the schools received any money from the school budget during the school year just ended; 39 per cent received no money for departmental support; 7.5 per cent did not know if any money had been set aside for this purpose; 12 per cent replied that there was no definite amount, and 4.5 per cent did not answer.

Of the twenty-five cases where support was given, the amount ranged from fifteen dollars to two hundred and fifty dollars. The average amount appropriated was one hundred and nine dollars and eighty cents. If the total of all appropriations were averaged among all schools reporting, the average would be only fifty-three dollars and eighty-two cents.

Must All Supplies be Purchased From Fees Received? In answer to this question, twenty-nine respondents answered "Yes", thirty-three answered "No" and five did not answer. This would seem to indicate that in perhaps forty per cent of the schools, at least partial support is given in financing the supplies management program. This does not agree, in full, with the percentage of schools reporting departmental support but the inconformity is perhaps due to the percentage of the replies received.

Annual Reports. It would seem that the instructor would insist on making an annual report for his own protection, at least to the principal of the

school who would have it available for inspection by those concerned.

Of the sixty-seven cases studied, forty-two per cent stated that annual reports were made, forty-five per cent did not make reports and thirteen per cent did not answer this question.

One teacher reported that the office made all reports to the superintendent and school board but did not state that he made a report to the office.

One instructor replied that it was not necessary because the clerk of the board handled all funds and made all purchases.

An instructor in the eastern part of the state made this remark: "Have never been asked for an annual report, but think that such should be turned in."

Summary. It has been the purpose of this chapter to give a brief review of suggestions and guiding principles of the industrial arts program as advocated by recognized authorities in the field. The guiding principles and objectives of the State Advisory Committee for Industrial Arts in Oklahoma Schools have been included. A review of the present program has been given and recommendations made toward the development of a better system.

The next chapter will be devoted to a discussion of the results of the questionnaire and an evaluation of the methods of supplies management that are now being used in the industrial arts shops in Oklahoma.

CHAPTER IV

THE PRESENT PROGRAM OF SUPPLIES MANAGEMENT USED IN OKLAHOMA SCHOOLS AS SHOWN BY THE SURVEY

Each year many questions are asked concerning the program of the industrial arts departments in the schools. What does it cost to take an industrial arts course? What can be made? Who pays for the materials? These, and many other questions, are asked by the parent, the pupil and, in many cases, by the administrator who is planning to install a shop program in his system. In the latter case, the cost of the program to the school is one of the chief interests of the superintendent. He wants to know what the cost of maintenance will be in order to determine the extent to which his budget will carry the program and how diversified a program he will be able to offer with a given appropriation.

The problem of supplies, in many cases, is one which primarily concerns the teacher and in no small way it is also a concern of the school. If a good system is worked out by the instructor, the cost to the pupil and cost of maintenance is kept to a minimum. The inquiry to determine current practices in handling and disposing of supplies will be described and its results interpreted.

RESEARCH TECHNIQUE USED

The only logical method of obtaining the information needed in studying the problems relating to supplies was through the questionnaire. Another possible method of securing the required information would be through personal contact with the teachers selected as respondents in the study and, as this was impossible, due to time and expense, the questionnaire method was used.

Formation of the Inquiry Form. Even when the subject is of vital interest to those asked to cooperate, a clear, concise form must be written in order to obtain enough replies to make the study valid.

The inquiry should be brief and yet ask for all information needed, statements should be easily understood to avoid confusion and unnecessary questions should not be asked. It should require little time to answer and a self-addressed envelope should accompany the form. With these criteria in mind, an attempt was made to devise an inquiry form which would fill these requirements. After several revisions the final form was sent out. (The final revision of the inquiry form is included in this thesis as Appendix B, pages 73 to 75.)

Selection of Respondents. The teachers chosen as respondents for this study were chosen from the 1940 Directory of Industrial Education Teachers in Oklahoma. One hundred schools of all sizes were chosen with the idea of getting a fair sampling of the many types of shops in Oklahoma.

The Follow-Up Letter. When two weeks of time had elapsed after sending the inquiry form, a total of fifty-five questionnaires had been returned. As this was not believed to be an adequate response, a follow-up letter was sent to those teachers who had not sent in their answers and an additional twelve inquiry sheets were received, making a final total of sixty-seven responses. The follow-up letter is included in Appendix B.

Extent of Responses. In answer to the request for information, sixty-seven replies were received giving a like per cent of returns. Of the one hundred forms mailed, one school reported that industrial arts had not been taught for two years, one form was returned by the teacher to whom

it had been sent, with the statement that he no longer taught in the system as listed. One instructor stated that he no longer taught shopwork where supplies were needed, as his work was all with drawing classes and one envelope which had not been opened, was returned by the Post Office Department. This made a total of four returns which could not be counted in tabulating the replies, but to offset this deficiency, four teacher of industrial arts who were attending the Oklahoma A. and M. College summer school were interviewed and were asked to fill in the necessary forms to account for a total possible return of one hundred.

When a preliminary study of the sixty-seven usable returns was begun, it was found that some of the material was not directly concerned with the subject of supplies management but was relevant to it. This information was tabulated and included in Chapter III. The general subject of supplies management has been divided into a study of purchasing, issuing, collecting and accounting for monies and the necessary record forms used in these processes. These subjects will be discussed in the order just given.

METHODS OF PURCHASING SUPPLIES

Several methods of purchasing supplies are recommended and in use in the various schools of Oklahoma. The common practices vary with the size of the school in that the smaller shops, requiring fewer supplies, use the more lax methods while larger systems require more exacting accounting systems and are, therefore, run on a more businesslike basis. This study concerns itself with the "who", "how" and "where" of supplies purchasing and attempts to find the most common practices now in use in Oklahoma.

Who Purchases the Supplies? It seems that in the larger schools it is an invariable practice for the head of the department to purchase all supplies, while in the smaller systems several methods are in use.

Of the sixty-seven teachers who answered the inquiry, thirty-six reported that the instructor did all of the purchasing, in eleven schools the board of education made all purchases, and ten respondents answered that the head of the department purchased all supplies. Two schools reported that the head of the department in combination with the school board, made all purchases and four mentioned the combination of instructor and head of department. There were two responses from different schools in the same large system which indicated the use of the purchasing agent method and two schools reported that they did not furnish any supplies to the students.

An analysis of these reported practices shows that a little over fifty per cent of the schools allow the instructor to make all purchases. These schools ranged from average to small in size and would seem to show the prevailing practice in the smaller systems.

After determining who purchases the materials, it is necessary to find out how they are purchased. Several methods were named including: competitive bids, open accounts, by requisition and on purchase by the instructor from any source which he deems best.

Purchasing Supplies by Requisition. The practice of purchasing by use of the requisition was found to be the most popular. It was found that thirty-three schools of the sixty-seven studied use this method. Twenty-six schools reported that the requisition was not used and eight schools did not answer this question.

The Use of Competitive Bids. There were twenty-three schools which used this method of purchasing their supplies, thirty-five instructors reported that the materials used in the industrial arts shops were not purchased by competitive bid and six teachers indicated that this practice was used at least a part of the time. Three instructors did not answer this question.

In commenting on this phase of purchasing, many respondents volunteered the information that their schools followed a policy of buying large orders on competitive bids, these orders being placed usually before the beginning of the school term.

It would seem that there is a policy among the superintendents of passing the orders around among the local concerns in the home town, in the belief that this is a good method of keeping the good will of the local merchants. This practice penalizes the department because it cannot result in giving the department the benefit of the lowest prices. Several examples of this practice are discussed by the teachers who answered the questionnaires. Some of the comments were:

> We patronize as many local merchants as possible, but not on competitive bids.
>
> The board expects us to buy all materials possible from local concerns, providing they charge us only ten per cent over their invoices.
>
> Most materials are bought from reputable concerns, with quality in mind and the cost is usually reasonable.

The writer wonders if any teacher would ask to see the invoices as this might seem to indicate that he did not trust the merchant.

Some instructors mentioned the desirability of the open account as a convenience in obtaining incidental supplies. This method will be discussed next.

The Use of Open Accounts. Where it is at all possible to maintain them, open accounts with local merchants and, in some cases, with out-of-town concerns, are extremely useful to the shop department. This is especially true where the purchase of supplies by the instructor in the smaller systems is allowed while the handling and paying out of cash by the instructor is not an approved practice. Open accounts are also preferable when purchasing such items as leather and metal from distant sources, when catalog prices are difficult to interpret and somewhat unstable.

Although this practice is not in common use in Oklahoma schools, its value cannot be overlooked due mainly to its convenience.

The sources from which the supplies are obtained will be discussed in the following paragraph.

Where are Supplies Purchased? It was found that supplies are purchased from three sources, locally, out of the local city but in the state, and outside the state. Due to the inconsistency of the data relating to this question, it can only be estimated. There were several instructors who reported that ninety-five per cent of the supplies were purchased locally and one replied that all materials were obtained from local merchants. One of the larger systems reported that ninety per cent of the supplies used were purchased outside the state and that the other ten per cent were bought locally. This would seem to show that both extremes are practiced.

After making a study of the responses, it is estimated that the average school purchases sixty-five per cent of its materials locally, twenty per cent out-of-state and perhaps fifteen per cent out of the local city but in the state.

METHODS USED IN ISSUING SUPPLIES

Issuing the material in the industrial arts class is one of the problems which the instructor must work out satisfactorily in order to have a smooth running organization. The prevailing methods of issuing supplies or those mentioned most in the returned inquiry forms, are four methods which will be discussed separately.

Requisitioning Supplies from the Store Room. The practice of requiring the student to write a requisition and obtaining the instructor's approval before any supplies will be issued from the store room is included in this method. It does not differ from other methods of student-run supply rooms except for the use of the teacher-approved requisition. The procedure followed is for the pupil to make the bill of material necessary for the project to be made and then write the requisition, obtain the teacher's approval and apply for the materials at the supply room. The clerk of the supply room is to keep records of all supplies issued.

The use of the requisition in the school shop as a means of accounting for materials used in the shop is especially good due to its likeness to methods used in industry. This method can be recommended for use in the school shop where facilities are at hand to organize and maintain it in the shop program.

Each teacher was asked to explain their method of issuing supplies and four of the instructors reported that this method was used.

Supply Room and Student Clerk. In explaining this method, it may be stated that the supplies are kept in the store room and issued by students assigned to this duty. The materials are issued to any student on his

request and without the use of the requisition approved by the instructor.

The popularity of this method with the industrial arts teachers in Oklahoma schools would seem to justify its use. It was found that this method was used by forty-five of the teachers responding.

It may be explained that the supply clerk has an assistant and it is one of the jobs of the supply clerk to train his assistant to take his place at the end of a given time. This method is in keeping with the personnel plan which is in use, in some form or other, in most of the general shops. This plan calls for the rotation of the students through the different duties allocated to students in management of the shop.

Instructor Issues All Supplies. When the instructor issues all of the materials, waste should be cut to a minimum. This is perhaps the best recommendation that can be given this method of issuing supplies. Little benefit in knowledge of materials is gained by the pupil unless he is allowed to handle the supplies himself. The instructor may justify this method if he makes it a point to discuss the materials with the pupil as he issues them. This could hardly be called a good method because of the time which the teacher must use in this duty could otherwise be used for instructional purposes. This method was reported to be used by nine industrial arts teachers.

Lumber-Yard Method. Allowing the pupil to purchase all of his own materials in town and bringing them to the school shop could hardly be termed a method of issuing supplies but as this was practiced in two of the schools studied, it is included here. This method is economical to the school and surely the pupil gains much valuable "consumer's knowledge" in buying

his own supplies. But this method has many objectionable features. There are times, under this plan, when the pupil cannot work because of forgotten supplies.

There were six teachers who did not explain their methods of issuing supplies.

As there is a possibility of considerable waste in the shops where the pupils are allowed freedom of all the supplies, a question was included in the questionnaire dealing with this subject.

Are Supplies Freely Accessible to Students? In answer to this question fifty-six instructors replied that the students did not have freedom of the supply room. Nine teachers replied that all supplies were available to all students at all times and six stated that the greater part of the materials were accessible to the students. It seems that too much waste is the main criticism given to this practice of maintaining an open store room. The question of whether the supplies were issued by the instructor or student clerk presented itself after this question was asked.

Are Supplies Issued by Instructor or Student Clerk? It was discovered that only nine schools were found by the survey where the instructor issued all supplies. There were three cases mentioned where the student clerks issued all of the materials. Forty-one of the answers stated that the supplies were issued partly by the teacher and partly by the aid of student clerks. Fourteen instructors, in commenting on their methods, stated that the pupils got their own supplies under the supervision of the instructor.

After the supplies have been issued and the projects made, it is logical to turn to the matter of financing the program.

COLLECTION OF MONIES

The collection and handling of the money involved in the teaching of industrial arts provides the source of inconvenience and of possible criticism which every instructor would like to pass on to others. This responsibility is one which the teacher should not take lightly as much of the success of the whole program depends upon fair and businesslike procedure in the handling of all accounts. Some of the problems of financing the department are: (1) the willingness and ability of the school to pay a part of the cost of the course, (2) the various methods of collecting the cost of projects from students; for example, fees, collecting in advance, etc., (3) methods of figuring the costs of stock bills and others. These procedures will be discussed here.

Per Cent of Cost Paid by the School. It was found that very few schools bear any part of the project cost. Of the sixty-seven cases studied, two schools paid all the cost of all projects, eight reported that a small per cent of the cost was paid by the school, one reported fifty per cent paid by the school, one other school reported that fifteen per cent was paid by the school and one replied that ten per cent of the project cost was paid by the school. Fifty-four schools did not report any set percentage but several reported that fasteners and abrasives were furnished by the school at no cost to the pupil.

No reliable mean of the exact extent to which the average school participates in the problem of project financing could be estimated from the data reported in this study.

Fees Charged. In a study of the returns of the inquiry form, it was

found that shop fees, where charged, ranged from twenty-five cents as a book fee to five dollars per year as a deposit. It was found that forty schools charged a fee for shop classes and that twenty-seven schools did not charge shop fees. Many of the schools reported that a deposit was required of the student but not as a fee. Five of the forms returned stated that the fee was to defray the expense of buying books for the shop. This practice can be recommended, especially in the general shop, because of the saving to the pupils. The book fee is small enough that it represents considerably less than the cost of one book.

Collection in Advance. A policy of collecting all standard fees at the beginning of the school term was found to be prevalent. In most cases the collection of the cost of the projects was deferred until completion. The problem of collecting the difference between the deposit made and the cost of the finished project, while not always a problem with the better students, can be best met by holding up the grade cards of those owing the shop. It is suggested that an investigation be made as to the ability of the student to pay before these cards are held. In most cases the school will be able to bear the cost for those unable to pay their fees.

One instructor stated that he did not like for the pupils to pay small sums or installments, but would rather wait and collect all the money owed at one time. This would cut down the number of receipts to be written and save considerable time.

Collection on Completion of the Project. This practice was reported by the survey to be the one most used. Thirty-six cases were reported where

the project was collected for after its completion, thirteen instructors collected a per cent of the estimated cost in advance and the rest on completion, three collected the total cost in advance and fifteen did not answer this question.

Where is Money Kept? This question was not included in the survey, but was answered in comments of the teachers. There were only three cases where the department handled no money and in most instances the teachers stated that the money was turned to the office after collection. It is believed that this is the invariable practice.

Who Disburses the Money? Although this question was not asked in the questionnaire, since the prevailing practice seems to be that of turning the money to the office, it is assumed that all invoices are paid through the office.

Several instructors expressed the desire for the office to handle the money at all times.

Duplicate Receipts. The use of duplicate receipts, in all transactions where money is involved, cannot be too highly recommended. The instructor who does not use the receipt method leaves himself open to criticism by the administration, the pupil and the parent.

It was found that fifty-six per cent of the instructors answering the questionnaire used either the duplicating form of receipt or the stub receipt form. Twenty-nine per cent of the teachers did not use receipts but of this number, six reported that a permanent ledger was used and that each payment was recorded in this book with the pupil as witness of the insertion. Two instructors reported that no receipt was necessary

because the shop handled no supplies for sale to the pupils. Eight instructors did not answer this question.

In the light of information gained through this study, it is the present investigator's belief that every teacher should use some type of receipt. A rubber stamp, marking the bill of material paid, is a good suggestion for those who complain that the writing of receipts takes too much time from their instructional duties.

Figuring Project Cost. The following method of figuring the cost of a student-made project was reported by the survey:

1. Bill of material plus 25 per cent waste, plus 2 cents per square foot for finish.
2. Actual material in the project, plus 1/3 for waste and finish.
3. Actual cost, plus 20 per cent waste, plus finish.
4. Cost plus 25 per cent to cover waste and finish.
5. Cost of materials plus 1/3, plus 4 cents per square foot for finish.
6. Cost of all materials in the project, plus 10 per cent waste.
7. Cost of all materials, plus 25 per cent waste, plus 5 cents per foot for finish.
8. Actual cost of the materials.
9. Actual cost plus 1/3 for waste, plus hardware and finish.

In listing these practices, the writer merely copied the methods as listed on the returned inquiry forms. One method was extremely interesting which is not listed above. The students were required to make the same projects, the total cost of all the supplies was determined and then divided by the number of pupils taking the class. Of these methods listed,

only those mentioned as being used by at least three teachers will be discussed. Those methods will be discussed and a tentative evaluation of them will be made in the next part of this thesis.

A TENTATIVE EVALUATION OF THE METHODS OF ISSUING SUPPLIES AND OF FIGURING COSTS OF PROJECTS IN INDUSTRIAL ARTS SHOPS

The following trial evaluation was made with the purpose of showing the relative merits of several practices of supplies management used by teachers as reported in the study. No final recommendation as to a best practice can be made as a result of this evaluation. The opinions of several experienced teachers are given here as a guide for the less experienced teacher. There is no one system which can be designated as the only method which should be used, due to the different circumstances under which they are put into practice.

A method of evaluation was needed and after some study, it was decided that a form to be checked would be the best method. A discussion of the technique used and of the forms drafted is included in the following part of this thesis.

The Evaluation Technique. It was the present investigators belief that few industrial arts teachers will fully agree as to the best methods of issuing supplies and of figuring the cost of a student-made project. With this view in mind, an evaluation sheet was made which was to be checked by several teachers of wide experience. It was predicted that the result of this trial would indicate a wide divergence of opinion as to the best method in use.

Five men who are teaching or have taught college classes after having had experience on the high school level, were asked to evaluate the practices of issuing supplies and of figuring the cost of projects.

The evaluation sheet was divided into two parts, the upper part of the sheet contained the criteria of good methods and a list of the methods of issuing supplies to be rated. A chart with checking spaces was placed at the right of the list of methods. This chart had numbers corresponding to those given the criteria and were to be checked in the order given.

The form for rating the project cost methods was identical in form but included five criteria as compared to four listed as essentials of a good issuing method. A copy of the form used in the evaluation is contained on page 48.

Evaluation of Methods of Issuing Supplies. The rating sheets were distributed among the members of the rating jury and later returned. On examining the forms, after being checked by the jury, it was found that the requiring of the use of requisitions by the pupil had been chosen as the best method. This method received fifteen of a possible twenty votes. The "Supply Room and Student Clerk" method was chosen as the second best method, receiving thirteen votes of a possible twenty. The "Lumber-yard Method" received eleven votes giving it third place ahead of the "Instructor Issues All Supplies" method which only received nine votes. A sheet containing tabulations of these forms is included as page

Evaluation of Methods of Figuring Costs. It was found, after tabulating the evaluation sheets checked, that two methods were rated of equal value. The methods were stated as: "Stock bill plus 1/3 for waste and finish."

Each of these methods received sixteen votes of a possible twenty-five. The other two methods received fifteen and eight votes, respectively. They were stated as: "Stock bill plus 10 per cent waste, plus hardware and finish" and "Open store room, Pay for what is actually in the project." The tabulations of these methods are contained in page

The Jury Rating Discussed. The jury was asked to rate the supplies issuing methods on the basis of the criteria which were believed to be foundations of good methods. These were stated as:

1. Does the method save time?
2. Is it an economical method? (Economical to the shop and pupil)
3. Does it teach "Consumers' Knowledges"?
4. Can records be closed on short notice?

Using these conditions as a basis for rating the methods, the jury believed that the student running the supply room was the best time saver, all methods listed were economical except the lumber-yard method which received no votes as it was believed to be uneconomical to the student. The "Lumber-Yard" method was rated as the best as a means of gaining consumers knowledge. The requisitioning of supplies from the stock room and the lumber-yard method were rated as equal in regard to the question: "Can records be closed on short notice?" When all the forms had been checked and tabulated, it was found that the "Supply Room and Student Clerk" method was rated as the best method of issuing supplies in the industrial arts shop.

In rating the methods of figuring cost, the jury considered the following criteria:

1. Does the method save time?
2. Does it teach "Consumers' Knowledges?"

EVALUATION OF METHODS OF ISSUING SUPPLIES IN INDUSTRIAL ARTS CLASSES

CRITERIA OF GOOD METHODS

1. Does the method save time?
2. Is it an economical method?
3. Does it teach "Consumers' Knowledges?"
4. Can records be closed on short notice?

Note: Please check the method or methods which most nearly fill the above criteria.

	1	2	3	4
1. Lumber-yard method. Pupil furnishes own supplies				
2. Requisitioning supplies from the store room..				
3. Supply room and student clerk				
4. Instructor issues all supplies				

EVALUATION OF METHODS OF ARRIVING AT THE COST OF STUDENT MADE PROJECTS

CRITERIA OF GOOD METHODS

1. Does the method save time?
2. Does it teach "Consumers' Knowledges?"
3. Can records be closed on short notice?
4. Does it insure reasonable, fair price?
5. Does the method insure against loss if the pupil drops out when the project is partly finished?

	1	2	3	4	5
1. Stock bill plus 1/4 for waste and finish					
2. Stock bill plus 1/3 for waste and finish					
3. Stock bill plus 10 per cent, plus hardware and finish					
4. Open store room. Pay for actually what is in the project					

3. Can records be closed on short notice?

4. Does it insure reasonable, fair price?

5. Does the method insure against loss if the pupil drops out when the project is partly finished?

The first two methods named, "stock bill plus 1/4 for waste and finish," and "stock bill plus 1/3 for waste and finish", were each given five votes as a time saving method of figuring costs.

All methods were believed to teach "consumers' knowledges" to a degree. All methods, except the open store room method, received a majority of the possible votes on the question: "Can records be closed on short notice?" The stock bill, plus 1/4 for waste and finish received the best rating as a fair price method. None of the methods listed received a majority of the possible votes when check for: "Does the method insure against loss if the pupil drops out when the project is partly finished?" The final tabulations rate the "stock bill plus 1/4 for waste and finish" and "stock bill plus 1/3 for waste and finish" methods as the best as rated by the check sheet criteria.

Summary. It has been the purpose of this chapter to give a picture of the supplies management program as practiced in the schools selected for this study. Trial evaluations of the methods used have been made and the results tabulated.

It is the purpose of Chapter V to propose a plan of supplies management and forms needed in supplies management which will be suitable for use in the average school in Oklahoma.

EVALUATION OF METHODS OF ISSUING SUPPLIES IN INDUSTRIAL ARTS CLASSES

CRITERIA OF GOOD METHODS

1. Does the method save time?
2. Is it an economical method?
3. Does it teach "Consumers' Knowledges?"
4. Can records be closed on short notice?

Note: Please check the method or methods which most nearly fill the above criteria.

	1	2	3	4	Total
1. Lumber-yard method. Pupil furnishes own materials	2	0	5	4	11
2. Requisitioning supplies from the stock room.	2	5	4	4	15
3. Supply room and student clerk	5	4	2	2	13
4. Instructor issues all supplies	0	5	2	2	9

EVALUATION OF METHODS OF ARRIVING AT THE COST OF STUDENT MADE PROJECTS

CRITERIA OF GOOD METHODS

1. Does the method save time?
2. Does it teach "Consumers' Knowledges?"
3. Can records be closed on short notice?
4. Does it insure reasonable, fair price?
5. Does the method insure against loss if the pupil drops out when the project is partly finished?

	1	2	3	4	5	Total
1. Stock bill plus 1/4 for waste and finish	5	3	3	4	1	16
2. Stock bill plus 1/3 for waste and finish	5	3	3	3	2	16
3. Stock bill plus 10 per cent waste, plus hardware and finish	4	4	3	3	1	15
4. Open store room. Pay for actually what is in the project	1	3	1	3	0	8

CHAPTER V

A PROPOSED PLAN OF PURCHASING, ISSUING AND ACCOUNTING RELATING TO SUPPLIES IN INDUSTRIAL ARTS DEPARTMENTS IN OKLAHOMA

The problem of the thesis presented itself to the investigator during the past year while teaching shop work in an average size school in Oklahoma. It would seem to be appropriate to plan the program to fill the needs of this type of school.

Due to the relatively large classes and the relatively short length of the class period, a supplies management program should be devised which will take the minimum amount of time from the instructional duties of the teacher. It is believed that too much time is consumed in the average shop in keeping accounts, writing receipts, issuing supplies and collecting for projects and that a study which made the solution of this problem its aim, would be of value to the investigator and possibly to others teaching industrial arts. With these needs in mind, the problem of the thesis was pursued with more than ordinary interest. The final phase of this thesis consists of recommended procedures for purchasing, issuing and accounting for supplies in an industrial arts shop and a series of forms designed to expedite these transactions.

The proposal is divided into four parts: (1) methods of financing the department; (2) methods of purchasing supplies; (3) suggested methods of issuing supplies; (4) recommended practices relating to accounting for the income and (5) a series of forms designed for use in the first three groups of activities.

METHODS OF FINANCING THE INDUSTRIAL ARTS DEPARTMENT

There are several methods of financing the industrial arts department. A plan which will provide enough money to make purchases of large orders of supplies is, perhaps, the most valuable to the department. This plan allows those in charge of purchasing the supplies to place orders for semester needs at one time, taking advantage of the savings possible when purchasing in quantities.

Preliminary Appropriations by the School Board. Where it is at all possible, the industrial arts department should have a fund supplied by the school board which would be large enough to allow the department to buy semester needs at one time. There is a practice, in some Oklahoma schools, of the board furnishing a revolving fund which is repaid by the department each year. The board makes the appropriation to the department with the understanding that the instructor is to return all or a part of it at the end of each semester or at the end of the year. This plan is very satisfactory and is recommended by this study. The desirable points of this method of financing the shop program are that it furnishes the means of buying large orders at the beginning of the year and supplies the necessary means of purchasing incidental needs.

Collection of the Cost of Projects When Finished. By a study of the questionnaire forms returned, it was found that the practice of collecting for projects after their completion was a common practice. Where the students of the department are of average means, this practice cannot be recommended, but in the average school this is not the case. Since there are schools located in poor districts where the pupils cannot

obtain enough money to pay a fee of two or more dollars at the beginning of the school term, this practice can be justified. One of the greatest criticisms of this practice is that the student leaving the school in the middle of the term may fail to pay his shop account unless some method is devised which will compel him to do so. In schools where no appropriation for the support of the departmental supplies program is made, this method does not supply the necessary fund for purchase of semester needs at the beginning of the school term.

The practice of collecting for projects on completion is recommended in the system where the school board makes available a revolving fund for support of the industrial arts department.

Fees Charged. It is recommended that a twenty-five cent book fee shall be charged each pupil who enrolls in the shop department and shall be collected in advance. This fee shall not be returned to the pupil at the end of the year.

A project fee is desirable in the schools where industrial arts is offered as an elective subject and is not required. This fee should be possibly two dollars per semester charged with the understanding that if the pupil uses more than two dollars worth of materials, he would be held responsible for the difference. In spite of the desirability of this method, it could not be recommended for use in the junior high school where industrial arts is required of all students. There would be too many cases where the pupil would not be able to obtain the money to pay his fee.

This thesis recommends that the project fee be charged in the high schools and that only a book fee be charged in the junior high school, all projects to be paid for on completion.

Maintenance Cost. This thesis recommends that the school board pay the cost of all maintenance of the shops department either by a direct annual appropriation for maintenance or by refunding the cost of all maintenance financed by the department from the revolving fund. As it is a common practice for the shop instructor to make all minor repairs, it would seem that this would not be too much to ask of the school board.

Appropriations for New Equipment. Some school boards will make appropriations for small yearly additions to the equipment of the school shop when they would not approve requests for new equipment on a large scale. Due to this practice, it is well for the instructor to plan the addition of a few pieces of new equipment from year to year. The essential needs should be determined by the instructor and with additions to be requested each year until the necessary equipment to fill the need has been procured. It is recommended that this system be used in obtaining new equipment.

METHODS OF PURCHASING SUPPLIES

There are several methods of purchasing supplies which are practiced in the schools of Oklahoma. It has been found that some schools make it a policy to buy all materials from local concerns while others buy the greater part of their supplies from other sources. Some schools are found to follow rigid practices of purchasing while others are very lax in their methods.

The problem of purchasing supplies is analyzed into several separate divisions as: (1) a method of determining the amount of supplies needed; (2) obtaining the necessary money to purchase the supplies; (3) determining who shall make the purchases; (4) when the purchases shall be made; (5) where the purchases shall be made and (6) how the purchases shall be made.

In the recommendations the following general rules will prevail.

Estimating the Needs. In general, the needs of the department should be anticipated so that a large percentage of these can be bought before school opens. As a means of estimating the supplies needed for the coming year, Ericson gives the following advice to the industrial arts teacher: (6, page 27-28)

> Records of work, enrollment and other details, of previous years, as well as those indicating possible enrollments for the coming year furnish the most satisfactory basis upon which to act. Some school systems are demanding that supplies be specified for the entire semester while others offer the opportunity of ordering many items as needed from time to time. If the former system prevails, the teacher can do nothing but anticipate the maximum needs and act accordingly.
>
> There should be careful analysis of the problem, however, rather than a blind guess at the demands.

These estimations should be made at the end of the school year after trail enrollment for the next year has been made in the school.

Who Shall Make the Purchases? All supplies shall be purchased by the instructor with the approval of the principal or superintendent. This applies to purchases of considerable quantity only. The instructor shall purchase small items on open accounts without the approval of his superiors. This pertains to purchases not exceeding ten to fifteen dollars worth of supplies per month.

Where Shall Purchases be Made? Purchase of all supplies which are commonly stocked by the local concerns shall be made in the local town. This practice will have the approval of the superintendent and the board and can be relied upon to gain the good will of the local merchants. Hard to

get supplies or those supplies not handled by the local merchants shall be bought from the distant concerns which the instructor deems best.

When Shall Supplies be Purchased? It shall be the practice of the department to buy semester needs before the beginning of the school term and to replenish these supplies as needed.

How Shall the Supplies be Purchased? Several methods of purchasing the supplies are needed and standard rules should be followed in making all purchases.

All purchases shall be made by means of a regular requisition form which shall be issued by the teacher and countersigned by the principal.

All purchases exceeding ten dollars in cost shall be made on competitive bids. The teacher should make it a point to learn to write clear concise orders in order to avoid undesirable substitutions.

Open accounts limited to a total of from ten to fifteen dollars per month may be provided to allow for emergency purchases. These purchases may be made by the instructor with no other formal approval by the principal or the superintendent.

ISSUING SUPPLIES

This study included the issuing of supplies as a problem shop management program and from knowledge gained of the different methods in use in Oklahoma schools, the recommendations will be made. The problem of issuing materials probably takes more of the instructor's time than any other duty other than instruction.

The Method Recommended for Issuing Supplies. The methods of issuing supplies have been discussed in preceding chapters of this study and will

not be reviewed in general.

After a study of the evaluations and of the inquiry forms, as well as text book and methods books recommendations, the investigator believes that the best method for the average shop is by use of the supply room where supplies are issued by student clerks. This method saves time for the teacher, teaches consumers' knowledges, gives training in keeping certain accounts and records, makes for a more democratic procedure in conducting the shop class and keeps waste of materials at a minimum.

The supply room clerk trains his assistant to take his place, in this way the pupils may be rotated through this duty with little additional instructions from the teacher.

Forms to be Used in Connection with Issuing Supplies. Too many forms to be filled by the student confuse the pupil and simply require more records to be kept. It is recommended that the Project Record Form (page 62) containing a list of all the materials used in the project, be used in issuing the supplies and the supply room clerk can check the supplies as issued. By keeping all project sheets, the instructor has a check on the materials issued to the pupil. It is admitted that this system does not account for parts lost or spoiled, but pupils are placed on their honor to report all extra materials used.

After the supplies have been issued, the problem of keeping suitable records of them presents itself.

ACCOUNTING METHODS RECOMMENDED FOR USE IN SUPPLIES MANAGEMENT

Through the use of businesslike accounting methods, the industrial arts teacher can make his supplies management duties less demanding upon his time. A good system of records, and there need not be many, will

enable him to keep more accurate accounts of the supplies used in the shop.

It is believed that the following records are essential and will, perhaps, fill the need of the average shop. First, a record of all supplies purchased and all monies collected should be kept in some type of permanent leaf ledger; second, a method of keeping the accounts of the individual pupils is needed; and third, a suitable record of supplies, inventory should be provided. To supply these accounting needs, certain forms are demanded. The accounting methods and forms believed to be essential to the industrial arts program in the average school shop will be recommended in the following sections of this thesis.

General Accounts. This term is used here to mean the records of all purchases and disbursements pertaining to the shops department.

A permanent leaf ledger is recommended for keeping a complete record of requisitions issued, amounts received on accounts and amounts deposited in the principal's office. This method can be recommended over the file cabinet with each account separate. It is recommended that all invoices be retained in a suitable file for future reference.

Individual Accounts. A card index system containing a separate card for each pupil is recommended for use in the average school. This card is to contain the pupil's name, grade, home room, shop period and a place for a record of the projects made. The four by six inch card is recommended and the form (page 66) can be reproduced by means of the mimeograph machine.

This method will require very little of the instructor's time if the cards are kept in alphabetical order.

Inventory Record. It should be a practice in the Oklahoma schools to make an inventory of equipment and supplies at the end of each year. Copies of these inventories should be filed in the principal's office. It is suggested that these inventories be made separately. An inventory form is recommended for use in the average shop and is included in this thesis as page 85.

Collections. A review of the questionnaire forms answered and returned in this study, would seem to show that it is a prevailing practice for the instructor to collect payments for materials used and to deposit this money with the school office. Perhaps the ideal method would be for the office to collect all monies involved.

It is recommended that the instructor make the collections and give the pupil a receipt for the money paid. At stated intervals the money should be deposited in the office.

Receipts. A receipt shall be made by the instructor for all payments made to him and given to the pupil. This receipt shall be in duplicate to form a record of payments made.

A majority of the teachers in Oklahoma use some form of receipt. This policy is essential to good methods of managing the shop program and cannot be too highly recommended. The type of duplicating receipt book which contains several receipts on each page, requiring the changing of the carbon only after several receipts have been written, is perhaps the best type to use. This type of duplicating receipt book saves much of the teacher's time.

Project Cost. The method of figuring the cost of the student-made project which shall be used is that of the finished size stock bill plus 1/3 to

cover the cost of waste, screws, glue, sandpaper, finish etc. This method is believed to be fair especially when the majority of the projects are small. This method is recommended for use in figuring project cost in wood and metal activities.

RECOMMENDED FORMS

Some typesof forms are necessary in the supplies management program if accurate and systematic records are to be kept. Due to the expense of having these forms printed, the forms recommended in this study are to be reproduced by other means. The mimeograph is recommended where a great many copies are to be made, as the final copies are found to be as clear as those reproduced first.

Forms to be Mimeographed. Several forms have been made as a part of this study and are included in this chapter. These forms, which may be changed to fit the need of the particular teacher, are recommended:

1. The Project Record Sheet. This form is to be used by the student and should be complete and requires the instructor's approval before the project is begun.

2. The Accumulative Record of Individual Student Work. This form is of particular value for use in the general shop where the pupil rotates through several different shop subjects.

3. The Work Order. This form is to be used as a record of work done by the department for the school. Supplies used by the shops in construction of school property should be replaced by the school.

4. The Supply Requisition. This form is essential to the program and should be used when making all purchases.

5. A Card Index Form. A record of the projects made by the pupil is kept on this card and later transferred to the Accumulative Record Form.

These suggested forms are included in this chapter as pages 62 to 66.

Methods of Reproducing Forms. Few of the schools in Oklahoma include printing as a subject taught in the shop and must, therefore, have all printing done by a commercial firm. The cost of printing forms to be used in the industrial arts department could not be provided in the budget of the average shop program. Most schools do have some method of reproducing the work needed. The most common of these are by means of the mimeograph and the ditto machines. As these methods are much cheaper than printed forms, their use in the average school is not prohibitive. A set of printed forms from a representative school is included in Appendix B.

Summary. The proposed methods will not be agreed with by all but they are believed by the writer to be sound in principle. These methods may be used to advantage with slight modifications in the average school shop. This program of methods and the suggested forms will be put into actual practice in the general shop of the Ada Junior High School for the coming year.

PROJECT RECORD FORM

Any School Shop Department

NOTE: This form must be filled out and approved before project is started. INSTRUCTIONS: Make a complete drawing of the project, fill out the form and get the instructor's OK before starting the project. Keep this sheet in your folder when not in use.

Pupil's Name_____ Period____ Grade___ Shop No.____

Project Started_____ Project Finished_____ Teachers OK._____

(MAKE DRAWING HERE)

BILL OF MATERIAL

Number Pcs.	Issued By	Name of Piece	Kind of Material	T.	W.	L.	Bd. Ft.	Cost

Type of Finish_____

No. Screws Used_____ Sand Paper_____ Sheets

Other Supplies Used_____

Cost of Materials____

Other Supplies_____

Waste_____

Total Cost_____

Paid Date_____

Any School Shop Department

ACCUMULATIVE RECORD OF INDIVIDUAL STUDENT WORK

Name____________________ Grade_______ Home Room_______ Age____

Address_______________ Parents Name_____________ Phone Number______

Occupation of Parent or Guardian____________________________

AREA	PROJECT	BEGUN	FINISHED	COST	DATE PAID	GRADE

Any School Shop Department

WORK ORDER

No._____

LOCATION_____

FOR THE_____DEPARTMENT

DATE_____

Industrial Arts Department:

Please do the following work.

(DESCRIPTION OF WORK)

_____

_____

_____

_____

_____

_____

_____

If any materials are needed, they are to be purchased from_____

_____and charged to the_____fund.

Date Wanted_____

Signed_____

Principal of School

Any School Shop Department

SUPPLY REQUISITION

To The Office:

Please order the following supplies for the Industrial Arts Department.

Date_____

Order No._____

Where to order_____

Address_____

Ship Materials by_____ Date Needed_____

Quantity	Article	Catalog Price	Actual Cost	Date Received
		Actual Cost		

TOTAL COST_____ Requested by_____

Plus Freight_____ Approved_____
Principal

Cost to Department_____

The following form is to be reproduced on a four by six inch, ruled card:

CARD INDEX FILE

Name_____ Grade____ H.R._____ Period_____

Project	Cost	Date Paid	Date Begun	Date Finished

CHAPTER VI

SUMMARIZING AND CONCLUDING STATEMENTS

The program of the average industrial arts department in Oklahoma is too narrow in scope, showing a need of a broadened program of activities to fill the needs of the pupils in an ever-changing industrial world.

Very little material on the subject of supplies management was to be found in magazines and methods books relating to industrial arts subjects. If the suggested methods of procedure as outlined in the methods books can be relied upon, many of the shops of Oklahoma are run on a sound basis.

No high school text book was found which gave suggested methods of supplies management other than project forms and methods of making and figuring the lumber bill.

The kind of program recommended to fill the present need in the industrial arts program as shown by the survey is to be found in the general shop or a series of unit shops.

The survey showed the average industrial arts program to include two years of woodwork and one year of industrial drawing.

Out of a total of one hundred possible returns of the inquiry form, sixty-seven answers were received.

In purchasing supplies, the instructor of the average school does the purchasing with the approval of the principal of the school.

It was found that most supplies were bought by requisition and by competitive bids in the larger systems, while this method was not prevalent in the one-teacher schools. Most of the smaller schools allow

the instructor to purchase his supplies when needed, with preference given to the local concerns. Most supplies are bought in the local city.

The jury agreed that the student clerk operating the store room was the best method of issuing supplies. Some restrictions were applied as to small materials such as screws, lacing, abrasives, etc.

Two methods of figuring the cost of student-made projects were rated by the jury as being the best practices, they were: the stock bill plus 1/3 to cover the cost of waste, screws, sandpaper, finish, etc., the other method is identical except that only 1/4 is added to the stock bill to cover cost of waste and materials other than wood.

Less than half of the schools included in the survey received any appropriation in the 1939-40 school budget.

Sixteen cases were found where receipts were not used.

The majority of the high school classes ranged from eleven to thirty while the greater part of the junior high school classes ranged from twenty to forty.

A study of the methods in use was deemed necessary before recommendations for a suitable supplies management program could be made. The following forms are suggested for use in the average school shop:

1. Project Record Sheet
2. Accumulative Record of Individual Work
3. Work Order. For all work done for the school by the department.
4. Supply Requisition, to be used in making all purchases.
5. A Card Index Form. To be used in keeping a handy record of the individual student's work from day to day.

There is a need for more financial aid to the industrial arts program in order to broaden the scope of the subjects offered.

In the average industrial arts shop in Oklahoma a number of units of activity should be added to supplement the woodwork now being offered. More general shops are needed.

Good practices are being used in the issuing of supplies in most of the shops studied.

The average shop class is not too large for good practices to be carried out in the management of the shops supplies.

The Need for Further Study. A similar study could be made after a period of six or seven years to determine the improvement, if any, of the practices of purchasing and issuing supplies.

A study of the sources of materials used in industrial arts classes would be of value.

Methods of caring for supplies used, such as leather, metal, plastics and wood should be devised and described.

A study of the brands and sizes of tools for the different grade levels would seem to be a worthwhile study.

A careful study of the many materials used in the general shop should be made. This could eventuate in a single page of specifications for each common material such as shellac, glue, sheet copper, sheet tin, etc. Cost, sources of purchase, unit selling price and other useful information would be found on each information sheet.

APPENDICES

A. A Selected Bibliography

B. The Questionnaire Used in the Study

C. Sample Forms Used in Oklahoma Schools in the Process Of Purchasing, Issuing and Accounting for Supplies.

1. Project Forms

   a. Project Form used by the Woodwork Department of Cushing High School, Cushing, Oklahoma.

   b. Project Form used by the Industrial Arts Department, Oklahoma A. and M. College, Stillwater, Oklahoma.

   c. Project Form sold by the McCormick-Mathers Company, Wichita, Kansas.

   d. Stock Bill and Bill of Material, used by the Industrial Arts Department, Oklahoma A. and M. College, Stillwater, Oklahoma.

   e. Auto Mechanics Repair Record Sheet used by the Industrial Education Department of Tulsa Public Schools, Tulsa, Oklahoma.

   f. Materials Requisition, Project Record Card, Woodwork Supplies Card and Missing Tools Card used by the Cushing High School, Cushing, Oklahoma.

2. Inventory Forms.

   a. Equipment Inventory Form used by the Industrial Education Department, Tulsa Public Schools, Tulsa, Oklahoma.

   b. Finish Materials Record Form used by the Industrial Education Department, Tulsa Public Schools, Tulsa, Oklahoma

   c. Supplies Furnished by the Board, inventory form, used by the Industrial Education Department, Tulsa Public Schools, Tulsa, Oklahoma.

   d. Inventory form used in Ada Public Schools.

APPENDIX A

A SELECTED BIBLIOGRAPHY

1. Abelson, Harold H., The Art of Educational Research, World Book Co., New York, 1933, 332 pages.

2. Bonser, Frederick G., Industrial Arts for Public School Administrators, Teachers College, Columbia University, New York, 1930, 95 pages.

3. Brown, Arthur G. and Tustison, F.E., Instructional Units in Hand Woodwork, Bruce Publishing Co., Milwaukee, Wisconsin, 1930, 222 pages.

4. Crawford, Claude C., The Technique of Research in Education, The University of California, Los Angeles, California, 1928, 320 pages.

5. Douglass, J. H. and Roberts, R. H., Instruction and Information Units for Hand Woodworking, McCormick-Mathers Co., Wichita, Kansas, 1936, 128 pages.

6. Ericson, Emanual E., Teaching Problems in Industrial Arts, The Manual Arts Press, Peoria, Illinois, 1930, 433 pages.

7. Friese, John F., Exploring the Manual Arts, The Century Company, New York, 1926, 412 pages.

8. Friese, John F., Course Making in Industrial Arts, The Pennsylvania State College, State College, Pennsylvania, 1934, 79 pages.

9. Hausrath, Alford H., Jr., "A Shop Record System", Industrial Arts and Vocational Education, 23:50-57, February, 1934.

10. Hooper, P. C., "The Annual Requisition", Industrial Arts and Vocational Education, 22:181-3, May, 1933.

11. Hunt, DeWitt, A Manual for Hand Woodworking, Book II, Harlow Publishing Company, Oklahoma City, Oklahoma, 1925, 165 pages.

12. Kinison, Charles R., "A System of Accounting for the Industrial Arts Shop", Industrial Arts and Vocational Education, 28:342-4, September, 1929.

13. Metz, John J.,"Editorial Records and Reports", Industrial Arts and Vocational Education, 20:365 October, 1931.

14. National Education Association, Research Bulletin, "Vitalizing the High School Curriculum", The National Education Association, Washington, D. C., 7:175-274, September, 1929.

15. Newkirk, Louis V. and Stoddard, George D., The General Shop, The Manual Arts Press, Peoria, Illinois, 1929, 190 pages.

16. Paine, H. W., "School Shop Management", Industrial Arts and Vocational Education, 21:194-7, June, 1932.

17. Reagh, Arthur L., "Trends Influencing Industrial Education", Industrial Arts and Vocational Education, 29:189-191, May, 1940.

18. Reeder, Ward G., How to Write a Thesis, Public School Publishing Company, Bloomington, Illinois, 1930, 216 pages.

19. Schweickhard, Dean M., Industrial Arts in Education, The Manual Arts Press, Peoria, Illinois, 1929, 367 pages.

20. Smith, Homer J., Industrial Education, Administration and Supervision, The Century Company, New York, 1927, 334 pages.

21. Stephan, James Otto, Industrial Arts Supply Costs and Records in Eight Franklin County, Ohio Schools, an unpublished thesis, Ohio State University, 1936, 81 pages.

22. Stephan, James Otto, "Simplified Supply Cost and Record System", Industrial Arts and Vocational Education, 29:180-4, May, 1940.

23. Struck, F. Theodore, Creative Teaching, Industrial and Vocational Education, John Wiley and Sons, Inc., New York, 1938, 623 pages.

24. Struck, F. Theodore, Foundation of Industrial Education, John Wiley and Sons, Inc., New York, 1930, 492 pages.

25. Struck, F. Theodore, Methods and Teaching Problems in Industrial Education, John Wiley and Sons, Inc., New York, 1929, 214 pages.

26. Taylor, Byron M., "Industrial Arts Supplies", Industrial Arts and Vocational Education, 22:183-6, May, 1933.

27. Van Duzee, Roy R., "Industrial Arts Departmental Supplies, Maintenance and Equipment", Industrial Arts and Vocational Education, 21:143-9, May, 1932.

28. Vaughn, Samuel J., and Mays, Arthur B., Content and Method of the Industrial Arts, The Century Company, New York, 1924, 397 pages.

PROBLEMS OF PURCHASING, STORING, AND ACCOUNTING RELATING TO SUPPLIES USED IN INDUSTRIAL ARTS CLASSES IN OKLAHOMA

By JAMES C. EMERSON, JR.

ADA, OKLAHOMA

This inquiry form is being sent to one hundred selected teachers in Oklahoma in order to secure information about current practices in purchasing, storing, and accounting for supplies used in Industrial Arts Classes in Oklahoma. Will you please fill in the following blanks?

Name of teacher _____ City _____

Name of School _____ Type of School _____

Type of Shop _____

Fill out this table giving your daily schedule and information

Period	Ind. Arts Course	Class Size	Amount* of Fee--for course	Average ** Cost Per Pupil	Types of Projects
EX.	W.W. 1	20	$ .50	$1.00	Book rack, Tie racks
1.					
2.					
3.					
4.					
5.					
6.					

* This refers to initial deposits or collections to apply on cost of supplies used.

** Please estimate total average cost of course per pupil.

METHODS OF PURCHASE

Who purchases supplies? (Check answer) Instructor_____; Head of Dept. _____; Board of Education_____; Other Methods._____

_____

Are all purchases made on requisition? _____? If not, what percentage of purchases are made on requisition?_____. Where are supplies purchased? (Give percentage) Locally_____; In state, out of local city_____; Out of State_____; Are materials and supplies purchased on the basis of competitive bids?_____ (Yes or No) Comments_____

_____

_____

ISSUING OF SUPPLIES

Are supplies freely accessable to students?_____. Are all supplies issued by instructor or student supplies clerk?_____Please explain your method of issuing supplies._____

_____

_____

_____

_____

FIGURING COSTS

Who figures the cost in a student made project?_____

_____

When is the cost figured?_____

What method is used in figuring the cost? Please elaborate._____

_____

_____

_____

COLLECTION OF MONIES----

Check the method of collecting followed in your shop. Is any portion of the materials cost paid for by the school?_____; How much?_____. A fee is charged for each course and is collected in advance._____; A percent of the estimated cost is paid in advance, and the balance on completion of the project._____What percent?_____. Each project is paid for on completion._____. Project money is handled by: Office____; Instructor____. Do you use a duplicating (carbon copy) form of receipt for all payments made by students?_____ If any other method of collecting is used please give particulars._____

_____

_____

_____

_____

ANNUAL REPORTS

Do you make an annual report of receipts and expenditures including per-pupil-costs, to the superintendent and school board?_____

Explain:_____

MAINTENANCE

What amount of money was appropriated, in the school board budget, for departmental support for the year 1939-1940?_____

Must all supplies be purchased from fees received? Yess_____; No_____.

Is fee to cover both project cost and shop maintenance and tool replacement?___

_____. Other comments_____

_____

_____

Ada, Oklahoma
June 10, 1940

Dear Fellow Teacher:

Some time ago you received an inquiry form on, Problems of Purchasing, Storing and Accounting for Supplies used in Industrial Arts Shops in Oklahoma. As this is an important part of my thesis and your cooperation is extremly necessary in making this study accurate, I am expressing the hope that you will fill out and return this form at the earliest possible date.

Thanking you for your cooperation and kindness, I am

Sincerely Yours,

James C. Emerson

James C. Emerson,
Teacher of General Shop
Ada Junior High School
Ada, Oklahoma

PROJECT PLAN and RECORD SHEET

WOODWORK DEPARTMENT CUSHING HIGH SCHOOL

THINK THE THING THROUGH, THEN SEE THE THING THROUGH; FINISH THE JOB.

ect No. _____ Project Group _____

e _____ Project _____

Source of Plan _____

king Drawing. Use the space provided on the back of this sheet.

e Record. Use the numbers on the margin to record dates and time.

r of Procedure. Break the job into the different steps or divisions. Arrange and list these in the proper order rocedure.

_____ 2. _____

_____ 4. _____

_____ 6. _____

_____ 8. _____

_____ 10. _____

_____ 12. _____

_____ 14. _____

_____ 16. _____

_____ 18. _____

_____ 20. _____

Tool Processes. Check the list of tool processes for those to be used on this job for the first time. List a Good rence for each.

New Process	Reference (Book and page)

k Bill. Dimensions listed here should be for Finished Size.

Name of Piece	T x W x L	No. Pos.	Name of Piece	T x W x L
	x x			x x
	x x			x x
	x x			x x
	x x			x x
	x x			x x
	x x			x x
	x x			x x

ut Plan for Materials. Use the space provided on back of sheet.

Record. List here all items of material to be used in the construction of the project. Items purchased elsee or brought from home, should be listed and described. Write "own" under cost.

Pieces	Materials	Dimensions	Quantity	Price Ea.	Cost
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Coats	(Finish)		___ Sq. ft	@	$
___ Coats	(Finish)		___ Sq. ft	@	$
l Estimated cost (To be entered against account)					$

al Cost. Make all corrections in cost here, after plan is Okeyed.

___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
___ Pcs.		x x	___ ft.	@	$
al Cost (Estimated cost plus or minus corrections)					$

PROJECT AND BILL OF MATERIAL RECORD FORM
Copy drawing and make bill of material before
starting any new project.

Name of Project _____ Teacher's Ok. _____

THE STOCK BILL

Finished Size						Cutting Size				
Number	Name	T	x W	- L	Cu. In.	Number	T	x W	- L	

Student's Name _____ Date _____

Project | Date Began | Date Finished | Total Hrs.

DATE Mo.	DATE Day	DATE Year	NAME OF PART OR ARTICLE	KIND OF WOOD	QUANTITY	CUTOUT SIZE T'	CUTOUT SIZE W'	CUTOUT SIZE L'	FINISHED SIZE T'	FINISHED SIZE W'	FINISHED SIZE L'	TOTAL BD. FT.	COST PER BD. FT.	TOTAL COST	Check	NOTES OR COMMENTS

Total Cost of Wood $

DATE MO.	DATE DAY	DATE YEAR	HARDWARE	NO.	PRICE EACH	TOTAL COST
			Total Cost of Hardware			

DATE MO.	DATE DAY	DATE YEAR	FINISHING AND UPHOLSTERING	PRICE EACH	TOTAL COST
			Total Cost Upholstering & Finishing		$
			Total Hardware		$

GRADE_____ Instructor_____

Charges Paid | MO. | DAY | YEAR |

Total Charges $

Form No. SS-83 — The McCormick-Mathers Co., Wichita, Kansas

ORDER OF PROCEDURE

JOB ANALYSIS

In the "A" columns, check **all** the Information and Operation Units involved in this project. In the "B" columns, check only the **new** units involved. For unit titles, see Table of Contents in each of the publications below.

Instruction and Information Units for HAND WOODWORKING — Revised Edition — Douglass & Roberts
The McCormick-Mathers Company — Wichita, Kansas

Information Units								Instruction Units							
Unit	Pages	A	B	Unit	Pages	A	B	Unit	Pages	A	B	Unit	Pages	A	B
1	10-12			16	79-80			1	19-22			17	67-68		
2	13-14			17	81			2	27-28			18	69-70		
3	15-16			18	82			3	31-32			19	71-72		
4	17-18			19	83-84			4	35-36			20	77-78		
5	23-24			20	87-88			5	37-38			21	85-86		
6	25-26			21	91-92			6	39-40			22	89-90		
7	29-30			22	95			7	41-42			23	93-94		
8	33-34			23	96			8	43-44			24	97-98		
9	47-48			24	99-100			9	45-46			25	102		
10	51-52			25	101			10	49-50			26	104		
11	55-56			26	103			11	53-54			27	106		
12	60			27	105			12	57-58			28	108		
13	63-65			28	107			13	59			29	109-110		
14	73-74			29	111-112			14	61			30	113-114		
15	75-76							15	62			31	115-116		
								16	66						

Information and Operation Units in MACHINE WOODWORKING — Robert E. Smith
The McCormick-Mathers Company — Wichita, Kansas

Information Units				Operation Units (cont'd.)											
Unit	Pages	A	B	Unit	Pages	A	B	Unit	Pages	A	B	Unit	Pages	A	B
1	1-2			6	20-21			26	63-64			46	94		
2	2-3			7	21-22			27	64-65			47	94-101		
3	5-7			8	22-23			28	65-66			48	104-106		
4	7-9			9	23-24			29	67			49	106-107		
5	57-58			10	24-25			30	68-69			50	108		
6	59			11	26-27			31	69-71			51	108-112		
7	77-78			12	27-28			32	71-72			52	115-117		
8	102-104			13	29-30			33	73			53	117-118		
9	113-114			14	30			34	73-76			54	118-119		
10	127-129			15	31-33			35	79			55	120		
11	135-136			16	33-35			36	79-81			56	121		
12	142-145			17	36-38			37	81-83			57	121-126		
13	151-153			18	38-39			38	83-84			58	129-131		
				19	39-42			39	84-85			59	131-134		
Operation Units				20	43-46			40	86			60	136-139		
Unit	Pages	A	B	21	46-47			41	86-88			61	139-141		
1	9-11			22	47-48			42	88-89			62	145-147		
2	11-13			23	49-56			43	89-90			63	147-148		
3	13-15			24	60-61			44	90-92			64	148-150		

Oklahoma A. and M. College INDUSTRIAL ARTS EDUCATION Stillwater

INSTRUCTIONS: Before any student starts a project using any material furnished by this department, this Estimate Form must be filled out in duplicate form. One copy will be filed in the departmental office and the second copy will be retained by the instructor in charge of the student working on the project. The estimated cost will be subject to revision when the work has been completed. Students will not be permitted to start a new project until this form has been filled out and has been signed by the instructor.

Projects started as a requirement in a regularly scheduled course shall be paid for before the piece work is removed from the building. A project not a part of a regular course must be paid for before the student begins work on it.

STUDENT _____ PROJECT _____

Started _____ Finished _____ Course No. _____

STOCK BILL

No. Pc's	Name of Piece	Kind of Wood	T.	W.	L.	Cubic Inches

Total Cu. In. + 25% Waste ÷ 144 = Total Bd. Ft. Total _____

_____ + _____ ÷ 144 = _____ Bd. Ft.

BILL OF MATERIAL

1. _____ Board Feet _____ Lumber @ _____ = _____
2. _____ Board Feet _____ Lumber @ _____ = _____
3. _____ Board Feet _____ Lumber @ _____ = _____
4. _____ Sq., Ft., _____ Panel @ _____ = _____
5. _____ Sq., Ft., _____ Panel @ _____ = _____
6. _____ Sq., Ft., _____ Panel @ _____ = _____
7. _____ Hardware _____ = _____
8. _____ Glue, Sandpaper, Dowels, etc. _____ = _____
9. _____ Square Feet of Finish @ _____ = _____
10. _____ Screws @ _____ Each or Dozen _____ = _____
11. _____ Maintenance, Replacement _____ = _____
12. _____ Overhead, Use of Machines _____ = _____

Total Cost _____

Selling Price _____

AUTO MECHANICS REPAIR RECORD

TULSA MANUAL ARTS DEPARTMENT

r ..... Date .....

ss ..... Job No .....

hone .....

of Car .....

PARTS NO.	DESCRIPTION	COST
	TOTAL	

ATERIAL or FEE	DESCRIPTION	COST
	TOTAL	

Signature .....

FORMS USED IN CUSHING HIGH SCHOOL

CUSHING, OKLAHOMA

Project No. ------ **PROJECT RECORD** Project Grade ------

Project Group---- For Instructor's Files

Name ---------- ----------

Project ----------

Date Begun ---------- Date Finished ---------- No. Hours ------

No. Pcs.	Material	Size	Quantity	Pr. Each	Cost

Material Requisition

Name ----------

Date Received ------ Project No. ------

Project ----------

No. of Pieces ----------

Kind of Material ----------

Size of Stock ----------

Quantity ----------

Price Each ----------

Cost ----------

1 1 1 1 1 1 1 1 1 1

WOODWORK SUPPLY TICKET

50c

STUDENT'S NAME

INSTRUCTOR

DATE

No. 464

2 2 2 2 2 2 2 2 2 2

MISSING TOOLS

Tool _____ No. ____

Date _____ Period ____

Reported by _____

Shop............ School............

.........1935-36

.........1936-37

.........1937-38

"EQUIPMENT" INVENTORY

Industrial Education Department

TULSA PUBLIC SCHOOLS

...NTITY		Number Size Color Weight	NAME AND DESCRIPTION	1936	1937	1938
1936	1935					

(MAKE THIS OUT IN DUPLICATE)

Checked by.........1936

Checked by.........1937

Checked by.........1938

SYMBOLS
- W — Worn out (Incapable of Repair)
- B — Broken (Can be Repaired)
- S — Stolen
- L — Lost
- T — Transferred (To Whom Transferred)

FINISH MATERIAL RECORD No.__________

Tulsa Manual Arts Department Date__________ Period________

Name	Material	Quantity	Job

Teacher________________________ Shop________ School______________

"SUPPLIES FURNISHED BY THE BOARD" INVENTORY

Industrial Education Department

Date____________________

Quantity	Number Size Weight Color	Name	Value

Ada Public Schools

INVENTORY

Quantity	Description of Article	Condition			Approximate Value
		Excellent	Fair	Poor	