A PROGRAM OF GENERAL DRAWING
FOR LIMA CENTRAL HIGH SCHOOL

A Thesis Presented for the
Degree of Master of Arts

by

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THE OHIO STATE UNIVERSITY
1946

Approved by:

[Signature]
PREFACE

General drawing, as an orientation subject, is comparatively new in the scheme of general education of boys and girls. The experiment here presented is an attempt to associate drawing with actual life situations; to bring to light the many ways in which drawing is the servant of man regardless of vocation; to provide interesting drawing experiences which may result in useful applications; and to provide avenues for the seeker to see clearly and express his mental images graphically with logic, accuracy, and beauty.

Grateful acknowledgment for assistance, advice, and counsel is made to Dr. Robert E. Smith, Professor of Education, Ohio State University; to Dr. William E. Warner and numerous friends, who have from time to time offered advice and helpful criticism; and to my wife, Cosette, for typing the final copies of the thesis.

E. A. H.
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PART I

NATURE AND BACKGROUND OF THE STUDY
CHAPTER I

Drawing as a Subject of Study in the American High School

An overview of the various courses of study offered to youth in the public schools throughout the land would undoubtedly reveal that drawing, in some form, is included in the regularly prescribed curriculums. Further study would show that the formalistic concept of drawing is receiving the major emphasis as a school subject. Mechanical Drawing, as such, is being taught in most schools and consists largely of exercises and copy work bearing little or no relation to the realities of present-day living.

There has been ample reason for criticism of drawing instruction as given in the past. This was especially true in public school drawing, sometimes known as art work. Under the old system, the child was lost sight of in the struggle to produce "fine work." (1:p.188,189) Examination of statements of purposes of drawing indicates the basis for this criticism. A more specialized form of drawing known as mechanical drawing has escaped the general criticisms hurled at drawing. However, a few educators, having examined drawing instruction more deeply from the educational point of view, are inclined to doubt and to criticize mechanical drawing courses as now taught. Much of the work in these courses

# This form of citation is used throughout the thesis. The first number in parenthesis refers to the position of the reference in the bibliography and the second to the page.
has deteriorated into formal and abstract exercises. Morrison (2:p.423,424) has noted this, for he says;

"It is perhaps true that mechanical drawing, more than most practical arts courses, has fallen under the domination of formalistic exercise work. It has tended to hang suspended in the air, uncertain of any connection with realities, save in vocation-al courses in which its vital connection with work to be done is obvious. This need not be. Every project in a shop course may well be first a project in mechanical drawing. The principles which make the small house or electric motor an appropriate project in construction make it likewise an appropriate project in mechanical drawing. The two are further intimately correlated since the service-able educational use of the construction project implies the use of working drawings."

Mechanical drawing courses may and often do follow the old idea of manual training in which all the emphasis was placed upon tools and tool processes. In such work, technique is exalted and the development of ideas is minimized. Vaughn and Mays (3:p.178-180) have stated their criticism of mechanical drawing in the following terms:

"Many a piece of drawing has been superb in execution but pitiable in conception. Perhaps too much time has not been given to the mere technique, but certainly too little time and effort have been devoted to the accumulation of ideas worth expressing and too little importance has been attached to the significance of ideas properly conceived, thoughtfully developed, and adequately expressed......the technical schools have in the past devoted their time too exclusively to the study of tools and processes and to the practice in standardized manipulations. Not enough time has been given to the study of tasks to be done, situations to be met, interests to be served, to all of which mere tools and practices are but incidental....... The drawing and shop work of the elementary schools have been especially barren of ideas, unresponsive to needs, unyielding in their routine, and unproductive of satisfactory and permanent results. The subjects have been approached too much from the standpoint of tools to be used and processes
to be learned, and not enough from the standpoint of jobs to be done, conditions to be met, and real, vital tasks to be accomplished. Tools and processes and pencils and T-squares and ink and sandpaper and all the rest are but means and accessories necessary but incidental in carrying out an important work, just as letters of the alphabet are indispensable instruments for the reading and writing of a language. But the placing of the whole emphasis upon the tools and processes, an industrial-arts and drawing teachers have too generally done, is in exactly the same category with the teaching of reading and writing by the scrap heap of educational absurdities by practically every teacher in the land."

Another criticism, and possibly the most serious one, deals with the differentiation of drawing courses as determined by the purpose to be served. The failure to discriminate between general educational purposes and those of a strictly vocational nature has led us into the difficulty of developing courses vocational in nature but to serve general educational needs. Hankammer (4:p.45-46) says:

"Educators agree that drawing is a valuable tool in expressing and interpreting ideas. They advocate its greater use in all school subjects. It has been recommended for all pupils upon the grounds of developing their native ability and the discovery of talent in drawing. Those believing appreciation to be an important phase of general education hold that drawing has some contribution to make to the teaching of appreciation. Drawing instruction has been criticized upon the grounds of being formalistic and barren of ideas; of being interested in the subject from the standpoint of tools and processes, or technique; and finally because courses are not differentiated as to purposes to be served, the failure to segregate the vocational from general education. Closely related to the first criticism is the fact that the aesthetic element is so often lost sight of in the designing of projects. Educators believe that drawing courses should be much broader in content and less formalistic on an exercise basis. In other words, it should closely correlate with all students' activities."
The work must be adapted to the psychological and sociological needs of adolescents. The basic course might profitably be of a two-fold nature. The basic course for all should be for the express purpose of giving facility to the expression and interpretation of ideas graphically. The other type of course might well be made for the purposes of specialization having the vocational aspect as its ultimate aim."

Forward looking educators seemingly agree that drawing has definite and enriching contributions to make to the general education of boys and girls. The plea is for a broader and more functional program of drawing. Its values are seemingly self-evident. Long (5:p.5) presents the recognized values of drawing as follows:

- It trains the eye to see accurately, the hand to do skillfully, and the judgment to decide unerringly.
- It cultivates the artistic sense and an appreciation of beauty, of symmetry and of correct proportion.
- It cultivates the habit of planning definitely and of executing consistently according to well laid plans.
- It strengthens the powers of observation, perception, comparison, discrimination and original thought.
- It opens the eye to a new range of vision and trains the powers of analysis, enabling one to resolve things into their primal elements.
- It is the universal language - having the wonderful gift of talking to every nation in its own tongue.
- It speaks to the children from the blackboard of every classroom and translates vagueness into obvious truth.
- It is given the most valuable space in daily papers and in leading magazines, whether employed to interest, to instruct, or to amuse.
- It fosters and develops that refinement of discrimination that sees a pleasing harmony.
in certain colors, and that rebels at the jarring discord in other colors.

It sketches the outlines of the daintiest lace, whether intended for a baby's cap or the most elaborate costume; whether to be used to enrich a simple scarf or the most sumptuous drapery.

It is employed in designing a lady's brooch, or in planning a battleship; in giving the grace of outline to a simple bungalow, or harmonious proportions to an imposing mansion.

It details the specifications of every contract, whether to build a sleeping porch, or to construct a stone bridge; whether to lay a water main or to dig a Panama Canal.

As a rule the average person is unmindful of the ingenuity, skill, and thoughtful labor which have given birth to the many conveniences which science and invention have provided for the enjoyment and comfort of daily living. Society has come to accept these things as necessities.

The usefulness of drawing in life activities is undoubtedly accepted in the same light. Its values are taken as a matter of course, although some form of drawing usually precedes the creation of things made by human hands.

To have a general understanding of the values of drawing, the usefulness of drawing, and experiences in the practical application of drawing to life situations, should be considered the birth-right of every American boy and girl.
CHAPTER II

Nature and Extent of the Art Emphasis

The charge has been made again and again that Americans are restless, money grabbing, and are altogether inartistic people, far removed from interests in art and the creation of, and affection for, the more beautiful and finer things of life. It has been said that "moderns" have "eyes for the movies, ears for the radio, a nose for the news, the gentle touch; and all that is lacking in taste."

For thousands of years man has responded to a passionate urge and has beautified the product of his labor. These things have come down through the years as the most priceless and precious possessions of mankind, to satisfy the hunger for beauty that dwells eternally in the human breast. When a supreme quality of goodness and beauty exists in these creations, man calls it art. The pleasure that may be found in a cultivated enjoyment of these things is called art appreciation.

In art is found the revelation of the spirit of man, his deepest feelings and his highest aspirations, and the nations may come and go, but art remains, an enduring record of a nation's highest attainments. Greece lives in her Parthenon and her Praxitiles; Italy in her Madonnas, and her Raphaelas; France in her Cathedrals.

There is a growing realization of the need for beauty and art in social and industrial life. There is likewise a growing realization of the public school as the most
effective agency in bringing these things to pass. There is a growing appreciation of the fact that an education that is scientific, commercial, or industrial cannot provide the completeness that modern life and time demand. In emphasizing the need for a finer taste and discrimination among our people, a conscientious effort is being made to refine their choices, desires, and aspirations.

The art taste of a community will be no better and no worse than the standards established in the public schools. The one is commensurate with the other. We reap as we sow—crude and coarse manufactured products, ugly homes, sordid streets; or homes of true beauty and comfort, filled with manufactured products of refined taste, streets and parkways that express the best in town planning and civic beauty.

Art yields dependable profits to manufacturers and business men, for the nations with taste and skill control the markets of the world. But it is not sufficient to convert art, like resources, into material wealth; this material gain must in turn be converted into those higher qualities that have spiritual values and bring contentment through the enrichment of life. If there is ever to be a beauty loving people, if there is ever to be an art universally desired, it will be built upon the foundations now being laid in the public schools. The schools must accept and meet this challenge. During the past many school administrators have almost wholly neglected this important phase of American education.
As one evaluates the art programs being presented in the public schools one comes to the sad conclusion that the major emphasis lies in "art, for art's sake." Art teachers are doing a splendid job in teaching the elemental and fundamental principles underlying art education as such, but too little emphasis is being placed upon the application of these principles to materials and products used by man in daily living. As Ruskin has so ably put it, "All the greatest art which the world has produced is fitted for a place, and subordinated to a purpose. The best sculpture yet produced has been the decoration of a temple front - the best painting the decoration of a room." The craftsman whose work is based upon correct art principles should build a better table than one who is unfamiliar with the rules of design. The chances are that the proportions of his table will be better, that monotonous turnings on legs and stretchers will be avoided, and that it will be free of superfluous and inconsistent ornament and poor color combinations.
CHAPTER III

Nature and Extent of the Engineering Emphasis

The majority of courses in drawing as offered in public schools today allow tradition or the opinion of influential teachers rather than carefully determined principles based upon the actual needs of the pupil in a given environment. The customary method of preparing a course is to select arbitrarily a given number of plates and call it a course. With the development of industry, drawing secured for itself a place in public school instruction largely upon the assumption that it would advance industrial needs. This influence naturally has tended to determine the content of the courses to be given. It is therefore quite natural to find mechanical drawing holding the center of the stage. This type of drawing has a most important relationship to all industrial processes, but when taught specifically as a vocational subject it is doubtful if it has much value as a subject in the curriculum of the adolescent.

A survey (4: p. 47) of the nature and character of the content of typical textbooks on drawing in common usage throughout high schools reveals that the engineering emphasis is predominantly in evidence. Authors have divided the subject matter content into groups or units to provide training in definite technical skills. Some variations in the arrangement of topics is noted as well as space allotment to various types of subject matter. This may indicate to some
extent the degree with which the author held the topic important. It may also indicate the author's peculiar bent, training, or methods.

Little or no thought is given to the age of pupils, their interests, aptitudes, or abilities, or to the possible bearing of drawing on other subjects the pupil may be taking. The attempt is usually to achieve the very best work possible. Under such conditions, teachers often cannot understand why their courses seem futile.

With the increasing use of scientific methods in curriculum construction, drawing courses should receive the same critical scrutiny given other subjects.
CHAPTER IV

Hankammer's Social-Usage Analysis (l:p.76-88)

To ascertain, to a certain extent, the function of the various forms of drawing in relation to present day society one may profitably turn to Hankammer's social analysis study in which he measured a total of 314,844 square inches of printed matter. His analysis included fifteen popular magazines and five of the foremost newspapers. Magazines consisted of the following: American, Cosmopolitan, Forum, House Beautiful, Ladies Home Journal, Life, Literary Digest, Motion Picture, National Geographic, Physical Culture, Popular Science, Saturday Evening Post, Scientific American, Theater, and Vogue. Newspapers covered were the following: Chicago Tribune, Cleveland Plain Dealer, Detroit Free Press, New York Times, and the Ohio State Journal.

Summary of mediums analyzed giving total space and drawing space (table I). Percentage of space allotted to each type of drawing in magazines (table II). Total space devoted to drawing in magazines (table III). Percentage of space allotted to each type of drawing in newspapers (table IV). Total space devoted to drawing in newspapers (table V).

Commenting on this phase of his findings:

Hankammer has the following to say:

"The rapid industrialization of this nation has been paralleled with a veritable flood of printed matter - advertising, books, magazines, and newspapers. A casual glance at this mass of print will readily show more pictures, more color, more draw-
ing, and more hand lettering is being used. With an increased use of this material may we not legiti-
mately inquire as to what the schools are con-
tributing to the understanding and producing of the many forms of drawing presented to the reader? May we not find in the analysis of public text books, newspapers, and magazines, a suggestion as to the kinds of drawing which should be taught with a view of aiding in the interpretation of the printed page? Will such an analysis aid in determining the forms of drawing which should be taught to those depending upon the public school for an education which will function in life situations?"

The nature of the drawings analyzed indicates that drawing instruction should be diversified rather than limit-
ed to a single type of drawing and that instruction cannot justifiably be based upon abstract exercises. The data seem to justify the establishing of two types of courses in draw-
ing, namely: basic interpretive instruction for the rank and file of students, and specialized courses with a voca-
tional aspect for those wishing to specialize. The inter-
pretative instruction, developing an ability to do free-
hand sketching, should bear on the reading of working draw-
ings, making of analytical drawings, and giving an under-
standing of maps and graphs. Specialized courses will be conditioned by commercial and industrial needs. Data fur-
nished by Hankammer indicate that commercial art courses are justified in a public school program. Specifically: narrative, decorative, and lettering types of drawing should be taught in these courses.

Since 28.56% of considerably more than a quarter of a million square inches measured in the Hankammer study has been given to drawing in popular reading matter, may
one not conclude that drawing has sufficient appeal and instructional value to be given more serious consideration in textbooks and public school curricula?
### TABLE I

SUMMARY OF MEDIUMS ANALYZED GIVING
TOTAL SPACE AND DRAWING SPACE

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<th>Newspapers</th>
<th>Magazines</th>
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<td>162,742</td>
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<td><strong>measured</strong></td>
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<tr>
<td>Analytical</td>
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<td>Decorative</td>
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<td><strong>Total sq.in.</strong></td>
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<td>44,653</td>
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<td><strong>of drawing</strong></td>
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<td>% of space of drawing</td>
<td>29.76</td>
<td>27.43</td>
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### TABLE II

PERCENTAGE OF SPACE ALLOCATED TO EACH TYPE OF DRAWING IN MAGAZINES

<table>
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<th>Medium</th>
<th>Total Area</th>
<th>% Analytical</th>
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<th>% Graphs</th>
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<td>8.5</td>
</tr>
<tr>
<td>15</td>
<td>11,555</td>
<td>10.9</td>
<td>12.8</td>
<td>.00</td>
<td>.00</td>
<td>5.2</td>
<td>.00</td>
<td>13.9</td>
</tr>
</tbody>
</table>

### TABLE III

TOTAL SPACE DEVOTED TO DRAWING IN MAGAZINES

<table>
<thead>
<tr>
<th></th>
<th>Analytical</th>
<th>Decorative</th>
<th>Graphs</th>
<th>Instrumental</th>
<th>Lettering</th>
<th>Map</th>
<th>Narrative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sq.in.</td>
<td>4584</td>
<td>8742</td>
<td>281</td>
<td>414</td>
<td>6996</td>
<td>307</td>
<td>23329</td>
<td>44653</td>
</tr>
<tr>
<td>Per Cent</td>
<td>2.8</td>
<td>5.3</td>
<td>.17</td>
<td>.25</td>
<td>4.3</td>
<td>.18</td>
<td>14.3</td>
<td>27.45</td>
</tr>
</tbody>
</table>
### TABLE IV

PERCENTAGE OF SPACE ALLOTTED TO EACH TYPE OF DRAWING IN NEWSPAPERS

<table>
<thead>
<tr>
<th>Medium</th>
<th>Total Area</th>
<th>% Analytical</th>
<th>% Decorative</th>
<th>% Graphs</th>
<th>% Instrumental</th>
<th>% Lettering</th>
<th>% Map</th>
<th>% Narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27,950</td>
<td>6.0</td>
<td>6.0</td>
<td>5.0</td>
<td>0.0</td>
<td>5.0</td>
<td>0.7</td>
<td>15.0</td>
</tr>
<tr>
<td>2</td>
<td>34,407</td>
<td>6.0</td>
<td>7.0</td>
<td>5.0</td>
<td>0.1</td>
<td>4.0</td>
<td>0.0</td>
<td>12.0</td>
</tr>
<tr>
<td>3</td>
<td>37,989</td>
<td>5.0</td>
<td>5.0</td>
<td>4.0</td>
<td>0.0</td>
<td>4.0</td>
<td>0.0</td>
<td>12.0</td>
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<tr>
<td>4</td>
<td>30,361</td>
<td>8.0</td>
<td>15.0</td>
<td>1.0</td>
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<td>4.0</td>
<td>1.0</td>
<td>5.4</td>
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<td>5</td>
<td>21,395</td>
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<td>7.0</td>
<td>0.2</td>
<td>0.0</td>
<td>4.0</td>
<td>1.0</td>
<td>13.0</td>
</tr>
</tbody>
</table>

### TABLE V

TOTAL SPACE DEVOTED TO DRAWING IN NEWSPAPERS

<table>
<thead>
<tr>
<th>Total sq. in.</th>
<th>Analytical</th>
<th>Decorative</th>
<th>Graphs</th>
<th>Instrumental</th>
<th>Lettering</th>
<th>Map</th>
<th>Narrative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1614</td>
<td>13633</td>
<td>283</td>
<td>45</td>
<td>7781</td>
<td>344</td>
<td>21568</td>
<td>45268</td>
</tr>
<tr>
<td>Per Cent</td>
<td>1.0</td>
<td>8.9</td>
<td>0.62</td>
<td>0.01</td>
<td>0.22</td>
<td>0.75</td>
<td>0.45</td>
<td>2.76</td>
</tr>
</tbody>
</table>
CHAPTER V

Inferences Concerning Criteria for Projecting and Evaluating a Modern Program

A recent study made by Palmer Johnson (6:p.2) shows that both men and women in the ordinary walks of life consider other forms of drawing to contribute as much or more to useful life activities as do working drawings. From this may be assumed that drawing for beginners should embrace a great variety of experiences in graphic representation found useful in daily living and should not be confined, as it now is, to projection problems and working drawings.

Orientation in the Program of General Education. Drawing, as an orientation subject, affords rich experiences in the scheme of general education of boys and girls. It presents a body of activities and information so vital to present day industrial society that an individual must possess some knowledge of this art to be considered an intelligent citizen. It acquaints the student with the general field of the graphic arts and equips him with the simpler skills and bits of knowledge required in planning and designing and in graphically presenting ideas common to every-day life. It introduces him to the materials, media, usages, techniques and methods employed by the artist, engraver, printer, draftsman and designer. It serves as an avenue for guiding boys and girls in making choices and adjustments that are
significant for their educational progress.

Recreational and Cultural Functions. Those who possess at least an elementary understanding of the rules and principles of drawing and design find many occasions for the practical application of this knowledge in school life, home life, and in social and community living. It is knowledge which will serve well in the selection of home furnishings, wearing apparel, in home planning, garden planning, lot planning, playgrounds and community projects. If taught purposefully it tends to develop an understanding and appreciation for what is considered appropriate in workmanship and design and fosters a desire to be surrounded with the more beautiful material things. This may provide a source for many pleasurable hobbies and avocational interests.

Having developed an ability to portray one's thoughts and ideas with pencil and pen in the form of sketches, drawings and designs, one becomes inspired to express originality and individuality in many ways, such as: personalized bridge and tally cards, book plates, book marks, party invitations, invitations to social functions, Christmas cards, birthday cards, special event cards, etc., all expressing an individuality that cannot be purchased at commercial display counters. We may also find much practical pleasure in planning and designing the new home, pieces of special furniture, gadgets for the kitchen and sun-room, garden fixtures and furniture, and a deep interest in planning community playgrounds and parks. Business, professional, and
labor men will find it an asset to be able to present their ideas by quick and effective freehand sketches.

Technical and Vocational Connections. The exploratory experiences provided in the general drawing program serve as a "finding-course" for many boys and girls. It brings to light the abilities and aptitudes of pupils in certain specific fields.

If pupils display an interest and are skillful in such fields as cartooning, commercial art, sheet-metal layout, engineering drawing, home planning, landscape architecture, design, etc., they may be encouraged to devote further study in the specialized field of their liking. Here they are encouraged to make a comprehensive study of this specialized field including such items as qualifications, preparation, techniques involved, possibilities for advancement, remuneration, etc.
Formal Statement of the Purposes of the Study and the Techniques Employed in its Development

The purposes of this study are: (1) To determine the nature and content of a general drawing program for high schools. (2) To show that drawing as now taught in the public schools does not meet the aims of general education. (3) To offer some recommendations as to the content of high school drawing programs.

To determine the nature of the content of drawing is to reveal the changes needed in the light of present day use of drawing. To recognize and suggest a change is not sufficient. Recommendations or principles which seem to present an improvement over the older order must also be submitted.

Techniques employed -

1. Bringing to light educational practices regarding drawing instruction in the past.
2. Presenting the views of educators as expressed in their professional writings.
3. Research, by pupils, to determine "where drawing occurs in this community."
4. Organization of research findings for class-room use.
PART II

NATURE OF THE EXPERIMENTAL PROGRAM
CHAPTER VI

Status of Existing Program

Previous to the time of this experiment, drawing at Central High School, Lima, Ohio, had been taught from a purely vocational approach, emphasizing skills and techniques common only to the technical draftsman. The mechanical drawing class, consisting of fifteen boys, met daily for a period of ninety minutes throughout the school year. These boys had elected to take drawing because they liked it. Some had expressed a desire to follow some phase of drawing as their life work should they show promise of qualifying as a technical draftsman. "But," said one member of the class (Bob by name), "I don't care much about becoming a technical draftsman. I would like to be a cartoonist. What should I do to become a good cartoonist?" Sam volunteered that he would like to be a commercial artist. John proposed that everyone should learn something about drawing house plans for actual use in later life. Bill admitted that his chief interest was in sketching new and different automobile bodies. Then Dan asked the question, "Why can't we learn about these things here in our drawing class?" Dan's question helped to plant the seeds for richer experiences for all.

Realizing the inadequacy of a mechanical drawing course, as such, toward the achievement of general educational aims and sensing the possibilities for useful drawing
experiences in the broad field of the graphic arts, permission was granted to devote fifteen minutes of the regular daily class period to the discussion of drawing and its usefulness to man in his many fields of endeavor. Students responded enthusiastically and exhibited a sincere interest in the exchange of thoughts and ideas relative to this important life activity which here to-fore had received only a passive consideration.

Organization of Research Groups. Class discussions revealed that drawing is not limited to the engineering field but that it is useful in practically all walks of life regardless of vocation. This prompted the idea of organizing research groups to find out "where drawing occurs in this community." Following this suggestion, the class was divided into five groups of three boys each. Investigations were to be made during the regular ninety minute class period until the survey was completed. Sheets were prepared to record group findings. (Fig 1:p.27) This activity provided new interests, new incentives, and definite responsibilities which were accepted wholeheartedly. The class divided the city into five sections, planned their course of action, and launched upon an activity which proved to be one of the most instructive and most worthwhile experiences of their lives.

Research Techniques. Group leaders contacted the various firms for appointments. They were cautioned to present their requests in a business-like manner and to fully explain the purpose of the survey. Almost all firms responded
admirably and offered every assistance at their command to make the project worthwhile and meaningful to the boys. Individuals and some of the firms required but one visitation to secure the necessary data, while the larger firms required two or three visits to obtain the required information.

Firms contacted throughout the survey included:

Interviews were arranged with men from all walks of life, such as: doctors, lawyers, ministers, commercial artists, watch makers, carpenters, surveyors, tin smiths, architects, engineers, blacksmiths, landscape architects, florists, hotel managers, druggists, merchants, cabinet makers, lecturers, postal clerks, insurance men, realtors, repairmen, policemen, firemen, salesmen, printers, bankers, photographers, and many others including housewives and business women.
Compilation of Research Data. After a two-week period of purposeful research to ascertain "where drawing occurs in this community" the class found itself amid an avalanche of interesting and informative reports. Two full class periods were devoted to the examination and analysis of these findings. It was a refreshing revelation to all, including the instructor, to note the scope and far-reaching benefits derived from the many phases of drawing. These findings show the range of drawing from a simple scratch-pad sketch used to more clearly illustrate a point, to the large and technical assembly drawings of a monster locomotive which took months of deliberate planning ---- between these two extremes one finds drawing to be the expedient servant of man regardless of his profession, vocation, or walk in life.

Two hundred and nine data sheets were returned to the classroom. Only a few persons contacted refused full cooperation in the survey. One man called the instructor and demanded to know "why we didn't keep the boys in school and learn 'em somethin'." The huge task confronting the class now was to classify the findings into groups of like characteristics. Discovery was made that in quite a number of cases there was considerable overlapping which hampered definite classification. Making allowance for a reasonable amount of error, it was decided to prepare a table listing the various types of drawing according to their uses, (Table VI;P. 28), the numbers in the table indicating the
number of persons finding uses for the various types of drawing.
Figure 1

DRAWING RESEARCH DATA SHEET

Name of firm or person ______________________

Address __________________________ Date ____________

Nature of business ______________________________

Types of drawing done ______________________________

On vocational basis? ______________________________

How many employed? ______________________________

Partially vocational ______________________________

Occasionally useful ______________________________

Leisure time uses or hobby _________________________

Other Uses ______________________________

Mediums used ______________________________

Types of equipment used _________________________

Working conditions ______________________________

Salaries (if obtainable) __________________________

Opportunities for advancement ____________________

Survey made by ______________________________

__________________________

__________________________

27
### TABLE VI

**SUMMARY OF RESEARCH FINDINGS**

<table>
<thead>
<tr>
<th>Type of Drawing</th>
<th>Uses to Earn a Living</th>
<th>Partially Vocational</th>
<th>Occasionally Useful</th>
<th>Leisure Time Uses of Others</th>
<th>Another Uses and Occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Drawing</td>
<td>88</td>
<td>109</td>
<td>94</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>Architectural Drafting</td>
<td>14</td>
<td>36</td>
<td>61</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>6</td>
<td>43</td>
<td>90</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Sheetmetal Drafting</td>
<td>22</td>
<td>41</td>
<td>71</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Geometric Drafting</td>
<td>4</td>
<td>29</td>
<td>36</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Freehand Sketching</td>
<td>10</td>
<td>78</td>
<td>117</td>
<td>60</td>
<td></td>
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<td>Cartoon Drawing</td>
<td>3</td>
<td>18</td>
<td>48</td>
<td>80</td>
<td></td>
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<tr>
<td>Commercial Art</td>
<td>16</td>
<td>64</td>
<td>72</td>
<td>42</td>
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<td>Furniture Drafting</td>
<td>9</td>
<td>36</td>
<td>60</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Landscape Architecture</td>
<td>3</td>
<td>18</td>
<td>36</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Home Planning</td>
<td>18</td>
<td>44</td>
<td>90</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Graphs and Charts</td>
<td>2</td>
<td>47</td>
<td>87</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Map Drawing</td>
<td>6</td>
<td>21</td>
<td>34</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Etching Processes</td>
<td>8</td>
<td>18</td>
<td>7</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Drawing with Inks</td>
<td>7</td>
<td>20</td>
<td>74</td>
<td>92</td>
<td></td>
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<tr>
<td>Pictorial Drawing</td>
<td>3</td>
<td>32</td>
<td>63</td>
<td>37</td>
<td></td>
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<tr>
<td>Lettering</td>
<td>24</td>
<td>65</td>
<td>114</td>
<td>42</td>
<td></td>
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<tr>
<td>Chalk or large scale drawing</td>
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<td>12</td>
<td>24</td>
<td>18</td>
<td></td>
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<tr>
<td>Duplicating Processes</td>
<td>23</td>
<td>40</td>
<td>88</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Blockprint Design</td>
<td>0</td>
<td>14</td>
<td>31</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER VII

Evolution of the Interest Element

Inspiration and interest are closely related. An inspiring lecture or address is usually an interesting one. Interest inspires one to listen, to think, to learn, to solve, to accomplish. New experiences are usually interesting, especially so when one feels that they are making worthwhile contributions one's personal welfare and advancement. A lack of interest makes tasks burdensome and commonplace. The assignment of tasks to be done is seemingly the wrong approach to learning situations if the interest element is lacking.

With this philosophy as a guiding factor, an attempt was made to break away from the formalistic type of drawing and to substitute in its place vital work which is psychologically and socially suited to the interests and needs of pupils.

To publicize the new offerings in drawing seemed to be the next logical procedure to follow. Three avenues of approach were utilized in conveying the necessary information to the student body; (1) distributing informative bulletins to all home rooms, (2) presenting a detailed explanation of the offerings at a regular assembly program, and (3) extending an invitation for personal counsel with the instructor.

The fruits of the initial effort were gratifying.
The opening of the next semester found a class of thirty boys and girls in readiness for the new course in drawing. From this point on publicity seemed to take care of itself by word of mouth from students enrolled in the class. An additional class was added during each of the next three years and an extra teacher added to the staff. Girls as well as boys found a deep interest in the new experiences in drawing, experiences which provide general knowledge about all common forms of drawing to the end that they may interpret graphic ideas correctly in the acquisition of knowledge and use this instrument to vitalize transmission of ideas.
CHAPTER VIII

Physical Changes Required as the Program Progressed

The growth of any enterprise necessitates certain physical changes to facilitate the needs in proportion to such growth. Industries build additional buildings and add machinery and equipment to meet the needs of increased production. Business firms acquire additional floor space and hire additional help to more adequately meet the demands of the buying public. In this progressive struggle the schools are no exception. As school population increases and additional courses are added to the curriculum, appropriate housing must be provided, adequate equipment must be supplied, and additional teachers hired to meet the growing demands of the educational program.

During the first year of this experimental general drawing program the development of each unit of work was carefully followed, being ever alert to the needs and conditions necessary to the inducement of complete and properly organized units of instruction.

At the close of the second year of the experiment it was found necessary to prepare an additional room for general drawing classes. Registrations revealed that an additional class was to be formed at the opening of the fall term. Partitions were removed between two academic classrooms and the one large room prepared to adequately house the general drawing program. Thoughtful consideration was
given to planning, furniture, fixtures, equipment, supplies, and arrangement to fully serve the needs of each unit of work.

The opening of school found this room in readiness to accommodate classes of twenty-eight pupils. An inventory of the equipment utilized in the new drawing set-up is here presented with the hope that it may be helpful to teachers engaged in the instruction of drawing students.

Room Specifications

Room size - 34' x 60', rectangular in shape, 12' ceiling.
Natural light - windows on entire left side of room.
Artificial light - adequate indirect ceiling lights.
Floor - linoleum to suit color scheme of room.
Heat and Ventilation - wall encased registers under windows.
Service - electric plugs where needed, wash facilities, drinking fountain, compressed air for air brush.

Physical Equipment

Furniture and fixtures -
28 maple drawing tables with three drawing board lockers and utility drawer
28 28" metal drawing stools
1 service counter, 40" height, 34" x 78" hardboard top - built-in cabinets, shelving, and drawers for drawing paper, instruments, supplies, etc.
1 blackboard 4' x 12', slate, center of front wall
Bulletinboards, cork, four feet from floor to ceiling on back and right side walls
2 display cases - on walls outside door
Cabinets and cases -
1 for filing drawings
1 for drawing paper supply
1 for reference books and magazines
1 for filing clippings
1 for records and fee cards

Blueprinting equipment -
Machine - Pease Junior
Solution basins
Drying rack
Cutting table

Chalk Easels - two, movable

Miscellaneous equipment -
Mimeograph machine (Model T - Speed-o-Print)
Multistamp, postal and half-letter size
Hektograph
Silk screen frame
Blockprinting press
  2 ink brayers
  2 ink slabs (glass)
Waste baskets - 1 large, 2 small
Paper cutter - 18" Imperial
Pencil sharpener (long point)
Electric clock
Key boards
Blackboard demonstration set

Drawing Equipment -
28 kits - any good make
2 repair kits
28 T-squares, 24" transparent edge
28 45 degree celluloid triangles
28 30-60 degree celluloid triangles
28 irregular curves
28 12" boxwood triangular scales
28 draftman's brushes
6 36" T-squares
84 18" x 24" basswood drawing boards
12 24" x 36" basswood drawing boards

Special tools and equipment -
1 pantograph for making enlargements
6 sets carving tools for linoleum cutting
6 etching tools for celluloid etching
1 shears, 12" blades
2 proportional dividers
6 protractors
1 slip-stone
3 hardwood yard-sticks
2 8" outside calipers
2 8" inside calipers
6 styli, assorted
6 ink scrapers
12 12" raised edge rulers
1 paper punch
1 stapler
6 erasing shields
12 water color cups
6 steel rulers, fractional inches to 64th

**Supplies and Materials**

**Drawing paper -**
- Buff and white, 11" x 18" - 5 reams each
- Charcoal paper, 22" x 28" - 2 reams
- Mimeograph paper, letter and legal size
- Tracing paper, 36" x 50 yds. - 3 rolls
- Carbon paper, 1 quire
- Blockprint papers, assorted colors - 2 reams
- Squared paper, quarter inch - 1 ream
- Squared paper, half inch - 1 ream

**Process papers -**
- Blueprint, 36" x 50 yds. - 2 rolls
- Black line, 36" x 50 yds - 2 rolls

**Cardboard -**
- 6 ply, glazed - 100 sheets
- 4 ply, unglazed - 100 sheets

**Miscellaneous papers -**
- Colored art paper - assorted colors
- Stencil board
- Sketching paper
- Wrapping paper - white - 36", 20 lb.

**Pencils -**
- Drafting pencils - 2H and 4H - 1 gross each
- Sketching pencils - 6B - 1 gross
- 2 sets colored pencils - assorted colors
- 1 set Hektograph pencils - 8 colors
- 12 charcoal pencils
Inks -
- Black India Ink, 3 doz. - 3/4 oz. bottles
- Colored India inks, 2 sets - 12 assorted colors
- Blockprinting ink, 1/4 lb. tubes - assorted colors
- Hektograph ink, 5 bottles - assorted colors
- Mimeograph ink, 1 pt. can
- Stencil ink, 1 pt. can

Pens -
- Speedball or drawlet, 2 doz. - assorted sizes
- Spencerian - 1 gross
- Ball point - 2 doz.
- Shading - 2 doz.
- Special ruling pens - as desired

Chalks and Colors -
- White blackboard (hard & soft) - 2 doz.
- Colored blackboard chalks - assorted colors
- Pastels - 2 sets
- Water colors - six kits
- Lecturers chalk, 3 boxes - assorted colors
- Charcoal sticks - 2 doz.
- Show-card colors, 1/4 pts. - assorted colors
- Gold and silver show-card paints

Miscellaneous Supplies

Erasers -
- Ink
- Pencil
- Art gum
- Kneaded

Tape -
- Scotch drafting
- Adhesive
- Mending

Paste -
- Paper
- Mucilage
- Tri-Stix or Best-Test

Penholders - 4 doz.
- Linoleum - as needed
- Thumb tacks, 3/8" stamped steel - 1000
- Mimeograph stencils - 4 doz.
- Celluloid, 20 ga. - as needed
- Coller and brass strips for etching
Zinc plates - for etching
Fixative
Acid - for etching
Paraffin
Asphaltum paint
Gasoline - 1 gal.
Turpentine - 1 qt.
Rags for cleaning - as needed
Shellac - 1 qt.
Alcohol - 1 qt.
Silk Screen paints
Pro-film

Brushes -
Water color, 2 doz. - assorted sizes
Show-card, 2 doz. - assorted sizes
Lettering brushes - 12 assorted sizes

During the first year of the experimental general drawing course supplies and equipment were secured as needed. An inventory at the close of the school year revealed that the above list of supplies and equipment was needed to carry on the work of the various units in the program successfully.

Obviously, the "ideal" drawing laboratory can be most conveniently arranged at the time when the architect is designing the new school building. Even then, the architect too often shuns the timely advice and assistance of the department head and teachers when designing rooms to meet definite needs. However, most teachers are faced with the task of arranging old rooms as best they can to meet the needs of the activities to be carried on. Teachers usually try to do the best they can with what they have. The drawing laboratory at Central High School (Fig.3:p.38) is no exception to this rule. Arrangement was effected which would most suitably meet the needs of each unit of work. A
locker hallway was transformed into duplicating and filing rooms; washing facilities were installed; and bulletin boards were affixed to the north and west walls for the display of students' work.
Figure 3

- GENERAL DRAWING LABORATORY
- SOLUTION BASING
- DRIER PAN
- BLUE PRINT
- PICTURE GRAPH
- DRYING RACK
- PHOTO PRINT
- CUTTING TABLE
- DRAWING FILE
- STORAGE
- REF LIBRARY
- LOCKERS
- HALL
- BLACK BOARD
- MORGUE
- BOOKS
- DRAWING DESKS
- CHALK EASEL
- STOOLS
- SUPPLIES
- DR. TABLE
- SERVICE COUNTER
- INSTRUCTOR
CHAPTER IX

Reference Changes Required as the Program Progressed

Mechanical Drawing textbooks usually serve two purposes: (1) primary source of problems, (2) text and reference material. Most teachers depend entirely upon the text as a guide or tool for instruction. The content of the textbook used directly influences the course as to problems and importance attached to various phases of the course.

An analysis (4:p.47-67) of mechanical drawing textbooks most widely used in the public schools reveals a marked similarity in subject matter content although authors vary somewhat in the sequence of presenting the basic material of the text. A mastery of the elements of drawing presented by the authors should serve as a foundation for further study of the techniques and skills common to the professional draftsman.

Drawing, from the general education viewpoint, presents a more comprehensive outlook. The major emphasis now shifts to an understanding of the many forms of drawing and their usefulness to man regardless of vocation. This entails a search for appropriate reference material fitting the various units of the course. Books, magazines, bulletins, pamphlets, and literature of sundry kinds must be searched for informative material and illustrations which may serve as a light-house for the successful harboring of new drawing experiences.
Reference material selected for the various units of the general drawing program are listed in Part III of this study.

**Evolution of the "Clipping Morgue."** The accumulation of helpful reference material such as clippings, photos, samples, sketches, cartoons, prints, etc., presented the problem of filing such material for ready accessibility when needed. This provided a practical problem in the "Design" unit of the course. Having discussed the problem as to needs, capacity, and construction, each member of the class presented a sketch which in his opinion, would suitably serve the purpose. All sketches were displayed for consideration, and the better features of several were then selected and embodied in the final design. A committee of three students was elected to prepare working drawings and specifications for the project. The following "Clipping Morgue" evolved: a quartered-oak cabinet designed to harmonize with other furniture in the room. From the standpoint of durability the boxes to hold the clippings were to be made of 26 gauge galvanized iron with spot-welded corner construction. The top edges of the boxes were to be folded to minimize injuries when handling. It was determined that the boxes should be \(2'' \times 8\frac{1}{2}''\) by \(11\frac{3}{4}''\) in size to conveniently hold a goodly number of clippings. Label holders \(1'' \times 8''\) were to be spot-welded to the front end of the boxes to hold identification labels which were to be covered with strips of celluloid to insure cleanliness. The interior of the cabinet was to be made of
pigeon-hold construction to receive forty metal boxes. For the sake of convenience, it was decided to make the door of roll-top construction so that it would be out of the way while the cabinet was in use.

Detailed drawings of the cabinet and developments of the metal boxes were forwarded to the Department of Industrial Arts for construction and finishing.

Labels to identify the contents of the boxes were prepared by the class, such as: DESIGN, HOME PLANS, ARCHITECTURE, GARDEN, LANDSCAPE ARCHITECTURE, ETCHING, CARTOONS, LETTERING, MAPS, GRAPHS AND CHARTS, FACES, BLOCK PRINTS, FLOWERS, ANIMALS, LANDSCAPES, FURNITURE, PENCIL SKETCHES, POSTER DESIGNS, etc.

Upon completion, the "Clipping Morgue" was duly installed in the drawing room and is now considered a priceless possession by all who use it. Filling the boxes with appropriate illustrative material is being constantly shared by all members of the drawing classes. Such exclamations as, "I have found some fine clippings for the design unit," or "Here is some good illustrative material for the graphs and charts unit," or "Here are some modern house plans for the home planning unit" are heard almost daily by the instructor of the class. However, all material presented for the "Morgue" is closely checked for appropriate values before being placed in the boxes.

When students wish to draw a city map, a panel of lettering, a Hepplewhite chair, a Christmas card, or an
electrical gadget, the "Morgue" will yield reference material which will aid in drawing these subjects correctly.
Organizational Changes Required as the Program Progressed

Growth or change in any enterprise involves a reorganization of personnel to meet efficiently the needs of such growth or change. "A place for everything, and everything in its place" is an old slogan, which, if practiced, results in a minimum waste of time and effort. This is especially true in cases where myriads of small items such as tools, supplies, and reference material are to be stored for quick and ready accessibility. This practice, too, offers splendid habit-forming values to all who participate in it.

A comprehensive general drawing program involves the use of a more effective personnel organization than was found necessary in the strictly mechanical drawing set-up. A vastly greater amount of reference material, supplies, and equipment must be provided and economically dispensed. This should be done quickly and effectively - usually at the beginning of the class period - so that all students may have the greatest amount of time possible for class work. To the end that all may share in the added experience and responsibility of dispensing supplies, groups of three or four students were selected to perform the various tasks for a period of two weeks or more, after which they relinquished their duties to a new group.
Individual responsibilities might be listed as follows:

(1) Librarian - in charge of dispensing all books and reference materials needed for the particular type of work being done and seeing that such material is in proper order at the close of the class period.

(2) Supplies Clerk - in charge of dispensing the necessary supplies such as drawing papers, pens, pencils, ink, water colors, chalks, thumb tacks, cardboard, and many other items.

(3) File Clerk - in charge of storage cabinet which holds all unfinished work.

(4) Print Foreman - in charge of all duplicating equipment such as blueprint machine, blueprint papers, blackline papers, photoprint machine, silk-screen equipment, air-brush equipment, block-print equipment, etc.

Without some form of organized procedure in handling the many items required for the general drawing program, the process might soon deteriorate into confusion and disorder.
PART III

PRESENTATION AND ANALYSIS
OF THE
RESULTING PROGRAM
Taking cognizance of the research findings noted in Chapter VI of this study, an attempt was made to group the various drawing experiences into units of work according to uses and techniques involved, emphasizing the broader conception of all the common methods of graphic representation.

Unit content will be found general in character and suggestive of the things to be done with and through drawing. Problems are selected with reference to their usefulness and in keeping with the interests and experiences of boys and girls.

The comprehensive array of content which now follows is simply an attempt to provide a fairly complete breakdown of the subject of drawing from which any teacher, writer, or student may select his program of work - thus the outline is suggestive and should prove to be stimulating in the enrichment of any drawing program.

The "samples of work" accompanying each unit were taken from the drawing files at the time of this writing. Black and White illustrations only could be selected because of the reproduction method employed. Colors, therefore, are not in evidence.
Unit 1

An Introduction to Drawing

Purpose: To become acquainted with the basic principles employed in drawing; to become familiar with the use and care of equipment and tools used in drawing; to acquaint the student in a general way with the language of drawing - that lines and symbols used in drawing are for the purpose of conveying ideas, just as the symbols of any other language are used to convey ideas; to do simple layout problems in two dimensions, involving the use of the alphabet of lines, T square, triangles, scale, pencil, etc.

Discussion Topics:
- Origin and History of Drawing
- Drawing as a Universal Language
- Drawing, the Language of Industry
- The Use and Care of Drawing Equipment
- Where does Drawing Occur?

Demonstration:
- The Proper Use of Drawing Equipment

Experiences:
- Learning to use Drawing Equipment
- Making and Recording Measurements
- Drawing to Scale
- Correct Use of the Alphabet of Lines

Problem Suggestions:
- Uniform sheet layout.
- Secure dimensions and draw to appropriate scale - football field, tennis court, baseball diamond, basketball court, tennis court, croquet court, ping-pong table, shuffle-board, checker-board, Chinese checkers, horse-shoe court, garden plot, study hall seating arrangement, parking lot, or any other projects involving similar techniques.

Review of Experiences:

Helpful References:
- French & Svensen; Mechanical Drawing for High Schools, pp. 1-14.
- Hoelscher & Mays, Basic Units in Mechanical Drawing, pp. 1-10.
- Fryklund & Kepler, General Drafting, pp. 88-89.
Unit 2

Lettering

Purpose: To learn to do freehand lettering with pencil and pen; to learn about proportion, design, form and spacing of letters.

Discussion Topics:
- History and Development of Lettering
- The Importance of Lettering
- Basic Alphabets

Demonstration:
- Procedures in Designing Letters

Experiences:
- Learning to do lettering correctly
- Drawing Capitals and Lower Case Letters
- Drawing Numerals and Fractions
- Spacing of letters, spacing of words, and spacing of lines

Problem Suggestions:
- Design a desk-plate using your own name.
- Design a shipping-tag, filling in all lettering ready for mailing.
- Design your own letter head - name, address, phone number, and other necessary information.
- Design an original alphabet.
- Design a motto for your school.
- Letter an announcement for some school, church, or community activity.

Review of Experiences:

Helpful References:
- George, Ross F., *Speedball Textbook*
Unit 3

Describing Shapes Graphically

Purpose: To learn to interpret and understand drawings and blueprints; to learn the basic principles of projection and to construct simple drawings in three dimensions.

Discussion Topics:
The Purpose of Mechanical Drawing
The Importance of the Alphabet of Lines
The Theory of Orthographic Projection
Lettering and Title Strips

Experiences:
Learning to make two-view drawings
Learning to make three-view drawings
Learning to properly dimension a drawing
Learning to apply the alphabet of lines correctly
Learning to read drawings

Demonstration:
The Relation of Views
Use of Projection Frame

Problem Suggestions:
Two view drawing of rectangular block, book, cutting board, drawing board, etc.
Three view drawing of V block, slotted block, or appropriate models supplied by instructor.
Three view drawing of a simple piece of furniture.
Three view drawing of a machine part.

Review of Experiences:

Helpful References:
French and Svensen, Mechanical Drawing for High Schools, pp. 22-40.
Hoelscher & Mays, Basic Units in Mechanical Drawing, pp.81-97.
Unit 4

Inking Procedures

Purpose: To acquire a reasonable amount of skill in the application of inks with pen, brush, or ruling pen; to become familiar with inking procedures.

Discussion Topics:
The Manufacture of Ink
Kinds of Inks
Commercial Use of Inks
The Order of Inking a Drawing

Demonstration:
Techniques in inking
Use of ruling pen, common pen, brushes, etc.

Experiences:
Learning inking procedures
Using correctly the equipment employed in applying inks
Inking drawings

Problem Suggestions:
Ink pencil drawings of previous units which employ horizontal lines, vertical lines, and angle lines.
Ink pencil drawings of previous units which employ circles, arcs, and irregular lines.
Do a lettering project in ink.
Do a problem employing brush work in ink.

Review of Experiences:

Helpful References:
Fryklund & Kepler, General Drafting, pp. 121-123.
French & Svensen, Mechanical Drawing for High Schools, pp. 69-71.
Unit 5

Geometric Descriptions

Purpose: To apply the elementary principles of geometry as used by the draftsman in designing useful articles.

Discussion Topics:
- Values of Applied Geometry
- Geometry, the Basis of Structural Drafting
- Common Geometric Forms
- The Use of Geometric Layouts in the Sheetmetal Industry

Demonstration:
- Techniques in drawing geometrical forms

Experiences:
- Bisecting a line; bisecting an angle; copying an angle; constructing triangle, pentagon, hexagon, octagon, circle; measuring arcs; drawing tangent arcs, ogee curve, involute; drawing an ellipse by several methods.

Problem Suggestions:
- Draw a sun dial.
- Design a piece of furniture having an octagonal or an elliptical top.
- Lay out a radio panel with circular, elliptical and irregular shaped openings to receive fixtures.
- Design a wrench for hexagonal bolt head.
- Design a frame for an elliptical mirror or picture.
- Design a pentagon shaped clock case.
- Design a border employing triangular shapes.
- Design a border employing irregular shapes.
- Design some stars for Christmas decorations.

Review of Experiences:

Helpful References:
- French & Svensen, Mechanical Drawing for High Schools, pp.121-129.
- Fryklund & Kepler, General Drafting, pp.76-85.
- Woellner & Wittick, General Mechanical Drawing for Beginners, pp.41-48.
Unit 6

Surface Developments

Purpose: To learn about the theory of development and make elementary applications in drawing problems.

Discussion Topics:
Where is Surface Development used?
The Theory of Surface Development
Its Importance to the Sheet Metal Industry
Sheetmetal Drafting as a Vocation
Most Common Forms of Sheet Material

Demonstration:
Techniques in sheet material layouts

Experiences:
Learning to apply the principles of sheet material Development in designing useful things for the school, the home, the office, the store, and the farm

Problem Suggestions: (including stretch-out)
Design a mail box for the front porch.
Design a lamp shade.
Design a cake pan, drip pan, fudge pan, serving tray, vegetable bin, bread box, match box, waste basket, funnel, hot plate stand, soap dish, cookie cutter, etc., for your mother's kitchen.
Design an ash-tray, candy dish, candle sconce, set of coasters, desk set, book ends, hot dish mats, jewelry tray, wall vase, etc., for your home.
Design a set of house numbers.
Design a dust pan, angler's tackle box, tool box, foot scraper, sheetmetal cover for outdoor furnace, medicine cabinet, double wall milk bottle box, etc.

Review of Experiences:

Helpful References:
Fryklund & Kepler, General Drafting, pp.97-114.
French & Svensen, Mechanical Drawing for High Schools, pp. 130-147.
Unit 7

Pictorial Drawing

Purpose: To become acquainted with the several forms of pictorial representation and make application of this knowledge in drawing problems.

Discussion Topics:
Uses of Pictorial Representation
Kinds of Pictorial Drawing

Demonstration:
Using objects and models as aids in developing the power of visualizing

Experiences:
Learning to distinguish between Isometric, Oblique, Cabinet, Perspective, and Orthographic views and to make proper application of this knowledge in drawing objects for illustrative purposes.
Developing the power of visualization
Transferring mental pictures to paper so that others may see and interpret correctly

Problem Suggestions:
Make an Isometric drawing of an object.
Make an Oblique drawing of an object.
Make a Cabinet drawing of an object.
Make a Perspective drawing of an object.

Review of Experiences:

Helpful References:
French & Svensen, Mechanical Drawing for High Schools, pp. 111-120.
Mattingly & Scroggin, Applied Drawing and Design, pp. 70-83.
Fryklund & Kepler, General Drafting, pp. 90-97.
Beem & Gordon, Freehand Drawing, Book 1, pp. 1-64.
Unit 8

**Freehand Sketching**

**Purpose:** To become acquainted with the methods used in making freehand sketches; to develop some skill in freehand sketching.

**Discussion Topics:**
- An ability to Sketch is an Asset to Everyone
- Freehand Sketching is a Preliminary to all Technical Drawings and Designs

**Demonstration:**
- Techniques used in Sketching

**Experiences:**
- Applying the rules and techniques employed in making freehand pencil sketches
- Expressing ideas with pencil or pen

**Problem Suggestions:**
- Sketch a map of your vacation trip noting historical spots, as well as other points of interest, with appropriate sketches.
- Sketch a plan of your future home.
- Sketch a plan of your proposed garden.
- Sketch a plan for a community park with adequate playgrounds, shrubbery, flower beds, etc.
- Make a sketch of a new piece of furniture.
- Make a sketch of a gadget you may wish to have patented.

**Review of Experiences:**

**Helpful References:**
PORTAIT OF
WARREN C. BETTS
BY JIM STRONG • 1946-1946
Unit 9

Working Drawings

Purpose: To make practical application of the principles covered in preceding units; to make assembly and detail drawings; to properly dimension a drawing.

Discussion Topics:
Successful Construction Depends upon Correct Planning
The Purpose of Working Drawings
The Importance of Accurate Dimensioning
The Importance of Notes on Working Drawings
The Importance of Detail Drawings

Demonstration:
The Mechanics of Dimensioning

Experiences:
Learning to do purposeful planning
Learning to make accurate measurements
Learning to record measurements correctly
Learning to read drawings

Problem Suggestions:
Design a pair of book-ends, supplying all the necessary information to construct them.
Design a piece of furniture for your home with complete working drawings, detail drawings, accurate dimensions correctly applied, and all necessary notes for construction.
Make detail drawings of broken machine part to be sent to machine shop for construction.
Make working drawings with complete specifications for an article to be sent to the foundry for construction.

Review of Experiences:

Helpful References:
French & Svensen, Mechanical Drawing for High Schools, pp. 93-102.
Hoelscher & Mays, Basic Units in Mechanical Drawing, pp. 103-134.
Mattingly & Scrogin, Applied Drawing and Design, pp. 56-64.
GENERATOR
Unit 10

Design Essentials

Purpose: To develop good taste and appreciation of whatever is appropriate in materials, design, decoration, and fitness to purpose; to acquire an introductory understanding of the technical skills common to the designer.

Discussion Topics:
- The Meaning of Design
- Designing Involves Creative Thinking
- The Designer must Follow the Rules
- The Birth of New Ideas
- Fitness to Purpose
- Nature, a Source for Design Motifs

Demonstration:
- Dividing and Zoning the Primary Mass

Experiences:
- Applying design rules to a particular problem
- A study of well designed articles and buildings
- Learning to distinguish between good and poor from the design viewpoint

Problem Suggestions:
- Design a book plate for your own use.
- Design a fireplace screen of good proportions.
- Design a small book case for your own room.
- Design a metal or wooden jewelry casket.
- Design a lighting fixture for your own room.
- Design a copper porch light.
- Design a copper mail box.
- Design an occasional table for the living room.
- Design a modernistic ash-tray.

Review of Experiences:

Helpful References:
- Gottshall, Design for the Craftsman, pp. 1-145
- Varnum, Industrial Arts Design, pp. 7-190
- Mattingly & Scroggin, Applied Drawing and Design, pp. 198-209
Unit 11

Furniture Drawing

Purpose: To make application of design principles in designing useful articles of furniture for the home; to learn about the characteristics of Period Furniture; to learn something about factory production of furniture.

Discussion Topics:
- Period Furniture
- Modern Furniture
- Furniture Drawing Involves the Rules of Design
- Appropriate Woods for Furniture
- Importance of Wood Finishes

Demonstration:
- Distinguishing Characteristics of Period Furniture
- Woods and Wood Finishes

Experiences:
- Learning to distinguish the various types of Period Furniture
- Visits to Furniture Stores
- Learning about woods and wood finishes
- Learning to distinguish between good and poor design in furniture

Problem Suggestions:
- Make sketches of the distinguishing characteristics of period furniture for your notebook.
- Clip designs of modern furniture from magazines and periodicals for your notebook.
- Design a Colonial foot-stool.
- Design a radio stool embodying some form of period style furniture.
- Design a modern occasional table or stand.
- Draw a Duncan Phyfe coffee table.

Review of Experiences:

Helpful Suggestions:
- Bulletin, The American Home Course in Period Furniture
- Booklet, Chats on Period Styles in Furniture
- Booklet, Furniture, Its Selection and Use
Unit 12

Home Planning

Purpose: To learn about symbols, facts, and practices employed in drawing buildings; to learn to read house plans and know something about the value of specifications.

Discussion Topics:
- Types of American Homes
- Modern Fabricated Homes
- Symbols and Practices Employed in Designing Homes
- Building Materials
- Specifications
- Alterations

Demonstration:
How houses are constructed (Use of model)

Experiences:
- Learning about types of homes commonly found in America
- Learning about appropriate building materials
- Learning to write specifications
- How to make alterations
- How to draw house plans

Problem Suggestions:
- Draw plans for a one-car garage.
- Draw plans for a child's play house.
- Draw plans for alterations to be made in your own home.
- Draw plans for built-in features, such as – closets, book shelves, china cabinets, broom closet, ironing board closet, linen closets, window seat, etc.
- Draw plans for a small home including first floor plan, basement plan, front elevation, side elevation, rear elevation, lot plan, and detailed specifications for building.

Review of Experiences:

Helpful References:
- Elwood, Problems in Architectural Drawing
- French and Svensen, Mechanical Drawing for High Schools, pp. 148-159.
- The Architectural Forum, The Book of Small Houses
- Nelson & Wright, Tomorrow's House
Unit 13

Landscape Architecture

Purpose: To learn about the rules and practices employed by the landscape architect; to beautify the home lot by applying elementary principles of landscape design.

Discussion Topics:
- Landscaping as a Hobby
- Landscape Architecture as a Profession
- Trees, Shrubs, Flowers, Grass, etc., suitable for Beautifying the Home Lot
- Soil and Fertilizer as Important Factors in Maintaining Beautiful Lawns
- Garden Furniture and Fixtures

Demonstration:
- How to convert a home lot which is unattractive into one of beauty (sketches and blackboard illustration)

Experiences:
- Learning about trees, shrubbery, flowers and grass appropriate for beautifying the home lot and about arrangement for pleasing effects
- Making visits to nurseries
- Making application of this knowledge in beautifying the home lot

Problem Suggestions:
- Sketch your home lot as it is now.
- Make another sketch of your home lot showing possible changes and additions which might make it more attractive.
- Design a pergola, arbor, fence, gate, outdoor furnace, bird house, lawn seat, etc., which might add beauty to your yard or garden.
- Make a detailed drawing of a rock garden showing dimensions, water supply, drainage, and appropriate vegetation.

Review of Experiences:

Helpful References:
- Shepardson, *Furnishing the Home Grounds*, pp. 8-45
Unit 14

Color Values and Uses

Purpose: To acquire a general understanding of color and color values; to make a practical application of this knowledge in the selection and use of color for the home, home furnishings, and wearing apparel.

Discussion Topics:
- Color as a Means of Enrichment
- Pigments and their Properties
- Principles of Color Harmony
- Color Classifications
- The Effect of Various Colors on People

Demonstration:
- How to obtain harmonious color combinations

Experiences:
- Learning about primary and secondary colors and how to combine two or more colors to obtain the hue we wish to use

Problem Suggestions:
- Design a color chart showing six hues in the color alphabet.
- Design a tile, a vase, or some other piece of pottery, and work out a proper color scheme for it.
- Select suitable colors for the walls of your room giving consideration to the color of the rug and the furniture.
- Design a Christmas card with a properly executed color scheme.
- Design a metal box or a wall plaque which is to be enameled and work out a color scheme for it.

Review of Experiences:

Helpful References:
- Gottshall, Design for the Craftsman, pp. 114-130.
- Carpenter, Colour, a Manual of its Theory and Practice.
Unit 15

Duplicating Processes

Purpose: To learn about the various processes of duplicating employed in business and industrial enterprises; to learn processes of duplicating by making blueprints, black-line prints, photo-prints, mimeograph prints, and numerous other forms of duplicating.

Discussion Topics:
Commercial and Industrial Uses of Duplicating Blueprints, black-line prints, photoprints, mimeograph, hextograph, printing, silk screen, rubber stamps, etc.

Types of Equipment Required for Duplicating Processes

Demonstration:
How to use the blueprint machine to make blueprints, and black-line prints
The silk-screen process
How to make mimeograph reproductions

Experiences:
Learning to make prints by using duplicating equipment
Visiting print shops, blueprint companies, commercial art studios, engraving companies, etc.

Problem Suggestions:
Make an inked tracing on vellum tracing paper.
Make a blueprint using blueprint machine.
Make a black-line print.
Design a stencil and make a mimeograph print.
Make reproductions using the photostat machine.
Cut a stencil and make a silk-screen print.
Make other types of duplications if equipment is available.

Review of Experiences:

Helpful References:
French and Svenson, Mechanical Drawing for High Schools, pp. 75-76. (blueprints)
Hoelscher & Mays, Basic Units in Mechanical Drawing, pp. 151-150. (blueprints)
Zahn, Silk Screen Methods of Reproduction, pp. 13-147.
Heyer, Cartoon Portfolio. (mimeograph figures)
Unit 16

Map Drawing

Purpose: To learn to read maps and understand the symbols used in map drawing; to become better acquainted with city, county, state, and country by drawing useful maps.

Discussion Topics:
- Universal Use of Maps
- Kinds of Maps
- Symbols Used on Maps
- Map Lettering and Map Notes

Demonstration:
- Techniques used in map drawing

Experiences:
- Visiting the County and City Engineer
- Learning how to read maps of various kinds
- Drawing maps

Problem Suggestions:
- Draw a map of your vacation trip, employing the symbols used in map drawing.
- Draw a map of your county, indicating railways, important highways, rivers, towns, township lines, and other items of interest.
- Draw a map of your town or city, indicating streets, railways, highways, public parks, schools, churches, and other points of interest.
- Draw a map of a new city park or subdivision.

Review of Experiences:

Helpful References:
- Hoelscher & Mays, Basic Units in Mechanical Drawing, pp. 236-248.
- French & Svensen, Mechanical Drawing for High Schools, pp. 165-168.
Unit 17

Graphs and Charts

Purpose: To learn how masses of statistical data may be presented in condensed form by graphical means; to learn to read and understand graphs and charts; to gain experience in making graphs and charts.

Discussion Topics:
- Purposes of Graphs and Charts
- Kinds of Graphs and Charts
- Titles and Notes

Demonstration:
- Techniques used in constructing graphs and charts

Experiences:
- Collecting data for graphs and charts
- Collecting clippings of many different kinds of graphs and charts
- Recording data by drawing graphs and charts

Problem Suggestions:
- Draw a line graph showing the number of football games won and lost during the past season.
- Draw a bar graph showing the number of strike-outs per game of your favorite pitcher.
- Draw a single bar chart showing the ratio of material used in concrete for reinforced construction.
- Draw a pie-chart showing the number of boys participating in each sport in your school.
- Draw a line graph showing yearly increase in school population since 1930.
- Draw an organization chart of your city government, schools, industrial firm, or business concern.

Review of Experiences:

Helpful References:
- Fryklund & Kepler, General Drafting, pp. 127-131.
- Woellner & Wittick, General Mechanical Drawing for Beginners, pp. 48-52.
The chart shows the tardiness by buildings for the fourth month. The Central High School has the highest tardiness, followed by the South High School, Franklin, and Irving. The chart also shows the total enrollment, total tardiness, and average tardiness per 100 pupils entered.

**Central High School**

**TARDINESS GRAPh**

**Central Scores-1934-5**

**Basketball**

**Central High School**

**ChARTS & GRAPHS**
Unit 18

**Block Prints**

**Purpose:** To become acquainted with the processes employed in making block prints; to design, carve, and print blocks for individual use.

**Discussion Topics:**
- Commercial Use of Block Prints
- Block Printing as a Hobby
- Materials and Equipment
- Prints of Two or More Colors

**Demonstration:**
- Techniques in carving linoleum
- Inking and making prints

**Experiences:**
- Preparing appropriate designs for block printing
- Experience in carving linoleum
- Making prints
- Carving blocks for two or more color prints

**Problem Suggestions:**
- Design, carve, and print a monogram of your own initials.
- Design, carve, and print a Christmas card.
- Design, carve, and print your name on personal stationery.
- Design, carve, and print a booklet or program cover of two or more colors.
- Design, carve, and print posters for a school activity.
- Design a cut for the school paper.
- Design title pages for the school annual.

**Review of Experiences:**

**Helpful References:**
- Shinn, Cobb, *An Exhibition of Cuts*.
- Fletcher, *Wood-block Printing*.
Unit 19

Commercial Art

Purpose: To acquire an introductory understanding of those phases of art which are used in the preparation of advertisements and the sale of goods; to design posters for definite needs.

Discussion Topics:
- Commercial Art as a Vocation
- Commercial Art and Advertising
- Elements of Poster Design
- Color in Advertising
- Supplies and Equipment

Demonstration:
- Balance in poster design

Experiences:
- Visiting commercial art studios
- Visiting sign painter shops
- Doing large scale lettering
- Making posters for definite uses
- Learning to use brush and show card colors

Problem Suggestions:
- Design a show card employing large scale lettering.
- Design a football poster employing appropriate design and color.
- Design posters for basketball, baseball, track, tennis, class play, school dance, lyceum number, class party, or any other similar activity, using figures and color to make them attractive.
- Design a booklet cover for use in other classes.

Review of Experiences:

Helpful References:
- Wallace, Commercial Art, pp. 1-212.
- George, Speedball Textbook, pp. 1-88.
- Harshbarger, Practical Signs and Posterwork, pp. 1-77.
- Carlyle & Oring, Letters and Lettering, pp. 1-128.
- Shinn, Cobb, An Exhibition of Cuts.
- Beem & Gordon, Free Hand Drawing, Book 2, pp. 1-63.
THE CENTRAL HIGH SCHOOL CHOIR

presents

M'LE MODISTE-
A COMIC OPERA IN TWO ACTS

Music by
VICTOR HERBERT

Libretto by
HENRY BLOOM

Under Direction of
WILLIAM G. TEMPEL

44¢ TAX INCLUDED

NOV. 19 & 20 8 P.M.
CENTRAL AUDITORIUM

POSTER LETTERS

OCGD
PPUS
LMTH
JUAVX
KMWY
ZNSE

MONOGRAMS

C G G C C S
R Y F I S
H O V N
AQL SG TAP

PLATE NO. 14
Unit 20

Cartooning

Purpose: To acquire some skill through practice in expressing ideas on paper with pencil and pen.

Discussion Topics:
- Cartooning as a Profession
- Purposes of Cartoons
- Famous Cartoonists
- A cartoonist is a Versatile Person

Experiences:
- Collecting illustrative cartoons
- Learning the techniques of cartooning
- Doing some cartoons

Problem Suggestions:
- Sketch a plate of thirty or more action stick-figures with proper body proportions.
- Sketch a plate of six or more each of ears, eyes, noses, chins, mouths, lips, hands, feet, etc.
- Sketch a face in profile and full face embodying the same facial features in each.
- Draw a cartoon about some phase of school life.
- Draw an original cartoon about a member, or members, of the school faculty.
- Draw a strip cartoon of eight or more panels.

Review of Experiences:

Helpful References:
- Foster, How to Draw Heads, Animals, and Landscapes, (series of six booklets)
Unit 21

Etchings

Purpose: To learn about etching processes; to make dry point and acid etchings.

Discussion Topics:
- Types of Etchings
- History of Etching
- Etching as a Hobby
- Value of Good Etchings

Demonstration:
- Techniques of zinc etching
- Techniques of celluloid etching
- Techniques of acid etching

Experiences:
- Collecting etchings
- Learning to do zinc etchings
- Learning to do celluloid etchings
- Learning to do acid etchings

Problem Suggestions:
Design a metal name plate, fob, ash tray, book ends, with appropriate designs for acid etching.
- (copper, brass, or white metal)
- Pick an appropriate design and make a celluloid etching.
- Pick an appropriate design and make a zinc etching.

Review of Experiences:

Helpful References:
Barry, How to Make Etchings, (dry point)
Payne, *Art Metalwork*, pp. 42-60. (acid etching)
Chalk Talking

Purpose: To develop speed in presenting ideas and facts on a large scale with chalk for entertaining purposes or for conveying factual and technical information in a rapid-fire manner.

Discussion Topics:
- The Chalk-Talk Artist
- Values for Coach, Teacher, Lecturer

Necessary Supplies
- Techniques in large scale drawing

Experiences:
- Expressing ideas with chalk
- Learning to do large scale rapid-fire drawing

Problem Suggestions:
- Make a small pencil sketch of a face, a person, a figure, or any article. Using lecturer's chalk and a large sheet of news-print paper, make a large scale drawing of the sketch. (about 20 times larger)
- Draw a large scale character sketch in color.
- Draw a landscape in color.
- Make comic caricatures, trick drawings, upside-down drawings.
- Prepare a program for a school assembly.

Review of Experiences:

Helpful References:
- Tarbell, Chalk Talk Stunts
- How to Chalk-Talk
- Fun with Chalk
- Chalk Talks for Sunday Schools
- Brown, Chalk Talks
- Bart, Chalk Talk and Crayon Presentation
- Kindig, Chalk Talk Sermonettes
The Concluding Research Project

Purpose: To gain experience in organizing and presenting technical information by means of assembly drawings, or diagrams.

Specifications:
Source material must be secured by the student.
The project may be a process diagram, a theory, a method, or a principle illustrated and presented in diagram form.
Color may be used to indicate certain functions, or flow of liquids, or to distinguish various materials.
Explanatory notes may be added, if necessary.
Title should be in large letters.

Problem Suggestions:
- Manufacture of materials into finished product
- The principle of electric refrigeration
- Oiling system of an automobile
- Brake system of an automobile
- The making of a cigar
- Process of pasteurizing milk
- The process of dry cleaning garments
- The principle of distillation
- The principle of gas refrigeration
- Baking a loaf of bread
- Process of making potato chips
- Printing a newspaper
- Steam heating system
- Air conditioning system
- Jet-propulsion
- Steam engine
- Gas engine
- Air compressor
- Making a blueprint
- Plumbing system of a home
- Sewage disposal plant
- Auto lighting system
- Auto ignition system

This research problem is to be presented and explained before the entire class.
PART IV

OUTCOMES AND IMPLICATIONS OF THE PROGRAM
"As long as there has been the slightest amount of organized social life, so long have men sized up their fellow-men." - Franz

The meeting of the first two human beings was a contest of mental measurement, crude and limited as it must have been. The first physical contest between these two human beings might be conceived to be the first objective test of physical aptitude. It might be said that when man consciously learned anything, he was aware of testing himself.

Much of what has been done in the field of educational and aptitude testing has been done through the efforts of specialists in the fields of psychology and measurements. The pioneers in educational measurement have labored to put into the hands of present day teachers devices that will measure, objectively, the outcomes of instruction.

The era embraced by the past decade marks the development and use of the informal objective test by the rank and file of the teaching profession. This decade also includes the period during which criteria have been developed for the formulation and evaluation of objective measurements. Testing has now become, not a mysterious measuring device to be administered by the expert alone, but the heritage of that educator who makes the most intimate of educational contacts - the classroom teacher, the drawing and shop
teacher, the master teacher.

Most teachers realize that testing is an integral part of the teaching program. Perhaps none will be as valuable as the well made informal objective test made by the teacher, himself, to meet his own ends. Tests of some kind are necessary to encourage progress and this leads to a statement of the fundamental reasons for testing.

Fryklund (9:p.27) says that the reasons for testing are:

1. To present objective standards to the pupils. It is well for the learner to know that at a given time he will be held to account for certain achievements in a given course. The necessity for really learning subject content and developing mastery of skills is not always apparent to the learner. It is an excellent means of coercion to induce study.

2. To measure pupil achievement. Ideational learning and skills should be measured in the shop or drawing room. This can be done by requiring the learner to react to selected questions, and to perform selected skills which sample the instructional units of the course up to the time of the test. The results should be recorded and comparisons should be made during the progress of the course in order to secure an objective record of achievement.

3. To improve teaching. Tests tend to measure the teacher's method, organization of subject matter, attempts to diagnose pupil difficulties, and perhaps last but not least, the teacher's general influence.

4. To diagnose pupil difficulties. The program of testing is functioning effectively and most worthily when it is used for diagnostic purposes. All tests cannot be used for this purpose, however. Special attention should be given to detailed analysis when constructing highly effective tests for diagnosis. Tests are valuable for determining the needs of each individual in a given course.
5. **To compare one class or one school with another.**
At the present time newer methods of selecting subject-matter are enabling teachers to define units that will provide a means of standardization. The use of standardized tests based upon standardized units will enable comparison of one class with another in the same school or in other schools.

6. **To provide guidance data.**
Tests should provide information with respect to abilities and disabilities of the learners. Continued failure is an indication that a learner is not making connections in a given subject. When remedial measures fail, and mental tests verify the opinions of the teachers, it is possible that the school can do little for that learner in a given subject. He should not be encouraged to enter a field that requires an accurate knowledge of a subject in which he is consistently weak.

7. **To provide promotional data.**
So long as promotion depends in a large degree upon accomplishment, tests will be of value in measuring this accomplishment.

There are many things with which drawing teachers necessarily deal where exact measurements may at times be somewhat difficult to obtain. These things concern social traits and behavior problems, attitudes toward work, degrees of interest, judging educational worth, pupil-teacher and pupil to pupil relations, cleanliness, and many more. All are related to success or failure and therefore have a part in the educational process. Particularly are such problems related to drawing where there may be a greater spread of interest and a resulting variance in individual development.

An otherwise subjective situation may be objectified if it is broken down into its variables. These variables may then become ratings in a scale and may be charted as a profile. The more exactly such variables are separated
into elements, the more objective the measure becomes. Age, weight, and height - for example - may be measured and charted very intelligibly as separate elements, but would hold little meaning if given as a composite score or measure. The first purpose, then, is to consider otherwise un-measurable traits or developments by breaking them up into elements for rating in single scales or groups of scales - the latter known as profiles.

An extensive preliminary list of traits will facilitate the procedure of selections that the drawing teacher makes for his particular situation. There will also be a greater effort on his part to make selections consistent with the educational objectives he has set up for the program. The following list includes some of the classes of traits that may be included: intellectual, efficiency of performance, attitudes, social and moral qualities, temperament, etc.

After traits have been selected it is necessary to define them clearly. This will prevent the teacher from placing different interpretations on the same term. A term should be defined objectively whenever possible. Frequently a definition, rather than a term, is used. The point is that if a trait is only named, the teacher may read the term and devote little attention to the detailed information that the term describes.

When traits to be included in the rating scale have been determined, it is essential to weigh them according to an estimate of their importance.
The determining of weights for traits common to drawing experiences was agreed upon by a group of drawing instructors and incorporated in a rating sheet, (see Fig. 2). Names of students possessing a certain trait in varying degrees were written on a blank opposite appropriate rating values that have been previously determined. Some particularly outstanding student and some particularly poor student in the class may be used in this method with three other members falling in equal distances between the two extremes to give the rating greater sensitivity. Certain values may be prescribed for these five levels. The principle involved is based upon the comparison of the different members of the class with the members listed in the scale. Corresponding values may be then prescribed. An illustration of this method follows:

**LEADERSHIP:** initiative, force, self-reliance, proficiency, mastery of details.

1. Highest ------- Ed Mack ------------- 20
2. High --------- John Kauk ------------- 15
3. Middle ------- Dan Miller ------------- 9
4. Low --------- Joe Herbst ------------- 6
5. Lowest ------- Paul Wright ----------- 3

Another similar method involves rating students relative to other members of a definite group which has been agreed upon as a standard. In this method, the instructor classifies as many of his previous students as possible into five groups from lowest to highest, using these as criteria for future ratings.

It is also possible for the instructor to devise a self-rating scale for his students. Traits that are
related to the broader social concepts of drawing may be incorporated in this scale.

Another method for determining reliability is by comparing the ratings made by the instructor with the normal distribution curve. Skewness in either direction in the curve may indicate certain fallacies in the instructor's standards.

The types of tests employed and the manner in which they are administered depends largely upon the good judgment of the teacher. The value of testing depends upon its outcomes. Is the testing dependable? Does it measure pupil achievement? Does it diagnose pupil difficulties? Does it provide guidance data? Does it provide promotional data? Does it improve teaching? If testing accomplishes these things it may reasonably be assumed that the testing has measurably accomplished its purpose. Tests and testing are justifiable to the extent to which they aid in reaching the objectives of the program.

Tests should serve at least three useful purposes. First, and probably most important, is their usefulness as a teaching device - as a means of assisting students to progress more satisfactorily by,

a. pointing out a need for improvement,
b. indicating where improvement is necessary, and
c. revealing ways in which improvement can be brought about.

Second, tests provide an objective means of measuring student progress; that is, they aid in checking the efficiency of the teaching, in comparing students with one another and with themselves, and serve as a basis for classification, promo-
tion, advancement, and diagnosis. Third, tests are helpful in determining the status of students; e.g., a new student coming into class can be checked, by means of tests, for knowledge of the subject gained prior to his entrance into the class.

In all forms of testing it is highly desirable that the results of the test be made known to the student. It is the student, himself, who in the final analysis must see a need to improve and then realize what must be done to overcome his difficulties.
Effects on the School

Educational tours to new parts of the country or to distant shores usually tend to enhance and enrich the experiences of life. If blessed with the faculty of keen observation, one may derive additional benefits from such a journey. The degree of enjoyment and cultural development depends upon the character and personality of those sharing such an adventure. To some, personal comforts alone may be the barometer of a pleasant or boresome journey. For them, it rains too much - the food is poor - hotel accommodations are bad - the sun shines too warmly - strange people are boresome - customs are abominable, and, as a final expostulation - they wish they had stayed at home. For others, the landscapes are beautiful - the sunsets are gorgeous - strange people are friendly and interesting - customs are enlightening - mountains and valleys are a part of God's plan, and, as a final tribute - they are looking forward to another fine trip.

Lima Central High School is no different from any other school of comparable size. Its boys and girls are a cross-section of the average American youth. They enter the portals of the school, some unconsciously perhaps, to make preparation for useful and happy living. Most of them wear the smile of opportunity and are seemingly happy in the adventure; others are content to wear the mask of make-believe and seat themselves - when the bell rings simply
because it is one of the rules of the place. The degree of satisfaction or discontent is reflected in their ability to make proper mental and physical adjustments. Most of the pupils seem eager to grasp all educational advantages within reach, while a few shun them as a cup of bitter medicine to be swallowed at a time when there is no apparent illness.

With the inception of general drawing as a regular subject in the curriculum of Central High School, new fields of useful experiences were opened to its students. To reveal all the benefits derived from these useful experiences would be an immeasurable task. One would agree that the placing of fertilizer on the lawn has a nourishing effect, but to determine the value of the fertilizer on each blade of grass would be a delicate and almost impossible task, although the lawn as a whole would appear more virile, sturdier, and more beautiful because of the added nourishment.

It would seem logical however to point out a few of the more apparent benefits derived through drawing experiences which have enhanced the school as a whole. Some of them are - more pleasingly arranged bulletin boards throughout the entire school building; well designed posters for all school activities; interesting cartoons in the weekly school paper; appropriate block print cuts and captions in the weekly school paper; properly designed booklet covers for English, science, biology, and other subjects; suitable study hall charts; well designed stage
settings and furnishings; blueprints of the auditorium seating plat; posters for various civic drives, window designs for Christmas, Easter, and other special days; better quality of illustrative work, as attested by instructors of those classes in which drawing is involved, such as - physics, general science, biology, chemistry, history, etc.; scale drawings of alterations in the building; city school maps; well designed stencils for mimeographed bulletins; favors and programs for banquets and dances; athletic schedules, score charts, and notices; and seating plans for the stadium.

These, and many more school functions, enterprises, and activities, have been benefited materially by applying the knowledge gained in the general drawing classes in useful and practical ways. Drawing has become vital in the life of the school because students, themselves, are encouraged to take the initiative in planning, designing, and arranging whenever and wherever drawing may be useful in helping to solve the problems of the school.

These evidences of student interest and development attest the contribution of general drawing to the school's program and seem to indicate definitely that Central High School is a better school because general drawing has been accepted as a regular subject for boys and girls.
CHAPTER XII

Effects on the Community

One finds many places in life in which one must supplement his usual methods of expression by resorting to the use of drawings. The farmer finds it useful in mapping his fields in crop rotation. The navigator uses charts and maps to chart his course. The airplane pilot uses charts and maps in flying. The musician uses diagrams in learning to play certain instruments and his music is really a diagram composed of notes, bars, and scales. The executive uses diagrams to chart his staff and to present valuable aids to his board of directors. The scientist uses drawing to analyze and explain physical, chemical, and other natural phenomena. The student uses drawing in many of his learning situations. The landscape gardner, the interior decorator, the sign painter, the movie director, and many others make frequent use of drawings.

The American way of life would be difficult, if not impossible, to carry on without the use of drawing. Airplanes, steam engines, sewing machines, and refrigerators could not be built except as the details for building them are set down in the form of sketches and detailed drawings.

It would be a useless endeavor to try to give the details for building a locomotive, a battleship, or a modern community center by means of English alone. Even if people
were able to write out the detailed directions, too many words would be required.

When the American public receives the finished products of industry it has the problem of handling, using, and caring for them. Learning how to operate and properly care for these products is most important, and this can be done more effectively with the aid of drawings. Such drawings describe products, giving the names of the parts, and show how to assemble, install, operate, and service such things as automobiles, washing machines, oil burners, and milking machines. It is just as important to know how to use and conserve the products of industry as it is to know how to produce them.

The use of new products is an invitation to participate in new modes of living. This in turn encourages the elimination of old prejudices, the learning of new facts, and the perfecting of new skills.

The huge growth of technology in the American way of life makes it more and more important for all to have some ability in the use of drawing. The products of technology permeate one's daily life, and the extent to which drawing is used is shown in textbooks, magazines, newspapers, and sales and service manuals.
CHAPTER XIII

Results of the Follow-up

A locomotive is a huge mechanism made up of many smaller parts. Each small member is first made as an individual piece. It is cast, machined, polished, and prepared to serve a definite purpose. Other pieces are being prepared at the same time. They may be made of different material, may require different procedures in preparation, but all may be subjected to the same polishing process in preparation for service. All are prepared to serve different functions in the life of the locomotive. When all parts are in readiness the locomotive is assembled, wearing parts are oiled, steam is applied, and the locomotive slowly moves down the track on its trial run. The successful operation of the locomotive as a whole depends entirely upon the functioning of each small part. At this point the locomotive undergoes a thorough examination. If faulty parts are located, they are recommended for repair or replacement. If all parts function properly the locomotive is placed on active duty.

The preparation of boys and girls for the activities of life may be viewed in the same light. Coming from homes of varied atmospheres, different social status, and unlike religious beliefs, these children must be guided into the avenues of greatest usefulness to human society. The gates of equal educational opportunity are open to all.
Few will choose or be qualified to perform identical tasks. The prayer of the master teacher is for wisdom to guide, to direct, and to encourage each pupil to find that walk of life in which he may most fully serve humanity. Schools too frequently fail in this endeavor. Too many mistakes are being made. As defective locomotive parts are replaced by new ones, so young men and women are too frequently asked to withdraw from certain fields of endeavor because somewhere along the line they had taken the wrong turn of the road or omitted the necessary polishing process which might have conditioned them for satisfactory service.

The "follow-up", or checking on students who no longer cross the threshold of the school, is an obligation too often neglected by teachers and school administrators. A little friendly advice, a little assistance here and there, might serve as the manna for new vigor to perform their tasks more efficiently or to merit advancement in their chosen line of work.

Since the inception of general drawing in Central High School scores of students have graduated or left the school to enter vocations of their choice. It is encouraging to note the many practical uses being made of drawing in the diversified occupations and professions now being followed by former members of the general drawing classes when the activity was in its experimental stages. A few concrete examples follow:
Jack is a football coach in a neighboring city. He uses large scale drawing in illustrating football plays for his team. He also letters his own posters, notices, and schedules for bulletin board display.

Vic is a cartoonist on the staff of one of Ohio's largest newspapers. He "found himself" in the cartoon unit of the general drawing class.

John and Dan, twin brothers, are architects in one of Ohio's larger cities. They developed a liking for house planning in the general drawing class and attended an architects' school after graduation.

Bob discovered an ability for chalk drawing. Upon graduation he attended art school. During war service in Europe he painted numerous murals in restaurants and night clubs. He is now employed as a commercial artist.

Robert found himself very apt with charcoal and pastels. He is now staff artist for the chamber of commerce in a large Texas city. He occasionally forwards one of his circulars.

Jim took a liking to drawing details for small machine parts. He is now a technical draftsman for Westinghouse.

Mary showed proficiency in sketching house plans and built-in features. She is now doing the planning for her father who is a contractor.

Eugene got a thrill out of structural drawing. He is now a designing architect with a local firm.

Patty developed talent in freehand sketching. She served as a designer until she got married.
Francis designed scores of different filling stations while in high school. He now designs and supervises the construction of filling stations for a large oil company.

Bill learned to design furniture and various gadgets for the home. He now has his own small manufacturing plant and designs all articles made.

Don is assistant city engineer. He drew his first map in the general drawing course.

Arthur developed proficiency in detail and assembly drawings. He now is a technical draftsman for the Lima Locomotive Works. He teaches a night school drafting class.

Marie showed signs of promise in sketching and designing. She is now studying costume designing in an Ohio school.

Charles (colored) did some really fine lettering and poster work while in school. He now designs posters and letters all announcements for a colored recreation center.

Edward (a cripple) made fair progress in several types of drawing. He now does sketching in the drafting department of the Ohio Steel Foundry Co.

Walter, now a practicing physician, makes use of large scale sketching at clinics and before groups of nurses in training.
Many young people return to the schoolroom for additional training to fit them more ably for the particular type of drawing that they are required to do on the job. Many enroll in night school classes and extension courses for training in specialized types of drawing. The responsibilities of a teacher should not end when students leave school to engage in the serious business of earning a living. Helpful guidance and assistance at this stage is most important. Sincere efforts should be extended to help young people secure positions on a parallel with their capacities, so that they may work, grow, prosper, and be happy on the job. But in order to render this service in a work-a-day world the student must have developed salable skills and attributes generally required to hold, and merit advancement in, positions of responsibility.

One of the greatest joys of being a teacher is to merit the inward satisfaction of knowing that efforts extended in directing young people into channels of useful life activities is meeting with an appreciable amount of success.
CHAPTER XIV

Implications for Teacher Education

The curriculum of any course of training and instruction should be determined by the specific purposes to be accomplished. The definite purpose here is that of preparing teachers to teach general drawing. If this term represented a single and simple body of skills and related information to make skills intelligent, the problem of the curriculum would not be difficult. But general drawing is a broad and inclusive term. No headway can be made without first analyzing the total content of the field into its more important elements. Not only does one find that the breadth of content of the field is great, but also that there are two distinct but closely related kinds of purposes to be served - one which is called a general education purpose, the other a vocational education purpose. While the material used in realizing both purposes is similar in many respects, the basis of both selection and method may be different.

In determining what shall make up the work in courses for training teachers, one can only reach a point where both standards of selection and method of procedure can be properly judged by analyzing into its details the content of the work which those taught by the teachers are to do. Putting it in another way, one must know the activities which boys and girls are to be taught by the teachers who are being prepared.
It is conceded that the training of mechanical drawing teachers is being ably accomplished by technical training schools throughout the country whose specific purpose apparently is the training of men for vocational pursuits. Incidentally, if such men are hired to teach drawing in the public schools, they naturally will teach that which they have been taught to teach, which in this case is mechanical drawing, placing emphasis upon skills and techniques common to the technical draftsman, and using the same teaching methods as used by their professors in the training institutions. This practice would seem justifiable and practical only if such pursuits lead to vocational ends.

The fallacy among school administrators seems to be the acceptance of this narrow vision as adequate training to meet drawing needs in life situations. A mastery of algebra alone certainly would not be considered sufficient to meet all mathematical needs in daily living, yet a course in mechanical drawing has seemingly been the only approach to the acquisition of knowledge and experience in the broad field of drawing with its many and varied applications in real life situations. A narrow conception of drawing has resulted in the loss of much of its practical value.

General drawing attempts to present a much broader picture, information and experiences in all forms of drawing used by man in daily living. Thus the preparation and training of teachers to fully serve the needs of this broader program of drawing becomes the vital concern of
teacher-training institutions. Having determined what activities or units of work are to be taught to boys and girls in the general drawing program, a basis for teacher-preparation has been established. How this is to be done will depend largely upon the ingenuity of the teacher-training personnel. It would seem logical to solicit the co-operation and assistance of other departments of the institution who undoubtedly have rich contributions to make, such as, Fine Arts, Architecture, Engineering, Commercial, and others. It may be found necessary to add an additional course or two to the existing curriculum to meet fully the needs of the teacher-training program.

The qualifications of men and women to be trained as teachers merit serious consideration. What qualities should a person possess to become an efficient teacher? In this connection, Bonser (7:p.235) has the following to say:

"The present need is for teachers who are persons of large vision and richness of life; of scholarship that is related to the active needs of a social life confronted by problems that can be solved only by intelligence, integrity, and a true appreciation of the higher and more fundamental values in living."

"The Commonwealth Teacher-Training Study" (8:p.18) presents a "Rank List of Teacher Traits." The list contains twenty-five traits made by combining eighty-three trait elements. These twenty-five desirable traits were ranked by twenty-five administrators as to importance. It is interesting to note the administrators' ranking of qualities:
2. Self control 15. Attractiveness
3. Consideration 16. Industry
4. Enthusiasm 17. Neatness
5. Magnetism 18. Dependability
6. Adaptability 19. Scholarship
7. Breadth of interest 20. Originality
10. Refinement 23. Progressiveness
11. Carefulness 24. Fluency
12. Forcefulness 25. Thrift
13. Leadership

The psychology of the administrator as revealed by these rankings of qualities is illuminating. The teacher or layman would undoubtedly alter the arrangement of these qualities considerably; however, it is a definite indication to all teachers that they are being judged from many angles by administrators and parents and that their success or failure depends largely upon how well they fit into this general pattern.

The selection of teacher material is becoming increasingly important. Bonser (7:p.235) has noted this, for he says:

"Every teacher-training institution may prepare teachers to teach in harmony with the best conceptions we know. To do this, they must select students who have the capacity to respond to
proper education and training; make up their faculties of members who themselves have the qualifications which would be developed in their students; and provide the curriculum and equipment which represent opportunities for students and faculty to grow by co-operative participation in educative activities. That they should use all of the materials that are helpful from race experience with libraries, museums, and current life activities afford should be assumed without question. The whole matter lies with the faculties and administrative officers of the normal schools and teachers colleges themselves. The teachers are what these institutions make them."

The conclusion of the whole matter would seem to be that teachers must be educated to comprehend the large issues of life and trained to teach the young to meet these issues with intelligence and integrity.
SUMMARY

The vast welter of current writing on education is saved from being verbiage only by the grace of the readers' insight that at its simplest - education is people. It is people in a certain kind of conscious, vital, creative relation to each other. It is people with a little more experience with life and with organized areas of knowledge, guiding with specific intent the exploratory experiences of the less mature and less aware. It is the explicit effort to widen and deepen the sensitiveness of persons that they may the more wisely and with fuller kindness cope with the problems of life as these are encountered in daily living.

Every experience has some educational value for better or for worse. But what is good, or what is undesirable, is determined by the needs of society. A good education, then, in the light of present needs, is that education gained from good and favorable experiences. Education, in the narrower sense, is the sorting out of desirable experiences and their concentration in a systematic program to serve fully the needs of the individual and of society.

The experiment presented in this study has been an attempt to select and to associate drawing experiences with actual life situations. In approaching this problem it seemed advisable to bring to light some of the educational practices regarding drawing instruction in the past. The views of educators, as expressed in their professional
writings, reveal that the vocational aspects of drawing are predominantly in evidence. Mechanical drawing, as such, has been erroneously accepted as being self-sufficient to supply the drawing needs of all students. Little or no consideration had been given to the values and uses of drawing as material for general educational aims. The failure to discriminate between general educational purposes and those of a strictly vocational nature has resulted in developing courses designed primarily to serve general educational needs.

The usefulness of drawing to everyone, regardless of vocation, was determined, at least in a partial manner, by conducting a survey to find out "where drawing occurs in this community." This survey, conducted by students, revealed an almost universal application of the varied forms of drawing in life situations.

The manifestation of a deeper interest in drawing became apparent as drawing became functional in the school life of the student. This interest resulted in the formation of additional classes and increased facilities to meet the needs of the enlarged program. Better quality of illustrative work, in other classes where drawing is involved, is attested by fellow teachers. An ability to express one's ideas graphically in life situations is an asset to everyone.

Viewing the values, uses, and broad applications of drawing from the educational viewpoint, one concludes that general drawing has definite contributions to make in
the scheme of general education of boys and girls. It further provides the opportunity to encourage those who show proficiency to follow some phase of drawing as their chosen vocation.

Educationally, one of the big problems here is to find teachers whose range of vision, interest, and competence extend beyond a narrow specialty, and by the same token to find books with which to teach that are integrative yet sound, inclusive yet deep, and written in a language comprehensive to the teen-age mind. This problem should be the vital concern of all teacher-training institutions whose apparent duty is the preparation of efficiently trained teachers to teach the youth of our land.
PART V

APPENDICES
Appendix A

LIST OF REFERENCE BOOKS


Appendix B

BIBLIOGRAPHY


