A Study to Determine the Relative Achievement of Boys and Girls in Home Mechanics

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A STUDY TO DETERMINE THE RELATIVE

ACHIEVEMENT OF BOYS AND GIRLS

IN HOME MECHANICS

BY

JOHN R. CUNNEA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

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VITA

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CHAPTER I

THE HISTORY OF THE MOVEMENT TOWARD HOME MECHANICS

The home-mechanics course, which is considered a unique offering in the field of the industrial arts and household arts, has had an interesting evolution. Briefly, the course is one that selects material from both the industrial arts and the household arts with the idea of providing something useful and interesting to both boys and girls. Since the struggle of both the industrial arts and the household arts to find a permanent place in the curriculum is in itself an interesting one, it is evident that the story of the home-mechanics course is still more so.

Not only was it necessary for the industrial arts and the household arts to find a place in the curriculum, but, when they had once found a place, it was inevitable that the courses offered should undergo constant change. The nature of this type of course is peculiarly amenable to change. There have been changes, of course, in all the subjects of the curriculum. English, history, Latin, mathematics, and every other subject have undergone radical changes. But in all these subjects the changes, so far as content is concerned, have consisted in what was thought to be a better selection of material. The material itself already existed. Hence in these subjects we are not today teaching much that was not taught many years ago, but are teaching a selected portion of old material in new ways. However, in the industrial arts and the household arts the constant and rapid development of new
appliances and new processes has brought about a far more radical change in content than that which took place in any other subject.

Industrial-arts and household-arts subjects are comparatively new to the American educational scene, having been introduced only about three-quarters of a century ago. Industrial or manual arts' offerings in this country were greatly influenced by similar movements in Europe. While the work done in Russia and in the Scandinavian countries doubtless had the greatest influence on the American offerings, for the sake of completeness we will consider briefly the manual arts movement in all the major European countries which were involved.

"The first country to organize such work as a part of its school instruction was Finland, where, as early as 1858, Uno Cygnaeus (1810-88) outlined a course for manual training involving bench and metal work, wood-carving and basket-weaving." The work begun in Finland was observed by a Swede, Otto Salomon, in 1873. Salomon, at the time, was in charge of the famous trade school at Naas, Sweden. He was impressed with the value of handwork, not only as a medium of trade instruction, but also as a means of general education. Professor Friese points out that Salomon was confirmed in this belief after he had observed the sloyd work of Cygnaeus in Finland. Referring to Salomon, Friese states:

1 No misunderstanding will result if the reader interprets the terms "manual arts" and "industrial arts" as being synonymous, although, actually, "industrial arts", is the more modern term.

He wished to develop the normal activities of children in a beneficial way, instill respect for labor, develop independence and self-reliance, train in habits of order, exactness and cleanliness, train the eye in the sense of form, and develop physical powers.3

On the basis of Otto Salomon's work and observations the government of Sweden decided to introduce manual work into its schools. The introduction of this work was to serve the dual function of counteracting the bad physical and moral effects of city life and of renewing the declining interest in the industries of the home.

From these Scandinavian beginnings the manual-arts movement spread to the larger European nations. As Cubberly says:

France was the first of the larger European nations to adopt this new addition to elementary school instruction, a training school being organized at Paris in 1873, and in 1882, the instruction in manual activities was ordered introduced into all the primary schools of France.4

While the movement was rather slow in getting across the Channel into England, having been first introduced in London about 1887, it is interesting to note an addition for the girls which the British provided. We quote Cubberly again:

The government at once accepted the idea, encouraged its spread, and began to aid in the training of teachers. By 1900 the work was found in all the larger cities, and included cooking and sewing for the girls, as well as manual work for the boys.5

5 Ibid., p. 769.
In Germany a type of manual training was introduced by Dr. Waldemar Goetze. It was first begun at Leipzig and gradually spread through central and southern Germany. The work in Germany seems to have been developed independently of the work done in the Scandinavian countries. However, as will be brought out later, the German movement had an influence on the American work in this field.

Della Vos was the person instrumental in developing the Russian system of tool instruction. It was first introduced at the Imperial Institute of Moscow in the year 1868. This shopwork differed from that introduced in Finland ten years earlier in that it was strictly vocational. Its purpose was to train skilled workers and engineers needed for the construction of Russian railroads.

These various movements in the European countries all had their particular influence on the American scene. These influences will be best understood if we consider separately the characteristics and the contributions of each country's type of manual arts.

The work done in Sweden was called sloyd work. A sloyd was a tinker, a sort of jack-of-all-trades. Sloyd work was originally considered a home art. However, the industrialization and urbanization of a large portion of the Swedish population effected a decline in the home arts. That Otto Salomon considered this sloyd work a part of the child's general education has been previously pointed out. Professor Friese describes the method of instruction as follows:

All pupils did not work on exactly the same model, but they did work in the same
general group requiring the same type of instruction. In presenting new work a model was shown. A sketch or working drawing was made by the teacher and this was copied in notebooks by the pupils. The operations were formulated and written in the notebooks. Class instruction was supplemented by individual help. An interesting outgrowth of this work was the development of small-sized woodworking tools for children. The articles made were useful, but there were some preparatory exercises.6

The Swedish sloyd was conceived of largely as general education and its influence on the American scene was to beget a greater regard for child interests and capacities and the methods of using them in educational handwork. The educational psychology of the Swedish system was that of formal discipline and transfer of training. Use was made of mechanical drawings in the making of objects which had intrinsic value and interest for the child. This interest was capitalized upon because the child's mind was on the goal while he was performing the preliminary exercises. The Scandinavian influence made itself manifest in the early American manual training, particularly as regards transfer of training, formal discipline, and the performance of preliminary exercises.

The Russian system, unlike that of the Scandinavian countries, was intended as vocational education and not a part of general education. In the Russian method of tool instruction models of intrinsic value were not made; rather they were exercises in the strict sense of the word. They were models

of specific techniques in working with wood or metal. There was some work
done on real jobs and articles, but usually they were in the form of group
projects. The interests of the boy were not considered. American manual
arts were influenced by the Russian system largely along the lines of organ-
ization and administration. Probably the Russian influence was felt more on
the high-school level than upon the elementary-school level. This idea is
expressed by Cubberly:

In the United States the manual training
and household arts ideas have found a very
ready welcome. Curious as it may seem, the
first introduction to the United States of
this new form of instruction came through
the exhibit made by the Russian government
at the Centennial Exhibition of 1876, show-
ing work in wood and iron made by the pupils
of the Imperial Institute at Moscow. This,
however, was not the Swedish sloyd, but a
type of work especially adapted to secondary
school instruction. In consequence the move-
ment for instruction in the manual activities
in the United States, unlike in other nations,
began as a highly organized technical type of
high school instruction, while the elementary
school sloyd and household arts for girls came
in later.7

Some of the ideas that were drawn from the Russian system were:

1. Occupational analysis as a basis for organi-
   zation of the course of study.

2. Subject matter was organized from the simple
to the complex and teaching methods were
developed.

3. Close record was kept of pupil progress.

4. Separate shops, or unit shops as they are called in this country, were organized for each trade.\textsuperscript{8}

These ideas obviously lend themselves more to the secondary scene than they do to the elementary level. They are still current in the high-school unit shops.

There are many features in the distinctive type of manual training developed in Germany that have carried over to the American system and have persisted to the present time. The German system was the first to use teachers who were pedagogically trained and who had received supplemental instruction in mechanics from skilled artisans. The generally recognized superiority of this type of teacher was attested to by the Navy during World War II, when for instructors in aircraft mechanics the Navy chose teachers with no aircraft training whom they trained in mechanics instead of choosing mechanics untrained in teaching. Briefly stated, it is considered easier to make a mechanic out of a teacher than it is to make a teacher out of a mechanic. The German system also made use of child interest in the selection of articles to be made, and the learning experience through careful direction was emphasized as much as the finished product. The German manual-arts concepts which influenced the American situation are, to the present day, considered valid in industrial-arts education.

These were the European antecedents of the American system of manual arts. As was mentioned earlier, the manual-arts movement in this country began on the secondary level as a result of the Russian exhibit. As a direct

\textsuperscript{8} Adapted from Friese.
result of this exhibition of the work of Della Vos, the Mechanic Arts School of Boston was established by Dr. Runkel in 1877. The curriculum of this school was highly specialized with unit shops for the various trades. However, before this type of school became generally accepted, an influence, strictly American, made itself felt.

Professor Friese thus traces the American influence on the manual-arts movement in this country:

For a number of years previous to 1879, the germ of what was later to become American "manual training" had been developing slowly in St. Louis. The movement there was separate from the experimentation in eastern centers which followed the introduction of the Russian and Swedish plans. In 1873, Calvin Woodward, who had been experimenting with manual education in secondary schools connected with Washington University, advocated the introduction of instruction in handwork into all secondary schools as a part of the general education of all boys.9

In 1879 Calvin Woodward established a manual-training school in connection with Washington University. In order to secure funds for the project he had to organize it on the basis of vocational education. However, since he had originally advocated the use of handwork on all levels of the educational ladder regardless of the occupation the boy intended to follow, he is considered the father of American manual training. Thus it will be understood that, while the American industrial arts movement was in part precipitated by European influences, it also had home origins and influences.

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Experimentally, as early as 1880, handwork was tried on the elementary level. In the Workingmen's School construction work was initiated in the kindergarten. Later it was extended upward in the form of simple woodworking. In 1882 an experimental class in woodworking was formed in one of the public schools in Boston. In the same year the board of education of Montclair, New Jersey introduced manual training to the curriculum of the elementary schools. Philadelphia, in 1885, made similar additions to the elementary school curriculum. Three years later the city of New York added drawing, sewing, cooking, and woodworking to its elementary-school course. These movements were largely manifestations of Calvin Woodward's idea that manual activities deserved inclusion to the curriculum as a phase of general education. While some of the earlier introductions of manual arts were the result of the Woodward influence, the Swedish sloyd had some effect on the later introductions.

From these beginnings the manual-training movement spread. At first its adoption in the various school systems was slow, but by 1900 forty cities, almost all of them in the North Atlantic group of states, had introduced manual training into their schools. Manual training, however, was not readily accepted by all. It had to fight for its place in the American educational system. Friese records that in the National Education Association the controversy over whether or not manual training deserved a place in the general curriculum raged from 1882 to 1889.

Gradually organizations were formed to further the work of the movement. In 1893 the Western Drawing Teachers' Association was formed. This later developed into the Western Arts Association. The Eastern Arts Association came into existence in 1899. Teacher training for manual training began in Boston in 1886 when a very influential school was established there. Bradley Polytechnic Institute in Peoria, Illinois, established teacher training on a broad scale in 1897. This was considered an important step in the development of manual training in the Middle West. Gradually the manual arts gained recognition by American educators.

The teaching of the household arts for the girls is of somewhat earlier origin than the teaching of manual training for the boys. This was due to the position of girls in the schools. Needlework and household arts were considered the fitting subjects for the girl to study and when girls were first admitted to the schools "they were presented with the crumbs of education."¹² In fact, as is pointed out by Bevier and Usher, the early schools were provided for boys only, and

The Dames' Schools were the only organized agency outside the home, and they are said to have afforded opportunities to learn needlework, dancing, and improvement in manners.¹³

For this reason it is easy to understand that when the public schools of Boston were opened to girls in 1798 they had instruction in needlework from their regular teachers. The domestic sciences were considered essentials for

¹³ Ibid., p. 9.
the girls. When the schools were first opened to girls, reading, writing, and arithmetic were considered frills, and unessential for female needs.

It is the growth and expansion of the domestic sciences rather than their introduction which makes the history of this side of the industrial and home-making arts. During its development, home-economics instruction has been largely influenced by the purposes and methods of manual training, general industrial training, and vocational education. The expansion of cooking and sewing in the schools was greatly accelerated by the development of the manual-training movement. These were the subjects which were considered the type of manual training adapted to the needs of the girls. Manual training in the schools was supposed to serve two major functions. The first of these was to contribute to the development of the whole child through learning by doing. The second of these purposes was to give practical training for future vocations.

The aims and methods of the courses given to boys and of the course offered to the girls were somewhat different. The future occupation of the girls for the greater part was that of a homemaker, and the subjects of sewing and cooking were logically vocational needs of the girl. However, the materials and processes learned by the boys in the manual-training courses were so far removed from what they might do in the future that manual training had to be justified on the grounds of general education for the boys. Thus courses for the girls were assigned a dual function; vocational education and general education. This double value assigned to the training given in the household activities has done much toward confusing the real
educational value of the subject.

The manual-training movement received popular support, both from the layman because he saw practical value in it, and from the educator because he saw it as a method that was valuable in general education. In one sense the introduction of manual training into the schools marked the beginnings of more socialized education, but the subject matter, aims, and methods of the manual-training movement were interpreted so narrowly that the results of such training fell far short of the ideals of both the educator and the layman. The domestic-science courses of cooking and sewing, and the manual training with its emphasis on woodworking, accomplished neither vocational efficiency nor the imparting of a knowledge and real understanding of industrial and household problems. Their primary accomplishment was to give hand skill and a knowledge of constructive processes.

The manual-training movement which was influenced, as we have seen, by the Scandinavian sloyd, the Russian tool instruction, the German manual training, and the Woodward manual training, also left its marks. Professor Friese lists the "influences of manual training" which were felt for a long time and some of which are still felt:

The philosophy of transfer of training, or ability to transfer skills and habits from one subject to another, either within the field of manual training or from it to academic fields, was an accepted but unproved aim.

Manual training was conceived largely as woodwork and at times some metalwork.

A course of study was formed on the basis of a series of set exercises or problems followed in sequential order.
The original lack of pupil interest in the articles made was not sensed and corrected for a number of years. Articles of interest to pupils and provisions for individual differences began to appear during the end of the period in which educational handwork was called manual training.  

With the recognition of these shortcomings came the beginnings of a more modern concept of aims, subject matter, and methods. The value of interest in all fields of education was being given more emphasis. The change in pedagogical thought, as a result of which the pupil became more important than the subject matter, was gaining more adherents. Thus the ideas of originality, pupil choice in the selection of problems, and creative design were introduced to improve the handwork offerings. With these came a newer conception of creativeness in relation to manual arts; namely, that manual arts is a means of self-expression, and a medium for teaching design, proportion, color, and so forth. These new concepts did much toward making the manual arts acceptable to a greater number of educators as a phase of general education. 

Cubberly indicates the passing of the early concept of manual training and household arts as follows:  

With the breakdown of faculty psychology and the abandonment in large part the doctrine of formal discipline in the training of the mind, the whole manual training and household arts work has had to be reshaped... these new subjects came to be conceived of in their proper light as means of individual expression

---
and to be extended to new forms, materials, colors, and new practical and artistic ends.

Today instruction in the manual work and household arts in all their forms has been further changed to make of them educational instruments for interpreting the fields of art and industry and homelife in terms of their social significance and usefulness.\textsuperscript{15}

To the more far-seeing educators the failure of manual training was due, not to the inadequacy of occupational activities as educational material, but to the narrow and formal interpretation of these activities. The use of occupations to vitalize the work of the school and as a means of giving pupils an understanding of and an interest in the occupations that are carried on around them is steadily growing in the schools. This attitude toward the manual arts is clearly expressed by Dewey:

Gardening, for example, need not be taught either for the sake of preparing future gardeners, or as an agreeable way of passing time. It affords an avenue of approach to knowledge of the place of farming and horticulture have had in the history of the race and which they occupy in present social organization. Carried on in an environment educationally controlled, they are means for making a study of the facts of growth, the chemistry of soil, the role of light, air, and moisture, injurious and helpful animal life, etc. There is nothing in the elementary study of botany which cannot be introduced in a vital way in connection with caring for the growth of seeds. Instead of the subject matter belonging to a peculiar study called botany, it will then belong to life, and will find, moreover, its natural correlations with the facts of soil, animal life, and human relations. As students grow mature, they will

perceive problems of interest which may be pursued for the sake of discovery, independent of the original direct interest in gardening -- problems connected with the germination and nutrition of plants, the reproduction of fruits, etc., thus making a transition to deliberate intellectual investigations.

The illustration is intended to apply, of course, to other school occupations -- woodworking, cooking, and on through the list.16

Interpreted in terms of manual training and household arts this would mean that woodworking, cooking, and sewing, should be used as an avenue of approach to the study of the practical, scientific, social, and art problems related to these activities. The study of woodworking could logically embrace such things as historic uses of wood, sources of wood, lumbering, activities and occupations connected with various types of woodworking, uses of wood, and so on. One needs but to consider a few of the phases of the study of foods and of clothing to realize how well those studies might fit into any program of general education. With the acceptance of these ideas by various educators throughout the country manual training gave way to a broader and more inclusive concept called "manual arts". Professor Friese describes the period of change as follows:

No clear-cut line can be drawn between what was known as manual training and its successor, manual arts. There was a growing interest in the application of art principles to industrial products. The designing of problems to be made in the school shop became

an important part of educational handwork, and the true "educational project" was born. It was quite natural that "training" should be supplanted by "arts". The newer term means skilled hand occupations and also contains the thought of art and design. The term "manual arts" had long been used in Europe in a broad way but its first official use in America occurred in the naming of the Macy Manual Arts Building of Teachers College, New York, by Charles A. Bennett. 17

During the manual-arts era the emphasis was still primarily upon skill, but the concepts of originality and design were introduced. It was natural that the addition of these concepts should make the subject more acceptable as a phase of general education. It must be remembered, however, that country-wide acceptance of this newer concept was extremely slow in being accomplished. As is true with any change in education, many teachers are reluctant to change their methods and do so only under pressure or after considerable time has elapsed. Some schools initiated their handwork programs with a type of work closely allied to the manual-arts concept, particularly those which were more directly influenced by the work of Larsson, who brought the sloyd from Sweden to Boston in 1888. These schools did much work along the lines of arts and crafts, worked with a variety of materials, and employed the concepts of interest to produce originality in design. In too many schools the Russian influence was more strongly felt and courses of the more formal and technical type were introduced with their emphasis on specific skills and formal exercises. Many school systems had this type of work long after the manual-arts era was heralded in by Bennett in 1894.

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While the course was not so strictly formal, the subject which was dropped from the curriculum of the Chicago schools in 1933 because of a limited budget was called manual training.

Manual training in the Chicago public schools as it was experienced by the author, who was a pupil in the Chicago elementary schools from 1926 to 1934, consisted entirely of woodworking. Emphasis was on the finished product and the acquisition of skills in the handling of the various woodworking tools. However, the learning of the tool processes was in connection with the making of a project, not as formal isolated exercises. Before the author's time in the schools such skills were learned independently of the making of any article. Learning to square a board, for example, was learned on a standard-sized piece of board passed out by the instructor on the first day of class. Many negative attitudes were produced by this method of instruction. Up to the time that manual training was discontinued in Chicago, little was done in the way of application of art principles or originality in design to the projects being produced. The author, of course, can speak from experience of only one of the Chicago schools. It is possible that more progressive manual-training teachers in other schools employed the broader manual-arts concepts in their presentation of the work. It is also possible that there were some old-line formal disciplinarians on the payroll in June 1933. It is probably safe to say that the handwork which Chicago abolished was a hybrid of the manual-training and of the manual-arts concepts. Just how much manual training and manual arts was included depended upon the individual teacher.
Following the acceptance of the manual arts concept and the idea that handwork was a legitimate phase of general education, considerable work was developed in the school systems throughout the country in the arts and crafts. In some schools the subjects were separate, in others the work was integrated. Various systems, depending upon wealth and philosophy, offered the work at different grade levels. The prevalent practice seems to have been for handwork to be a separate subject and to be offered to pupils in the sixth, seventh, and eighth grades.

In the development of the present-day concept of the industrial arts program the manual-arts phase is considered the second of three periods. Concerning the manual-arts phase of development the following comment is made in the report of a committee appointed by the United States commissioner of education to clarify the position of industrial arts in the schools of the United States:

This, of course, was wholesome, but all the time there was something going on in American life that was being missed by school programs, namely, the phenomenon of industry itself.18

The introduction of the third period is most authoritatively explained in the following quotation from the report of the above-mentioned committee:

The influence of industry brought about a third period of development, which was referred to by Richards, Russell, and Bonser, and others, as "industrial arts" (1906-10).

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The feeling was that all of the old that was good should be retained but that certain new concepts should dominate. One of the first ideas along with the origin of the junior high school in the second decade of the present century was to provide for broad orientation or exploration. Industrial arts began to call for a diversity rather than a specialization of skills. Many materials were used along with experiences in the basic techniques employed by industry. Bonser's early definition, "Industrial arts is a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these changes," was but a modern interpretation of the aims of general education. 19

Here we find education changing to keep pace with the society into which it will send its product. If handwork and household arts were to justify their place in the curriculum as general education, a modification in the light of a changing society was necessary. This is an application of the principle of change. 20 Professor Friese accurately describes this third period and the reasons for its advent:

A new concept of the nature and purpose of what has come to be known as industrial arts was clearly enunciated by Dean James E. Russell in 1909, and by Professor Frederick G. Bonser in 1911. The new concept was largely in terms of the elementary school level. How to interpret, react to, and secure the greatest benefits from industry and its products was conceived as being of equal or greater value than the development of hand skills. It should be remembered that at that time we were embarking to an even greater extent than before upon large scale production. Industrial intelligence and consumer's knowledges were the two general

20 Wm. F. Cunningham, Pivotal Problems of Education, p. 283.
outcomes these two educators had in mind as the greatest contributions that handwork in general education could make. Here the related phases of shopwork find champions. Russell said that the study of industries should be for the sake of securing a better view of man's part in controlling production, distribution, and consumption.21

This third developmental period of handwork, the industrial-arts period, brings us roughly up to date in the handwork offerings of our schools. That its content and objectives have varied from time to time and from place to place we shall see later. Industrial arts, which was based on a wide sampling of industrial experiences, became more generally accepted as a branch of general education. In school work there was greater attention to the industrial scene than to the separate vocations. The industrial-arts movement also brought with it the idea of the general shop. The general shop, as contrasted with the unit shop, contained facilities for carrying on a variety of industrial activities. These were some of the influences which have prevailed on a country-wide basis.

While the handwork for the boys was undergoing this three-phase development, the household-arts program for the girls was simply expanding in content and generally keeping pace objectively with the social and industrial objectives that the boys' handwork was acquiring. Household arts, which originally consisted only of sewing and cooking, grew more inclusive with the development of the science of home economics. That the early offerings in the field of domestic science were considered inadequate is brought out by Bevier and Usher:

Among educational movements which in recent years have engaged the attention of the public none has been received with greater favor than the attempt to introduce into schools for girls and women some systematic teaching of the arts which are practiced in the home...Cooking and sewing are quite commonly taught in the public schools, and cooking schools for women have been organized in numerous places. While useful instruction in these lines is imparted, it is generally recognized that much remains to be done before the teaching of domestic science can assume its most effective form.²²

The expansion of household arts and domestic science into the more inclusive subject matter heading of "home economics" was due primarily to two things. First of these was the application of the principles of science to the household arts which brought the subject to a higher level and increased educational prestige. The second factor was the inclusion of more things than cooking and sewing. The Syllabus of Home Economics, published by the American Home Economics Association in 1913, lists the subject of home economics as including (1) food, (2) clothing, (3) shelter, and (4) household management. In the same publication a definition for home economics was stated which compares almost word for word with the 1945 edition of Webster's dictionary:

Home Economics, as a distinctive subject of instruction, is the study of the economic, sanitary, and aesthetic aspects of food, clothing, and shelter, as connected with their selection, preparation, and use by the family in the home or by other groups of people.

...Home Economics, like many other subjects of instruction--for example sociology,

engineering, agriculture— is a complex. In it the contributing groups are art, history, anthropology, sociology, and aesthetics, economics, physiology, hygiene, mathematics, chemistry, physics, and biology.23

On the level of secondary education the tendency has been to keep the fields of industrial arts and home economics separated. The secondary schools have long resisted the trends toward integration and the break-down of subject matter barriers. However, on the elementary level, there has been a definite trend toward the merging of the two subjects under the title of industrial arts. This is justifiable when one considers the definition of industrial arts:

Industrial arts is a study of the changes made by man in the forms of materials to increase their values and of the problems of life related to these changes.24

It is reasonable then to include "changes" made in foods and clothing as well as those made in wood, steel, stone, and so forth. Bonser and Mossman in their book, Industrial Arts for Elementary Schools, organize in this manner:

The elementary school devotes its efforts to those elements of study which are of common value to all persons without consideration of sex or future occupation. It limits its work to those needs which are common to all in a democratic form of life. This, of course, does not mean that the individual differences of children are not respected, but it does mean that the common elements by which people live efficiently, cooperatively, and


harmoniously together are the basic materials emphasized. All must know how to read and use the general processes of number; all need to know the more permanently important facts and meanings of geography, history, literature, and science as these enter into daily life and intercourse. Is there not also a body of experience and knowledge relative to the industrial arts which is of common value to all, regardless of sex or occupation? If so, this should properly make up the content of the industrial arts as a study for the elementary school to that degree in which elementary school children have the capacity for it.25

The authors above quoted suggest the following subject-matter areas as being suitable for an elementary school course of study in industrial arts:

1. Study of Foods.
2. Study of Clothing.
3. Study of Shelter.
4. Study of Utensils.
5. Study of Records.
6. Study of Tools and Machines.

The Office of Education committee on Industrial Arts and Its Interpretation in the American Schools, reporting fourteen years later sets forth the same idea:

No differentiation should be made on the elementary level in the opportunities in industrial arts offered to boys and girls. Both are consumers of the products of industry; both have needs for the traits that industrial arts aim to develop. As members of the same classes and social groups they should study

their problems together. Each will tend to supplement the other because of their varying abilities and because of the keen interests they will probably take in different aspects of the same study. If the elementary school deals adequately with the problems and challenges of its pupils, it will include for both boys and girls the experiences inherent in industrial arts. 

In the committee report the following areas are suggested for an elementary school course of study in the industrial arts. This, of course, is for both boys and girls:

1. Study of Food.
2. Preparation of Foods.
4. Study of clothing.
5. Study of Shelter.
6. Ways of Building.
8. Activities in or near the home.
9. Care of the Home.

It will be perceived from the reading of these suggested subject-matter headings that industrial arts on the elementary level centers about the home, just as social studies in the primary grades centers about the home, and gradually moves out to embrace the community as the child grows older.

From these generally accepted statements of industrial-arts philosophy and objectives the various school systems throughout the country developed

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different types of courses with varying emphases, objectives, and methods. The general trend, however, was to develop a course that centered about the home. In many cases it was given a more descriptive title called "Household mechanics."

Local conditions caused variations in the content of these courses. Household mechanics for the rural youth was vastly different from that for urban boys and girls as far as regards the specific content and materials and methods of instruction. While, ideally, the courses in various systems should have been very similar in philosophy and objectives with variations only in the more specific matters to meet particular community needs, there were many systems that had courses which were almost vocational in nature. In this type of course the guidance values of the work is emphasized. These courses were considered exploratory experiences wherein the boy or girl could obtain an over-all view of the field in order better to consider his particular area of specialization:

Educational institutions all over the country have given a great deal of attention to the subject of home mechanics during the past few years, and millions have been spent in promoting the work of vocational training and guidance. Home mechanics is primarily a guidance subject for those trades which have to do with the home.27

Other course-makers in the industrial arts stressed the development of appreciations and attitudes. These people express the more generally accepted

purposes of the courses in industrial arts and home mechanics:

The principal purpose of the work should be to develop desirable attitudes, and habits of thought and action, rather than a high degree of skill in a variety of activities. It should develop a habit of observing how things are done, why they are done in a certain way, and the habit of carefully analyzing and planning tasks before they are begun. These are among the most valuable habits a boy can form. 28

In some schools, where the more modern philosophy of the industrial arts as general education met more opposition, tradition kept the boys' and girls' offerings separated. The boys' work had to do with masculine vocations and mechanics; their handicraft work was with materials such as wood, metal, plastic, and ceramics. The girls, on the other hand, were instructed in the home-economics phases of home maintenance and their handicraft work was largely sewing and weaving. The idea that industrial-arts offerings should be the same for boys and girls came more gradually upon these systems:

Traditionally industrial arts education has been provided for boys only. Now the trend is to conceive industrial arts not peculiarly as the beginning of trade education for men, but as an avenue to a liberal and appreciative understanding of industrial life, necessary for boys and girls alike. 29

The city of Detroit in 1926 instituted a course called "household mechanics" which was offered only to boys. In 1929 Earl L. Bedell, supervisor of vocational education in Detroit, in an article summarizing the opinions of

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Detroit principals concerning household mechanics, quotes one principal as having said:

The purpose of household mechanics is to aid in making the boy or girl a worthy home member.

It is just as essential for a girl to know how to repair an extension cord of a flat iron, to tell a screw driver from an auger bit, to use a hammer, and to distinguish basewood from walnut in furniture, as it is for a boy. Likewise I think a boy should know a few of the essential facts about cooking, baking, diet, etc. A very good idea would be to let the boys exchange their course with the girls for nine or ten weeks if they so choose. It would make an ideal combination in any home, and would greatly increase the value of the household mechanics course. 30

It would seem, from the above quotation, that the principal considered household mechanics at least partly vocational in nature.

Following this, exchange classes were introduced in various parts of the country and in most cases were received enthusiastically. In reviewing the literature of the period pertaining to exchange classes, one finds nothing questioning the value of industrial-arts training for girls. However, that there was some doubt concerning the value of home-economics training for boys is indicated by the appearance of articles in periodicals evaluating the training in home economics for the boys. None of these are research studies. They are the presentation of opinions either of individuals or committees.

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31 A. E. Hussey and V. L. Pickens, "Boy and Girl Exchange Unit; girls in shop and boys in the kitchen," Practical Home Economics, 12:101, April, 1934.
Fay Mack, writing an "Evaluation of Training for Boys in Home Economics," expresses the opinion that training for boys in the home arts is a worth-while addition to their general education. A committee, reporting on the value of home economics for boys, recommend differentiation not in specific objectives but in emphasis. In the main these opinions are positive expressions of the value of home economics for boys.

As Chicago emerged from the depression and more funds were made available for the operation of its schools, a realization of a need for the replacement of handwork was felt. Manual training and domestic science had been dropped in 1933. Under the direction of Dr. Louis V. Newkirk a co-educational home mechanics course was evolved. Commenting on its introduction, Dr. William H. Johnson, superintendent of schools at that time, describes the course as follows:

The home mechanics course is designed to replace the old courses in manual training and domestic science which became obsolete and were dropped from the curriculum in 1933. The older handcraft courses put the emphasis on tool operations and a limited number of construction materials. These old courses were the result of pioneer attempts to provide the needed instruction in handwork to help boys and girls make the proper adjustments to our new mechanical and industrial world.


Fig. 1 A TYPICAL HOME MECHANICS LABORATORY (looking to rear of room).

All home mechanics laboratories in the city conform to the same general plan. Notice the tables with movable stools to facilitate group activity. Also provided are vise benches, cooking tables, stoves, sink, and power machinery.
Fig. 2  SAME LABORATORY LOOKING TO FRONT OF ROOM.

Cabinets in left-front corner are for tools. The apparatus on the tool cabinets simulates repair activities in the electrical and plumbing units. The panel in the center front with the two banks of white cards is an electrical questionnaire. The cards are changed according to the unit being studied at any particular time.
This course included both the mechanical and home-economics phases of home maintenance, and was participated in by boys and girls. The course, while incorporating the ideas of forward-looking educators, was considered unique and was tried experimentally in five elementary schools during the school year 1938-1939. One thousand boys and girls participated in the early try-out period. By June 1945 home-mechanics laboratories were opened in one hundred and fifty elementary schools with more than fifty thousand boys and girls participating. World War II with its attendant shortages of school personnel and materials hindered the incorporation of the subject into the curriculums of more elementary schools. However, the post-war period is seeing the installation of more laboratories. Some of the new school buildings provide a shop especially designed for home mechanics.

The course was designed in such a way as to preserve flexibility, so that it might be changed in the light of changing needs and progress in educational thought. The broad objective of this new practical-arts course for the upper grades is general education. The pupil experiences in the course center around practical activities in the home. The specific objectives of home mechanics are set forth in the preface of a recently published text for home mechanics:

To give consumer knowledge about the selection and efficient use of the products of industry that are a part of home living.

To develop handy-man abilities with the ordinary hand tools and a variety of construction materials.

To teach the use of handcraft for leisure time activities in the home.
To contribute to the development of the personality of the child and to further the social objectives of general education. Courses in home mechanics offer a student opportunities to work as an individual member of a group or to assume responsibilities for leadership.35

The home-mechanics course is divided into twelve learning areas: Electricity in the modern home; selection and care of clothing; reading and making of drawings; care and use of tools; sanitation and air conditioning; selection and serving of food; ventilation and safety; care and repair of metal articles in the home; practice in painting and finishing; wood construction in the home; selection and arrangement of home furnishings; and maintenance of house and garden.

Although there are twelve instructional areas in the home mechanics laboratory course only eight are presented as separate units. The areas of finishing, woodwork, drawing, and care of tools are used as an integral part of the remaining eight. Projects requiring pupil performance are given for each learning area. These consist of necessary jobs in the selection, care, repair, and construction of materials used in and about the home. The acquisition of practical knowledge and appreciation also forms a major part of each unit of work. This is achieved largely through care on the part of the teacher to prepare the pupils, visual aids, and supplementary materials. An extensive suggestive list of projects is given for each area so that the teacher may select those most suitable for his or her particular school and community.

The following eight units are the basic ones of the twelve mentioned previously and cover a period of two years. Each of the units is studied for ten weeks. A pupil, beginning home mechanics work in the seventh grade, will have had instruction in all eight units by the time he graduates two years later.

**ELECTRICITY IN THE MODERN HOME:** includes instruction in such things as care and repair of electrical appliances, theory and practice of fuses, reading electric meters and computation of bills, and electrical safety.

**SANITATION AND AIR CONDITIONING:** covers material concerning plumbing and heating. Pupils are taught how to repair faucets, ball cocks, flush valves, and sink drains. Methods of heating homes and firing furnaces are presented.

**CARE AND REPAIR OF METAL ARTICLES IN THE HOME:** has to do with the care and repair of those tools which pertain to home maintenance. Some of the jobs include cleaning of silverware, sharpening knives and scissors, washing widows, polishing metals, and so forth.

**SELECTION AND ARRANGEMENT OF HOME FURNISHINGS:** pupils are acquainted with the different types of joinery used in furniture making, taught how to care for various types of finishes, how to refinish furniture, and how to make simple repairs on articles of furniture.

**VENTILATION AND SAFETY:** some of the jobs in this area include cutting window shades to size, glazing a window sash, installing door and window

36 At the present time a committee is studying the possibility of changing time allotments to the various instructional areas.
Fig. 3 GROUP OF BOYS PERFORMING A SOLDERING JOB.

Programming of home mechanics sometimes presents difficulties. At the school where this investigation was carried out a room is divided according to sex. The boys have a double period of home mechanics while the girls have library and gymnasium. Each week boys and girls assemble for a single period of demonstration and discussion.
hardware, making of window screens, care and repair of different types of door locks, and consumer information on those items.

MAINTENANCE OF HOUSE AND GARDEN: includes instruction on planting, care of lawns, planting and trimming of shrubbery, planting and pruning of trees, care and repair of garden tools, arrangement of equipment in garage and basement, etc.

SELECTION AND CARE OF CLOTHING: includes instruction in sewing, both hand and machine, and cleaning of clothing. In accordance with the general objectives of industrial arts the history of clothing is brought out and a "study of the changes" in materials is a part of the unit.

SELECTION AND PREPARATION OF FOODS: presents elementary facts concerning cookery, baking, selection of foods in accordance with the principles of good nutrition, and proper table settings for various occasions. Other activities center around wise buying, and the social significance of food.

As was pointed out before the specific selection of subject matter within the above areas is determined by the local teacher to meet the needs and interests of the individual school community. It is easy to understand that the type of job which would be suitable for pupils in an apartment hotel area might not be at all appropriate for pupils in a residential district. Likewise the economics status of the community is a conditioning factor in determining the selection of content.

From 50 to 60 percent of the time a child spends in the home mechanics laboratory is devoted to the care and repair type of work. The remainder of his time is spent in the construction of small projects from a wide variety
Fig. 4 GROUP OF GIRLS PERFORMING A SOLDERING JOB.

While the boys of their room are in library and gymnasium, the girls have a double laboratory period of home mechanics. These girls have seen a teacher demonstration of soldering and are now trying their hand at it. Girls in background are performing other jobs connected with the unit. Jobs are rotated from group to group according to a rotation schedule.
of materials. During the war years salvaged materials of all kinds were used, such as tin cans, wire coat hangers, etc. The projects are so designed that they do not take an entire semester to complete as was the case with most of the manual training type project. Usually the article can be made in one or two class periods. A child often loses interest in anything that takes too long to construct.

As much of the work as possible is presented on a laboratory basis. Of course much of the material concerning the history, industrial treatment, etc., of various materials and processes must be presented by visual aids, discussions, and readings. However, where possible, the child learns to do the job by working on an apparatus designed to simulate the real situation. If the job has to do with the wiring of door bell circuits the child has the necessary tools, bells, buzzers, wire, dry cells, and so forth to do the task at hand. If he is to repair a faucet he has an actual faucet upon which to perform the job. The learning situation is vivid, real, and first hand.

Both men and women are included in the ranks of home mechanics teachers. They must have the general educational background that is considered fundamental in the adequate preparation of all elementary teachers. In addition, the home mechanics teachers must have mechanical ability and must be trained in the content and methods of the course. To this end a course for the training of home mechanics teachers has been developed at the Chicago Teachers College. The qualifications for a teacher of home mechanics are:

- General elementary certificate
- Nine semester house of industrial arts
- Nine semester hours of home economics
Three semester hours of science

Three semester hours of integrated construction

Two semester hours of preparation of materials and methods in home mechanics.

The typical home mechanics laboratory is about twice as long as the regular classroom; it has as much built-in cupboard space as possible; it is equipped with gas and electrical outlets, a sink, and running water. The room equipment includes a tool and storage cabinet, two workbenches with vises, two cooking tables with stoves at the side, six large worktables, wall benches with storage space below, two sewing machines, an ironing board, a teacher's desk, a filing cabinet, stools which can be placed under the tables when not in use by pupils, and wall shelves for display of finished projects. The home mechanics laboratory is an elementary edition of the general shop with its facilities for working with a variety of materials.

The home-mechanics course does not require the use of dangerous power machinery although many laboratories do have a scroll saw, drill press, and lately, with the introduction of plastics, electric buffers for polishing and finishing. Other machines are the sewing machines and a hand-driven grinder. The course also requires the use of a variety of hand tools. Children are taught not only their use but also their care and consumer information concerning their purchase.

The Chicago home mechanics laboratory course has been developed to fill a modern educational need, which has resulted from fundamental changes in the industrial, economic, and social life during the past half century. This
course must continually change because necessary additions to and deletions from its content will be made with the advance of modern home life. The material in this chapter is intended to brief the reader on the nature and purposes of the industrial arts, and particularly on the home mechanics situation in the Chicago elementary schools. It is hoped that this will enable the reader better to understand the problem under investigation.
CHAPTER II

STATEMENT OF PROBLEM AND DESCRIPTION OF EXPERIMENT TO DETERMINE

RELATIVE ACHIEVEMENT OF BOYS AND GIRLS IN THE

TWO MAIN AREAS OF HOME MECHANICS

"Studying the course of study and the curriculum in action are not passing fads. They are permanent and fundamental activities of the educational scene in the United States. The general movement is rapidly becoming more effective, the results more successful."¹ It is impossible ever to expect the perfect curriculum or the course of study which will never require further revision. The changes which are made in educational method are not those which will lead us eventually to absolute perfection. They are modifications which, after observation, experimentation, and study, are considered best for a particular situation at a particular time.

"While the dynamic nature of the curriculum should always be given due emphasis, there is no implication that the curriculum can represent the feelings, beliefs, or desires of individual teachers and immature individuals growing casually out of daily classroom experience."² Balance and moderation are essential. Changes and revision, while necessary and inevitable if the schools are to keep up with the changing needs of society, must only be

² A. B. Moehlman, School Administration. (Cambridge, Mass., 1940), 362.
effected for valid reasons and after careful deliberation.

Therefore home mechanics, in spite of its rather long evolution, cannot be accepted as the best thing we may offer along handwork lines. Perhaps the principals, teachers, parents, and even pupils who inquire, "Why should a girl learn about plumbing and why should a boy learn to sew?" are right in their implication that the boys should be given instruction only in the industrial arts and the girls instruction only in home economics. It is possible that identical offerings for both boys and girls is not accomplishing the objectives of the handwork courses. Perhaps exchange classes were interesting and successful only so long as they were novel. On the other hand it may be that boys and girls gain mutual benefit when both facets of home-making are presented. It is possible that the hue and cry against the home-mechanics idea are the "desires of...immature individuals growing casually out of daily classroom experience." 3

The immediate purpose of this investigation was to determine the relative achievement of boys and girls in home mechanics. The subjects of the experiment were two hundred and fifty seventh and eighth-grade boys and girls of the Volta Elementary School, Albany Park, Chicago, Illinois.

It is acknowledged that achievement is not the only outcome of learning. Father Cunningham lists all outcomes of learning under three headings:

Many words are used to label these outcomes, but they all fall naturally into one of these three groups: (1) cognition, e.g., knowledge, facts, meanings, concepts, understandings,

3 Ibid.
laws, principles, etc.; (2) affection, e.g., attitudes, ideals, appreciations, tastes, interests, dispositions, etc.; and (3) conation, e.g., abilities, skills, habits, techniques, procedures, etc. 4

Our measurement of achievement may be considered to cover somewhat the areas of cognition and conation. This leaves the area of affection apparently without evaluation and it is into this area that an important part of the objectives of the home-mechanics work fall. However, that there is positive correlation between achievement and the development of positive attitudes cannot be denied. For that reason we may consider that a certain evaluation is being carried out in this area.

While this study has as its basis a very small sampling, both of pupils and range of work covered, and cannot approach the degree of validity which would be attained with a broader sampling, it does, in a small way, attempt to obtain some objective data on a problem which has previously only been discussed in a subjective manner. If it provokes further thinking, talking, or writing, pro and con, a worthwhile purpose will have been achieved.

The home-mechanics laboratory group is subdivided into six smaller groups in order not to crowd any particular work area. Jobs are then rotated according to a rotation schedule so that each pupil in the class has an opportunity to perform all the jobs set down for the ten weeks' work. The present experiment was set up on a similar basis. Six different projects were selected. Three of the projects are typical of the work done in industrial-arts shops where boys alone are instructed and three are typical of the work done in

4 W. F. Cunningham, The Pivotal Problems of Education. (New York, 1940), 81.
In the selection of the above projects was the matter of procuring sufficient materials for two hundred and fifty pupils.

All pupils were given the same preliminary instruction, which consisted of teacher demonstrations on the making of the projects. Each child received a job sheet and the necessary materials for each project. Standardization was stressed. Finished models of each of the items were on display and the children were instructed to make their product look as much like the finished models as possible. The children's participation in the experiment lasted ten weeks, during which the projects were rotated so that each pupil made (or attempted to make) each of the projects.

When a project was finished it was tagged with the child's name and stored pending judging. In order to achieve a degree of objectivity in the scoring the following method was used. Mr. John T. Newell, supervisor of industrial arts and home mechanics for District I, assisted the author with the judging. At intervals of approximately two weeks Mr. Newell stopped by at the school to judge the products for the preceding two-week period. Grades were given to each product on the basis of a scale which was set up at the first round of judging. A score of 100 was given to any product which compared to the teacher-made models mentioned above. From the initial group of Projects were selected the representative products for each grade score to

<table>
<thead>
<tr>
<th>Industrial Arts Projects</th>
<th>Sewing Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic bud vase</td>
<td>Pot holder</td>
</tr>
<tr>
<td>Plastic letter opener</td>
<td>Compact bag</td>
</tr>
<tr>
<td>Aluminum bracelet</td>
<td>Lapel pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic bud vase</td>
<td>Clay vase designed</td>
<td></td>
</tr>
<tr>
<td>Plastic letter opener</td>
<td>Letter opener made of plastic</td>
<td></td>
</tr>
<tr>
<td>Aluminum bracelet</td>
<td>Bracelet made of aluminum</td>
<td></td>
</tr>
<tr>
<td>Pot holder</td>
<td>Pot holder designed</td>
<td></td>
</tr>
<tr>
<td>Compact bag</td>
<td>Compact bag designed</td>
<td></td>
</tr>
<tr>
<td>Lapel pin</td>
<td>Lapel pin designed</td>
<td></td>
</tr>
</tbody>
</table>
make the above-mentioned scale. This scale was kept and used on subsequent judgings.

By the end of the ten-week period each pupil had recorded on his work record card six grades, one for each of the six projects. This was the basis upon which the relative achievement of the boys and the girls in this particular home-mechanics situation was determined.
CHAPTER III
PRESENTATION OF DATA

Both in the field of education and in other fields many times a particular movement is taken too seriously and is carried too far. Certain proponents of the progressive movement carried their ideas too far as was evidenced by the lack of planning, goals, and achievement in some of the progressive schools. The extreme traditionalists, on the other hand, often carried their methods too far to the development of negative attitudes and the detriment of the educational product. In most educational areas at some time or another among some particular group the pendulum has admittedly swung too far one way or the other.

The wise educators have been the ones who stressed a middle of the road attitude, who recognized the values worth retaining on both sides. Knowing where the middle lies is not easy, and the middle winds as do the edges "depending upon the terrain and the situation," to use an expression popular in the army. Maintaining a sensible equilibrium requires long experience, common sense, and foresight. The neophyte cannot lay claim to these qualities but can, by the exercise of caution, avoid the pitfalls of the extremes.

Therefore in the process of evaluation for this experiment consideration will be given to objective measurement and to subjective evaluation. While the latter phase will be subordinate because of its subjective nature it is
nonetheless a necessary adjunct to the interpretation of results.

From the following table showing the comparative means and quartile deviations it can be seen that the girls did a little better than the boys in the sewing projects and the boys held a slight edge on the industrial arts projects. The quartile deviations for the bud vase and the letter opener are not in accordance with the general results but their lack of compliance is very slight and can be neglected.

**TABLE I**

**TABULATION OF RESULTS**

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>Boys Mean</th>
<th>Quartile Deviation</th>
<th>Girls Mean</th>
<th>Quartile Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bud vase</td>
<td>85.6</td>
<td>4.8</td>
<td>82.9</td>
<td>4.4</td>
</tr>
<tr>
<td>Pot holder</td>
<td>75.7</td>
<td>12.4</td>
<td>82.5</td>
<td>10.9</td>
</tr>
<tr>
<td>Letter Opener</td>
<td>77.9</td>
<td>10.9</td>
<td>76.5</td>
<td>9.9</td>
</tr>
<tr>
<td>Compact bag</td>
<td>77.0</td>
<td>11.5</td>
<td>79.2</td>
<td>10.0</td>
</tr>
<tr>
<td>Bracelet</td>
<td>82.8</td>
<td>7.0</td>
<td>80.6</td>
<td>8.4</td>
</tr>
<tr>
<td>Lapel pin</td>
<td>71.8</td>
<td>11.8</td>
<td>77.9</td>
<td>10.8</td>
</tr>
<tr>
<td>Average on industrial arts projects</td>
<td>82.1</td>
<td>80.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average on home economics projects</td>
<td>74.8</td>
<td>79.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average on all projects</td>
<td>78.5</td>
<td>78.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE II
PERCENTAGE AND ANALYSIS OF SPOILAGE

<table>
<thead>
<tr>
<th>Project</th>
<th>Number Spoiled</th>
<th>Error involved lack of strength or manipulative skill</th>
<th>Error involved lack of understanding of process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bud vase</td>
<td>Boys 12</td>
<td>10 (63%)</td>
<td>2 (17%)</td>
</tr>
<tr>
<td></td>
<td>Girls 10</td>
<td>10 (100%)</td>
<td></td>
</tr>
<tr>
<td>Pot holder</td>
<td>Boys 36</td>
<td>19 (53%)</td>
<td>17 (47%)</td>
</tr>
<tr>
<td></td>
<td>Girls 17</td>
<td>12 (70%)</td>
<td>5 (30%)</td>
</tr>
<tr>
<td>Letter opener</td>
<td>Boys 28</td>
<td>12 (43%)</td>
<td>16 (57%)</td>
</tr>
<tr>
<td></td>
<td>Girls 29</td>
<td>16 (55%)</td>
<td>13 (45%)</td>
</tr>
<tr>
<td>Compact bag</td>
<td>Boys 32</td>
<td>30 (94%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td></td>
<td>Girls 23</td>
<td>23 (100%)</td>
<td></td>
</tr>
<tr>
<td>Bracelet</td>
<td>Boys 7</td>
<td>4 (57%)</td>
<td>3 (43%)</td>
</tr>
<tr>
<td></td>
<td>Girls 15</td>
<td>12 (80%)</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Lapel pin</td>
<td>Boys 46</td>
<td>40 (87%)</td>
<td>6 (13%)</td>
</tr>
<tr>
<td></td>
<td>Girls 30</td>
<td>30 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

The bud vase was a rather unique project and was comparatively easy to make. It held a high degree of interest for both the boys and the girls. For these reasons the means of both boys and girls were high and the quartile deviations were low. Spoilage on this project was also comparatively low.
FIGURE 6 COMPARISON OF SCORES OF BOYS AND GIRLS ON THE BUD VASE

FIGURE 7 COMPARISON OF SCORES OF BOYS AND GIRLS ON THE POT HOLDER
FIGURE 8  COMPARISON OF SCORES OF BOYS AND GIRLS ON THE LETTER OPENER

FIGURE 9  COMPARISON OF SCORES OF BOYS AND GIRLS ON THE COMPACT BAG
FIGURE 10 COMPARISON OF SCORES OF BOYS AND GIRLS ON THE BRACELET

FIGURE 11 COMPARISON OF SCORES OF BOYS AND GIRLS ON THE LAPEL PIN
The pot holder was quite a bit more difficult to make and required attention to detail. Step-by-step precision was necessary for a neat finished product. Interest was not nearly so keen with either sex as it was for the bud vase and the letter opener. The girls did quite well on this project but the mean for the boys was low and their spoilage was high.

Both sexes manifested a great deal of interest in the letter opener. However, it was rather difficult to make and the attainment of a perfect or near-perfect product depended upon attention to a sequence of operations. The twisting of the handle on this project required considerable manual dexterity, since it had to be done rapidly to prevent the breakage which would be caused by cooling of the plastic. Spoilage was high on this project for both the boys and the girls.

Interest in the compact bag was largely due to the fact that it was a sewing-machine project and the children were intrigued for that reason. A general awe was manifested by boys and girls at the precision with which the machine did the sewing when the teacher demonstrated the making of the project. The sewing machines used were of the foot-treadle type and the children had great difficulty in co-ordinating their foot movement so that the machine would operate in a forward direction. Backward movement caused broken thread and snarls which in turn resulted in a spoiled product. Practically all the spoilage on this project was the result of the pupils' being unable to propel the machine properly.

Boys and girls scored comparatively high on the bracelet and the spoilage was relatively low. This project was simple and attractive. The fact
Both boys and girls experienced difficulty in co-ordinating their foot movement so that the sewing machines operated in a forward direction.
that the child could stamp his or her name on it further stimulated interest.

Interest was least evidenced for the lapel pins. While a half dozen attractive patterns were provided, most of the children seemed to consider the making of this project a chore. Perhaps the lack of interest was caused by the simplicity of the project and the fact that it required no more than scissors, needle, and thread. Children are many times interested in a thing because of the activity, machines, or tools involved in its making.

The ultimate test of the success of a curriculum or course of study is the present or future performance in society of the pupils who participated in that curriculum or course of study. Certain long term studies have carried on follow-up investigations of graduates. Performance of the pupils outside school for this study are based upon reports to the author by pupils and parents. Naturally these reports cannot be given the consideration which is given objective data, but they are supplementary and necessary to complete analysis of the situation.

Almost without exception parents who visit the home-mechanics laboratory where this experiment was carried out feel that the program set down is valuable for their children. Many have expressed regrets that this sort of thing was not offered when they were in school. Parents of children who are taking or have taken home mechanics have indicated outcomes of the work which were manifested at home such as simple repairs, interest in cookery, and the starting of home workshops. Of course the percentage of parents who turn out for the parent-teacher meetings and the open-house nights is small. For that reason the opinions expressed may not be representative of the total
Fig. 13 GIRL CUTTING LETTER OPENER ON JIG SAW.

Most girls have only to overcome an initial fear of cutting themselves to become as proficient as the boys in the use of this machine.
Fig. 14 NO VICARIOUS EXPERIENCE HERE.

Half size classes facilitate instruction.
Fig. 15 DEVELOPMENT OF SOCIAL SKILLS THROUGH GROUP ACTIVITY.

In a laboratory situation children learn to work together, to share tools and machinery, and to wait their turn for individual help and instruction.
parental opinion.

Observations of pupil attitude and behavior for the past three years reveal that the children are very interested in the subject. Occasionally at the introduction of a new unit of work some of the girls will manifest a dislike for the work if it is of the industrial arts type and in the same way the boys will sometimes indicate a dislike for sewing (though never for cooking). However, this initial attitude is usually gone by the next class session. Many pupils have made statements and asked questions pertaining to repairs they have performed at home as the direct outgrowth of a particular unit. Boys have consulted the author concerning the purchase of tools and machinery for their home workshops. Girls report invading their father's or brother's workshop. Certainly, with at least a portion of the school population, the objectives of the course are being accomplished.
CHAPTER IV
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In order better to consider the conclusions which seem to be justified as a result of this very limited study of the relative achievement of boys and girls in home mechanics the following summarization of data is presented:

1. On projects that are generally considered to be of an industrial-arts nature the achievement of the boys was slightly higher than that of the girls.

2. On projects that are generally considered to be within the realm of home economics the girls achieved slightly higher averages than did the boys.

3. The lack of a pronounced difference in the achievement of boys and girls is considered to be significant.

4. For both the boys and the girls the averages were sufficiently high and the spoilage was sufficiently low to consider the achievement satisfactory.

5. Subjective evaluation from expressions of parental opinion and observations of pupil reaction is favorable.

The above summarization expresses without figures the results of the experiment performed. It is realized that the number of pupils involved in the experiment is small and that the group cannot be considered a random sampling of seventh- and eighth-grade pupils. Further, a limitation is recognized in
the fact that the opinions of only two judges were used to assign grades to the projects made by the pupils. In evaluating the conclusions of this study it must be remembered that the above-mentioned shortcomings restrict the degree of generalization but the data seem to justify the expression of certain conclusions.

With regard to the particular group on which this experiment was carried out, the data that have been presented would appear to justify the following conclusions:

1. The interest and achievement of the boys in the needlework projects were sufficient to warrant continuation of sewing instruction to boys.

2. The interest and achievement of the girls on industrial-arts projects were sufficient to warrant continuation of that type of instruction to girls.

3. General interest and achievement would seem to indicate that the home-mechanics course has positive values for both boys and girls.

Application of these conclusions to other situations must be tempered by the observed degree of likeness between this situation and the situation to which one might desire to apply these conclusions.

In view of the foregoing conclusions pertaining to this experiment it would seem logical to recommend that the course, in this school, at least, be continued as is for both boys and girls. Schools contemplating the introduction, change, or discontinuance of this type of course must temper their decisions by the degree of similarity of their situation to the one described
in this thesis and also by some other considerations which will be brought out later.

The limitations of this experiment have been mentioned previously. It is realized that this study is inadequate in scope. While the method seems satisfactory, an expansion of the number of projects and the addition of repair activities would greatly increase the validity of the testing program. Increasing the number of pupils and school situations would make the conclusions applicable to a wider segment of the school population. If this study can be considered to be of value in a small way and in a particular situation it would be appropriate to recommend a repetition of its type on a larger scale. A more intensive study would involve the following features:

1. Standardized instruction in a variety of projects, repair activities, and related informational material pertaining to a certain portion of the home-mechanics course.

2. Achievement measured by grading of projects according to a scale, performance tests in tool operations, and paper-and-pencil tests to measure related informational material.

3. Questionnaire to summarize observations and subjective evaluations of principals, teachers, and parents.

Undoubtedly a comprehensive study of the type suggested would have value for teachers in determining the approach they would use in their instruction. It would also be of benefit to school administrators in determining whether or not a program of home mechanics would be advisable for their particular school system.
In deciding whether or not a program of this type would work in other schools certain other factors should be considered. These considerations are offered tentatively and only on the basis of the author's three-year experience as a home-mechanics teacher.

The type of child will determine to some degree the type of program which will be successful in the school. The child's home environment has an effect on his attitude toward the type of work offered. The school in which this experiment was carried out is populated by upper-class Jewish. The parents, for the greater part, are well-to-do business men. When home mechanics was first introduced to the school three years ago the quality of work done by the pupils was poor and the children's attitude was somewhat blase. There seemed to be a feeling that manual work was a little bit "below" them. This attitude was more noticeable on the repair-type activity than on the project work. However, at the present time, the quality of work done is, on the whole, much better, and it can honestly be said that interest is wholehearted. The author, during his practice teaching, taught the same subject in a school populated by a predominantly Bohemian group. While the homes in the community were cared for meticulously, there was not much money. Parents were working people: factory help, building-trades laborers, and the like. The children at that school seemed to appreciate the home-mechanics work very much more. Repair activities were more meaningful because of the economic necessity for performing them in the home.

If any generalization might be made from the foregoing statements it would be logical to say that with lower economic groups even a limited program of home mechanics with a minimum of tools and equipment and using
salvaged materials such as apple box wood, tin cans, and coat hangers would be acceptable to the children and would be successful. There is little need to "sell" the subject to pupils of this type. They see in it necessary home repairs. They are interested in the projects and toys which they can make but might never be able to buy. The children from wealthier homes are more sophisticated and have to be "interested" by good machinery, a very attractive laboratory, the best in materials, and demonstrations that "move." Sometimes it seems that education is catering so much to showmanship in the use of vivid materials, precision presentations, visual aids, and so forth, that studying and the understanding of concepts via verbal description is becoming a lost art.

While it is true that the lower-income groups will be satisfied with a more limited program that is no excuse for offering that kind of thing to them. The type of laboratory and equipment are important factors in the success or lack of success in the presentation of this type of course. The laboratory in which the experiment described in this paper was carried out is considered to be one of the better-equipped shops of its type in the city. In the power machinery line it has a scroll saw, a drill press, sander and buffer combination, and an electric grinder. The hand tools are more than adequate. Supplies and materials, wood, plastics, metals, cloth, etc., are sufficient. There are means at hand for duplicating various types of work sheets, patterns, teacher-made objective tests, and the like. Good equipment, adequate materials, and visual aids greatly facilitate the successful presentation of the work. Precision and the absence of makeshift methods
make the child, rich or poor, feel that the work is worthwhile and give the teacher a feeling of a job well done.

The author has worked in three school shops during his experience. Two of these shops were inadequately equipped and run down. There was an insufficient supply of materials because of shortages caused by the war. The program in these shops could not be called a successful one. However, the shop described in the preceding paragraph is equipped in such a way that a good job is possible. It is the writer's feeling that unless a school or a school system is willing to spend the money required for a really fine shop it is better to have no home mechanics at all. Neither should the school sacrifice the fundamentals to institute a home-mechanics course. It would seem that a school is justified in expanding its offerings only when other areas do not suffer as a result of that expansion. Many people have expressed the opinion that the schools are trying to do too much and doing none of it well.

So far we have touched briefly on (1) the pupil, (2) materials, and (3) the socio-physical environment as they pertain to the presentation of a course in home mechanics. In all areas of the curriculum the teacher is considered the most important factor in the learning situation. The home-mechanics teacher has to be a jack-of-all-trades. In order to teach this type of material as a laboratory subject it is necessary that the teacher know, not only the theory of cooking, sewing, electricity, plumbing, woodwork, metalwork, etc., but also the practice. He must be able to demonstrate all processes in the course of study with reasonable skill. Too often the philosophy of the teacher learning with the child has prevailed. In any
phase of the curriculum the teacher should be an expert in order to deserve the respect of the pupil. Respect for the teacher's skill will be a motivating factor for the pupil and a catalyst to the learning process.

The fifth and last factor in the learning situation is the curriculum or, in the case of a single subject, the course of study. The writer has experimented with three methods in the presentation of the course of study. The first, and probably the least successful, is to allow the child to make any project he desires, being limited only by the equipment and materials available. While this works well with the child who has ideas or who can perceive what the finished project will be like by looking at a plan, it is not satisfactory for the unimaginative, or border-line interest, individual. This type of pupil must be motivated by seeing a finished product of what he intends to make. Usually he requires a complete demonstration of steps involved in the making of the project and a step-by-step direction sheet for his use when working on his own.

A second method is to prescribe definite projects which must be made by everyone. A rigid program of this type lends itself to an orderly method of instruction. After a project is selected for the class a job sheet is drawn up describing in definite sequence the processes involved in its construction. Next the making of the project is demonstrated to the entire class by the teacher. Mimeographed job sheets are in the hands of the pupils during the demonstration and the steps described therein are followed precisely to train the child in following printed directions. Finally the child constructs the project himself during a laboratory period following the directions in
the job sheet. A strictly prescribed program is not compatible with current thought among industrial-arts people but sometimes it is necessary to teach basic techniques and fundamentals before one can expect any display of creativeness on the part of the child.

The third method involves a combination of the preceding two. The author has found that it works out quite well to have a basic list of projects presented as described in the preceding paragraph. Most of the children will participate in this type of program. Other children who are more adept, more creative, or who have other interests and the ability to carry them out, can work on articles other than those prescribed in the basic list. This method of presentation provides adequately for individual differences and varying interests. It also insures instruction in some of the important, basic tool techniques which are necessary for successful achievement on the part of the pupil.

One thought that may well be restated in the closing of this paper is the importance of successful performance and achievement on the part of the pupil. A failure or two will do no harm and may even be of some value in training the child to bear a failure gracefully and to try again. However, repeated failures in the performance of jobs or in the making of projects soon leads the child to dislike manual activities and to lose respect for the subject and the teacher. Negative attitudes so produced are difficult to overcome. For this reason the teacher should evaluate every project and every activity in terms of the pupils' probable success. Nothing should be attempted for which there are not the proper materials and equipment available. Projects should be simple enough that most of the pupils can turn out
a good finished product. If most of the children do good work, even though it be relatively simple, the home-mechanics course will have positive values.
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