THE DESIRABILITY OF AN ELECTRICITY
COURSE IN THE MERKEL HIGH SCHOOL

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THE DESIRABILITY OF AN ELECTRICITY COURSE IN THE MERKEL HIGH SCHOOL

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CHAPTER I

INTRODUCTION

Merkel, the community in which this study was made, is located in Taylor County sixteen miles west of Abilene, Texas. The local school system consists of one primary school, one elementary school and one high school. This study deals with the high school only.

The high school includes grades nine through twelve and the curriculum is as follows: English, mathematics, history, science, social sciences, speech, physical education, home economics, music, vocational agriculture and trade and industrial education.

The one course of trade and industrial education, general industrial shop, is the newest course included in the curriculum. It has been in operation since 1947. At present, this general shop course includes units in woodworking, bench metalwork, welding, electricity and planning, and is open to students of the junior and senior classes. To improve the trade and industrial program is the real reason for this study. The study deals primarily with the desirability of a course in electricity.
Statement of Problem

This problem is an analytical study of the needs and interests of the Merkel Community to determine the contents to be used in formulating a course of study in electricity for the secondary school, if it is found it meets with the needs and desires of the community.

Delimitations

This study is made for the purpose of determining what should be included in an electrical course for the students of high school age. This study is not limited to students of any one grade but is prepared for any student of the secondary school; that is, grades one through twelve. The study is limited to the Merkel, Texas, community because of the nature of the questionnaires which involve only people and students of that locality. The interviews are limited to one hundred people of the Merkel community who have children of school age. Questionnaires are limited to high school students and then restricted to one hundred of them.

Definitions

The word "content" means the information which should be included in a course in electricity offered in the secondary school.

In this study, the term "secondary school" includes grades nine through twelve.
The term "leisure time" refers to that time which people may use for the pursuit of their own happiness outside of the job they depend upon for a means of support.

The word "electrical" indicates information dealing with electricity.

The term "electrical appliance" means electrical machines or fixtures which serve the home.

The word "inspector" usually designates a person appointed or hired by the city or county to inspect all new installations of electrical wiring or new appliances placed in a home or building. The inspector usually uses a code set up by the city as his guide.

The word "code" means specifications and requirements set up to maintain good safe wiring practices as recommended by the National Fire Protection Associations. The code is an American Standard approved by the American Standards Association.

The term "watt" is a unit used in measuring electrical power.

The term "kilowatt" refers to one thousand (1,000) watts and is the common unit used by electrical companies to figure the amount of electrical power used by a consumer per month.

The term "project" means a completed electrical article, such as a lamp, that will aid in the teaching of electricity to the student.

F. Theodore Struck defines "vocational education" as
"education which deals with knowledge, skills, and attitudes that fit an individual, wholly or in part, for a definite occupation or vocation, the pursuit of which equips him for successful living."¹ The foregoing definition of vocational education is used in this study.

Method of Procedure

Questionnaires were given to fifty boys and fifty girls of the Merkel High School. An alphabetical list of all of the girls in each of the four grades in high school was compiled and a similar list of all of the boys in each of the four grades in high school was made. From these alphabetical lists the names of thirteen girls and twelve boys were taken from the freshman class; thirteen girls and twelve boys were taken from the sophomore class; twelve girls and thirteen boys were taken from the junior class, and twelve girls and thirteen boys were taken from the senior class. These lists were so compiled in an attempt to include students whose backgrounds were different and whose parents were engaged in the various occupations of this locality.

One hundred interviews were held with people of the Merkel community who have children of school age. This group of one hundred was broken down into different

categories in an attempt to get a cross section of the people living in the Merkel locality. These different groups included: land owners living on their own farms; tenant farmers living on rented land; business men whose establishments are their sole support; the unskilled laborer; the skilled laborer, and the professional man. The writer feels that each of these groups of people has different views and ideas on the subject of electricity in accordance with the way it affects his daily life.

Because there is no local trade union or city code regulations governing house wiring in Merkel, boys who receive instruction in housewiring and become capable are eligible to wire houses for themselves or for people who may hire them, without the usual restrictions.

All the data obtained in this thesis were secured from these questionnaires and interviews with the exception of Chapter II, which is based on research work concerning some of the aims, objectives and outcomes of industrial arts and vocational education courses.
CHAPTER II

EDUCATIONAL SOUNDNESS OF COURSE

A course in electricity would be included under the industrial education part of any school curriculum and for that reason a portion of this chapter is devoted to the place of industrial education in the general educational field.

The Place of Industrial Education in General Education

In every high school we find two types of students—those who are seeking information for immediate economic ends, and those who intend to become college and university students. The high school course of study must be constructed so that it will serve as a means of determining for each boy and girl what he or she can best afford to do as a life work, and it must also be designed to place at the command of those who are directing the commercial and industrial interests of the world, individuals prepared for immediate active service in some life occupation. It would seem that the main objective of any curriculum is to give each individual the broadest possible education in the high school to fit him for the largest possible service in the community in which he is to live. In that case, then, high school courses of study should include both liberal and
industrial fields so that each individual student will have enough experience with both types of courses to decide in which field he would like to continue his work.

The objectives of general education were first listed in the Seven Cardinal Principles of Secondary Education. These principles are listed below and a brief summary of the way that industrial education can contribute to each of them is given.

1. Health
Through industrial education the pupil should learn:
   a. How to conserve and gain strength and muscular control through manual activities.
   b. To become familiar with occupational dangers and health hazards.
   c. Occupational safety precautions.
   d. To take account of personal health possibilities in the selection and pursuit of a vocation.

2. Fundamental Processes
Industrial education is a contributing factor in that it offers:
   a. Immerseable situations for the application of these processes.
   b. Opportunities for more firmly fixing them by means of tangible relationships, particularly in arithmetical computations.
   c. A necessary stimulus to many pupils not otherwise attracted to abstract fundamentals.
   d. An insight into the fundamentals in actual life outside of school.

3. Worthy and Economic Home Membership
Industrial education should assist the pupil to:
   a. Recognize quality, appropriateness, and value in industrial products of use in or about the home.
   b. Properly care for industrial products within onward possession in order to retain the fullest measure of service-ability.
   c. Appreciate the skill and labor required to establish and maintain a home.
d. Develop ability and resourcefulness which will function in the accomplishment of all.

4. Vocation

5. Civic and Social Education
   Industrial education should help to:
   
a. Develop loyalty to ideals of civic righteousness as a fundamental element in all work.

   b. Establish habits of cordial cooperation in social undertakings which involve individual contribution to the general good by means of group and community undertakings.

   c. Realize right relationships between various vocational groups and other groups of society.

6. Recreation and Leisure

7. Ethical Character
   Industrial education may contribute toward the development of character in such traits as:
   
a. Habits of industry.

   b. Responsibility of a task.

   c. Ethical integrity of the worker as shown in the finished product.1

The part that industrial education plays in vocation and recreation and leisure is discussed on other pages of this study.

Industrial education has an increasingly important role to play in the program of general education. It is defined by Bonser and Mossman in the following words:

As a subject for educative purposes, industrial education 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.2

Probably no recent statement has caused more of a stir


among educators than that made by Prosser in the report, "Vocational Education in the Years Ahead" (1945). The statement was in the form of a resolution and it said in part:

......We do not believe that the remaining sixty per cent of our youth of secondary school age will receive the life adjustment training they need......

It is an accepted fact that much of the failure and disappointment in life and possibly much of the crime that is prevalent today may be attributed to the fact that so large a proportion of our youth go out from our public school imperfectly prepared to meet the demands of the world in which they find themselves compelled to make some sort of a living. This is an old problem, but now as never before the people are recognizing that industrial education is one of the best possible solutions to this problem.

Industrial arts has lifted itself by its boot-straps out of the dark basement to be on par with some of the loftiest courses. It has done so because it has long recognized and tried to solve some of these life adjustment problems. Industrial arts has always been realistic education. The fact that for years it was (and still is to a lesser extent) the dumping ground for the problem boy is proof that it teaches good social attitudes.

Edward A. Shattuck summarizes the place of industrial education in general education by saying that industrial education

4Ibid., p. 149.
5Shattuck, op. cit., p. 149.
education does not compete with the goals of a truly humanistic education; on the contrary, it embodies some of the latter's oldest and soundest principles—learning by doing, preparation for life, and the integration of education with the actual social process.

Before any course should be included in the curriculum of any secondary school it should be educationally sound by meeting the imperative needs of youth, and for this reason the writer includes in this chapter ways that a course in electricity would meet these needs.

Imperative Needs of Youth

Youth is created of two sexes, of many different colors, creeds and tempers, and what youth becomes in later life depends on both heredity and environment. The most important fact of all remains—each of them is a human being and not one of them should be wasted. All of them should have equal opportunities to live and learn. Because society makes certain requirements of all youth and recognizes certain needs of youth, a common pattern of educational needs are formed. These needs are listed below.

1. All youth need to develop salable skills.
2. All youth need to develop and maintain good health and physical fitness.
3. All youth need to understand the rights and duties of the citizen of a democratic society.
4. All youth need to understand the significance of the family for the individual and society.
5. All youth need to know how to purchase and use goods and services intelligently.
6. All youth need to understand the influence of science on human life.
7. All youth need an appreciation of literature, art, music, and nature.
8. All youth need to be able to use their leisure time well and to budget it wisely.
9. All youth need to develop respect for other persons.
10. All youth need to grow in their ability to think rationally.

Since education is more important for the future of our nation now than ever before, it is of dire necessity that these needs of the student be met. As society becomes more complicated it becomes increasingly true that without high school education youth are likely to be deficient in any true understanding of what we call the American way of life, and unless some of the needs of youth are being met in our local high schools, many of our youth are apt to lose interest and drop out of school altogether. Any learning process involves three elements; namely, an impulse, an appropriate avenue of development, and a conclusion; and the writer feels that a course in electricity creates an outlet through which all three of these elements can be satisfied.

Frances Geraldine Voss⁷ made a study to analyze the needs

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needs of youth in the village, small town or large town and to organize them in the curriculum of the secondary school. One significant conclusion which was reached in the Voss study was that the needs of youth can be grouped under four areas of living, namely, (1) living in the home; (2) leisure or recreational living; (3) making a living (vocation); and (4) living in the community.

In the present study the writer takes three of the needs of youth, namely

1. All youth need to develop salable skills. (Vocational)
2. All youth need to know how to purchase and use goods and services intelligently. (Consumer)
3. All youth need to be able to use their leisure time well and to budget it wisely.\(^8\)

and shows how a course in electricity would contribute toward the above listed needs.

**Vocational Need**

Theodore Struck\(^9\) states that the American people believe in work and since vocational education prepares youth for effective work, vocational education is vital to America. Struck goes on to define vocational education thus:

1. In a broad sense of the term, vocational education refers to the experiences that enable one to carry on successfully a socially useful occupation.
2. As used with reference to federally aided instruction, vocational education has reference to training

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\(^8\) Planning for American Youth, *op. cit.*, p. 10.

for useful employment in trade and industrial, agricultural, business, homemaking, vocational-technical and other pursuits of less than college grade.

3. Vocational education means getting people ready and keeping them ready for the types of service we need.

4. Vocational education should aim to develop an appreciation of the significance of the vocation of the community, and a clear conception of right relations between employer and employee, and between producer and consumer.¹⁰

Bernard Kurland¹¹ says that the objective of vocational education may be listed in various ways, but the ones which he thinks cover the field most completely are given below.

1. To develop skill in the use of common tools.
2. To afford industrial information and social intelligence.
3. To foster appreciation of good material and workmanship.
4. To further intelligent choices of life occupation.
5. To inculcate worthy personal traits and attitudes.
6. To provide a measure of specific occupational training.¹²

Young people are vitally concerned with the selection of their life work and with securing part-time jobs after school hours and during vacations. This interest leads to an exploration of occupational opportunities, which may result in a consideration of technical and skilled-labor positions within the electrical industry, and of the qualifications for them.

¹⁰ Ibid., pp. 6-7.


¹² Ibid., p. 352.
Ralph O. Johnston makes the following observation concerning vocational education:

To match men (students) and jobs is educating for successful living, and must be the primary objective of all schools. The school must give students an opportunity to contact and study those pursuits which they will follow later, whether that requires them to go on to college, finish high school and go into an occupation, or drop out of school at some stage and go to work.13

Charles Simmons Greathouse made a study to determine if instruction dealing with the use of electricity and electrical equipment was needed and wanted by the families living on electrified farms in the North Texas Area, and, if so, should the public schools include this instruction as a part of their curricula. In obtaining the data for his study, he interviewed two hundred five (205) men and women living on electrified farms and submitted questionnaires to two hundred (200) high school superintendents, high school principals, teachers of industrial arts, managers of electrical co-operatives, county agents, home demonstration agents and county superintendents. Greathouse's study deals with the desire for instruction of electrical information on the part of the people he contacted; whereas, the writer's study deals with the content of an electrical course for the secondary school, and also includes how such a course would be educationally sound.

Greathouse concludes the following:

1. The rural people interviewed in this study wanted:

   a. The boys in their communities to receive instruction dealing with the proper use of electricity and electrical equipment encountered both inside and outside the farm home.

   b. The girls in their communities to receive instruction dealing with the types of electrical work encountered both inside and outside the farm home.

   c. The public school to give this instruction.

2. The professional people covered by this study believed in instruction dealing with the use of electricity and electrical equipment on the farm would aid the rural families as follows:

   a. Help them use existing electrical facilities more intelligently.

   b. Help them purchase that electrical equipment which is best suited to perform the jobs for which it was bought.

   c. Instruction of this type would aid these people in making minor electrical installations and repairs that now have to be done by certified electricians.

   d. This instruction for the boys and girls of each community would tend to:

      (1) Give these rural families more leisure time.

      (2) Raise their incomes.

      (3) Enable them to purchase more of the necessities of life.

3. Although it is found, according to the answers received from the questionnaires sent to the professional people in the North Texas areas, that some agencies are set up and equipped in some of the communities of this area to give instruction in the use of electricity and electrical equipment, it is the opinion of this study that these agencies are, for the most part, schools for veterans, vocational agriculture farm shops, and rural
electric co-operatives which are, in most cases, inadequately staffed and equipped to give the boys and girls sufficient instruction to help them materially in their work on the farm. Then, too, the ability of vocational teachers to teach the children in our public schools is questioned because these teachers are trained to give the technical training peculiar to their vocations only and are not familiar with the techniques of general education.

4. The professional people of the North Texas area believed:

a. A need does exist in the North Texas area for instruction dealing with the use of electricity and electrical equipment.

b. According to the philosophy and objectives of the public schools of Texas, instruction dealing with the use of electricity and electrical equipment should be included as a part of the curricula of our public high schools.14

As the uses of electric energy become widespread throughout the world, more and more are property, wealth and manpower being devoted to the generation of electricity and to the manufacture of electric equipment of all types, from huge motors to ten cent household appliances. Again, as the versatility and control of electric power make it more and more useful in industrial operations of all kinds, there is need for electrical workmen in a great number of non-electrical industries. Furthermore, some completely new industries, including radio, telephone, and sound motion pictures, have

emerged as a result of man's increasing control of electricity. All these mean vocational opportunities in great number and variety, from production engineering to assembly line soldering. While the expansion of the electrical industry has created many new jobs, such as electric welding and armature winding, it has also done much to eliminate others, for example, those of candlemaker and steam fitter. Young people must recognize these trends in vocational opportunities so that they not only may have a free choice among new branches of industry but also will not prepare for obsolete fields of specialization.\(^{15}\)

By 1935 more than twenty-one million homes(approximately eight per cent of the total) in this country were wired for electricity. Although in that year only ten per cent of the nation's farms were supplied with electricity from central stations, about twenty-five per cent were supplied with electrical power are largely confined to small isolated towns and villages and to farms far removed from electric central stations.

Almost all electricity used in homes operates electric appliances. By far the most common household use for electricity is illumination. Four hundred and thirteen million light bulbs of different sizes were sold in the stores in 1935 alone.\(^{16}\)

The general use of electricity has made the employment of special workers in this field a necessity. To illustrate two of the jobs which might be obtained through a knowledge of electricity, a brief description is given of the


\(^{16}\) Ibid., p. 2.
nature of the work done by an electrician and the kind of work done by an electrical engineer. Both of these jobs deal with electricity, but they are vastly different in nature.

The electrician is engaged in the wiring of buildings for supplying lighting and power currents; the installation of all kinds and types of electrical appliances in the home, and the setting of poles, wires and cables and other outside work that is required to put an electrical line in service.

The general electrician must have a knowledge of all kinds of wire used in his trade; he must know the requirements for electricians and electrical installations; he must know how to do repair work on electrical appliances. A knowledge of electrical principles is desirable, and the best workman nearly always endeavors to learn as much as possible about how electricity does its work. He not only studies how electricity does its work, but he studies other trades to discover in what way he can more intelligently cooperate with them.

A student finishing only a high school course in electricity would be reasonably well equipped to begin as an electrician's helper; whereas, the field of electrical engineering, while still dealing with the elements of electricity, is

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17 A. W. Dragoo and Kenneth L. Dragoo, *General Shop Electricity*, pp. 119-120
designed for the student who not only learns the fundamentals of electricity in high school, but who can also continue his education in some college or university which offers further study in this field.

The electrical engineer has to do with the design, invention, and manufacture of electrical apparatus. The large generators in the power plants have been designed and built by electrical engineers. Problems of city lighting, intricate telegraph and telephone systems, as well as radio stations, are studied and solved by the electrical engineer. There is no limit to the possibilities for advancement and achievement for the electrical engineer other that the limit of the ability, ambition, and financial resources of the individual. The field is never crowded and there is always ample room for personal life service and achievement.\(^{18}\)

The cases cited above are only two of many vocational needs toward which a course in electricity might contribute.

**Consumer Education**

Young people want to know and should be encouraged to learn how the various electrical appliances in their homes work. They want to know how they can make wise purchases and how appliances can be operated economically, efficiently, and safely once they are acquired. Students read advertisements and are puzzled by their sometimes spectacular claims.

Many students are entirely ignorant of the amount of power consumed by typical electrical appliances and do not realize the cost of operating them. They do not recognize the generalization that appliances involving heating elements cost much more to operate than those for lighting or for motion. Few realize that radios are among the less expensive devices in the home to operate, nor do they realize that electric lights, after they are installed, are so inexpensive to operate that no person need jeopardize his eyesight with inadequate illumination.\textsuperscript{19}

H. H. London and Robert Wayne Adams conducted a study in 1947 to determine the need for more knowledge of electricity. In this study, facts and opinions were sought from 2,085 operators of electrified farms and from more than 700 professional workers in Missouri who were managers of electric co-operatives, agriculture teachers, and industrial arts teachers. The majority of both groups believed that family members should know the following things concerning electricity:

1. How to select and purchase household electrical equipment.
2. How to operate and care for household electrical equipment.
3. How to estimate the cost of operating household electrical equipment.
4. How to read a meter and figure a monthly bill.
5. How to avoid overloading circuits and blowing fuses.
6. How to select and replace fuses.
7. How to plan the lighting of a room or building.

\textsuperscript{19}Stollberg, \textit{op. cit.}, pp. 11-12.
8. How to make simple repairs on household electrical equipment.
9. How to locate and eliminate the causes of blown fuses.
10. How to determine whether or not it would be profitable to buy electrical equipment.
11. How to plan the wiring of a building.
12. How to select and purchase non-household electrical equipment.
13. How to operate and care for non-household electrical equipment.
14. How to estimate the cost of operating non-household equipment.
15. How to make simple repairs on non-household electrical equipment.
16. How to change hand-operated machines to machine-operated machines.
17. How to rig up a portable motor.
18. How to install new lighting or convenience outlets and switches.
19. How to install a new circuit in a building.
20. How to wire a building for electricity.
21. How to do special wiring required in installing electrical equipment.²⁰

As a consumer of electric energy, the individual faces problems of buying and operating appliances and of purchasing the kilowatt-hours to run them. He should be able to select those appliances which best match his consumer needs and his buyer capacity. Extensive advertising and various consumer services provide information on the basis of which of these appliances may be selected. Much of the material is quantitative in nature, and the consumer should be able to understand and apply this information. He must decide which tasks can be done better or more cheaply by electricity

than by other methods. He must recognize situations in which he is paying for convenience. Then he must make the wisest choice from an ever widening array of brands and styles, covering a vast range of quality and cost.21

Marshall L. Schmitt gives the following illustration of the need for developing the ability to make intelligent selection of electrical appliances.

The Consumer Report of March, 1947, claims that in testing several different types of electric toasters, it was found that some were not acceptable because of: (1) Serious short-circuit hazard. (2) Handles uncomfortably hot for carrying after toaster had been in operation for a while. Not acceptable because samples failed the breakdown test.22

It is obvious that consumers do need to analyze what they buy, and a course in electricity can effectively show the need and clearly take the necessary steps to analyze appliances. For example, the teacher can point out and demonstrate what to look for in buying a radio. He can compare a radio set which has good fidelity, sensitivity, interference rejection, volume, and tuning range with a radio that has poor qualities.

As a consumer, the boy or girl should know not only how

21 Stollberg, op. cit., pp. 4-5

to purchase these appliances, but also how to take care of them once they have been bought. An example of this information is given by Kenneth Dameron in his explanation of the care of the motor of an electric refrigerator.

Motors are sometimes self-oiling and need no attention, but many of them need to be oiled occasionally. Follow carefully the manufacturers' directions with regard to oiling. Instructions are given as to the kind of oil to be used. Certain oils are too thin for motors; a moderately heavy oil is better. Put in the number of drops recommended. This is a case where a little is good, but a lot is not better. Too much oil is as harmful as none at all. Do not get oil on rubber, since oil causes disintegration. This applies to rubber gaskets around the refrigerator door.23

Dameron goes on to give a few hints in the care of small electrical appliances.

Keep the toaster free from crumbs; keep the waffle iron free from fat seeped over the rim; clean the grids with a wire brush but never wash them. Do not overwork the motor on the electric mixer. If it slows down or gets hot, the load is too heavy. Use a smaller load or thin the mixture slightly. The electric mixer operates so much faster than mixing by hand that there is a tendency to use it too long and overmix.

Electric cords are frequently sources of trouble. They should be kept free from kinks and knots which tend to wear the insulation and break the wires. Look out for worn cords and for broken plugs, since they may cause short circuits and blow a fuse.24

Such information on the care of electrical appliances could very easily be included in a course in electricity.

Another phase of consumer education which would be included in a course in electricity is the proper selection of electric light bulbs of very high quality and service rating.

23 Kenneth Dameron, Consumer Problems in Wartime, p. 379.
24 Ibid., p. 381.
The following description concerning the various types of light bulbs was found.

The proper selection of electric light bulbs of high quality and service rating is of much importance. Bulbs are manufactured for all the standard commercial voltages and are marked in volts and watts. Bulbs produced by standard American manufacturers can be depended upon to render efficient service over long periods. Care should be exercised in purchasing foreign made bulbs. Some use excessive current in proportion to the light produced. Always select bulbs of higher voltage than necessary and more in number than are needed. The cost of operation of the lighting system depends upon the size (indicated in watts), the number of bulbs, and the time in use. A lighting system, using ten one-hundred watt bulbs for one hour, will consume one thousand watts, or one kilowatt. When one kilowatt (1000 W) flows for one hour, it is said to be one kilowatt hour and is the unit of measure for all electrical current. Current is, therefore, sold at certain prices per kilowatt hour.

A new type of lighting has recently come into use, known as Fluorescent lighting. This type of light employs a mercury bulb, tubular in shape, mounted singly or in multiple in special fixtures. The long bulbs spread the light evenly throughout their length, helping to eliminate shadows. These bulbs have much longer life than the regular incandescent types of bulbs and use only about one-third the current for equal illumination.25

Leisure Time

Approximately one third of our time is leisure time, which is considerable time to spend as we please—free from our work and other tasks.

William C. Menninger26, General Secretary, The Menninger Foundation, Topeka, Kansas, feels that it is extremely

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26 William Claire Menninger, Enjoying Leisure Time, pp. 4-5.
important to your mental health and well-being to spend your leisure time intelligently doing what you want to do; such as, expressing strong emotions, creating or learning. After pointing out that it is important to work out a time schedule of work and play, Menninger discusses the topic of picking out a field in which to spend your leisure time. He points out that some people will like creative activities, some collecting activities, some educational activities, some competitive sports and games, some non-competitive sports and games, and some spectator activities and social group work activities.

It is probably a good indication that you have chosen the right hobby if the answer is yes to most of these questions.

1. Will this activity give me fun and enjoyment?
2. Is the activity within my capabilities?
3. Do I have the time for it?
4. Will I have particular needs which would be met by a special hobby?
5. Will my hobby meet with the approval of my friends and family?
6. Will this hobby meet my social needs?
7. Is the hobby practical?
8. Can it be continued indefinitely?
9. Can I afford it?
10. Is my location suitable for the hobby? 27

Electricity has many potential outlets as a hobby for recreation. One of these is amateur radio work which is open to both boys and girls, men and women.

Amateur radio is a scientific hobby, a means of gaining

27 Ibid., p. 42.
personal skill in the fascinating art of electronics and an opportunity to communicate with fellow citizens by private short-wave radio. Scattered over the globe are more than 100,000 amateur radio operators who perform a service defined in international law as one of 'self-training, intercommunication and technical investigations carried on by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.'

Amateur radio is a grand and glorious hobby but this fact alone would hardly merit such wholehearted support as is given it by our government at international conferences. There are other reasons. One of these is a through appreciation by the Army and Navy of the value of the amateur as a source of skilled radio personnel in time of war. Another asset is best described as 'public service.'

The 'public service' record of the amateur is a brilliant tribute to his work. These activities can be roughly divided into two classes, expeditions and emergencies. Amateur cooperation with expeditions began in 1923 when a league member, Don Mix, accompanied MacMillian to the arctic on the schooner Bowkion with an amateur station.28

There are several projects that the student in an electrical course can construct that would contribute toward helping him become a successful, satisfied amateur radio operator.

Marshall L. Schmitt states that every day police courts are filled with young people of school age who have used their free time in the wrong way. The problem of these juvenile delinquents in many cities is of major concern and is a problem with which the industrial arts teacher can be a help. The teacher can help prevent many youths of school age from being brought in police courts or sent to reform schools by guiding their thoughts and efforts to purposeful activities.

Some of the activities which can be encouraged in an electrical course are electrical appliance repair workshops, radio service shops, amateur radio stations, and radio controlled airplanes. These activities can develop into hobbies that may last a lifetime, and in some cases may offer a livelihood. These avocational possibilities inherent in the industrial arts shops should not be limited to in-school youth, but the shop should be opened at night to draw in and advise out-of-school youth and their parents.

Today, with the nations of the world debating over the problems affecting us directly in one way or another, it is very essential that our public school system be alert to both sides of the discussions that will eventually mold our futures. It is not enough for students to study and construct projects involving the technical theory of electricity, but they should also understand the social-economic implications that this energy offers to mankind, the present-day struggles over atomic energy, advisability of the St. Lawrence Seaway, Columbia River Power Projects, and many others.

Schmitt goes on to say that the industrial arts shops that include electricity as a part of their curriculum and utilize its potentialities to a high degree are contributing to the over-all objectives of education; and the shop which does not include electricity in the program cannot possibly fulfill its many obligations to the students who are in
attendance and are to be educated for the way of life in which they will find themselves compelled to make a living.29

In 1949 Gerald S. Brenholtz made a study to analyze the handicrafts program to find its function in education for life adjustment situations. This study is similar to the present study in that it deals with the life adjustment situations. The data used in the Brenholtz study were obtained from recent writing in the fields of education for life adjustment situations, from the psychology of learning, from general education, and from studies dealing with crafts in the school.

Brenholtz made the following recommendations:

1. The handicrafts program in the high school should be planned around the areas of persistent life situations.
2. The program should be planned in such a manner that the needs of the student will be met.
3. The program should be planned so that the needs of society for able, rational, and well-adjusted citizens will be met as well as possible.30

It is the belief of the writer that course in electricity will serve the same purposes of the life adjustment situation as the crafts course planned by Brenholtz.

In summarizing the needs of youth toward which a course in electricity would contribute, Marshall L. Schmitt lists

29 Schmitt, op. cit., pp. 3-4.

the following development which should be made by the students taking such a course.

1. The student develops the ability to make intelligent selection and purchase of electrical devices.
2. The student develops a definite knowledge of household electrical appliances.
3. The student develops an appreciation of the problems involved in the struggle to obtain these conveniences of our modern culture.
4. The student develops a degree of skill in maintaining electrical equipment for uninterrupted service.
5. The student develops an interest in the ever widening vocational possibilities in the electrical and its allied fields.
6. The student develops an appreciation of the great variety of avocational activities in which many individuals participate and enjoy.
7. The student develops the ability to think critically about problems that are world wide, such as atomic energy, and conservation of natural resources.\(^3\)

If the above references are true and can be used as authorities, it would seem that a course in electricity would contribute to the fulfillment of the imperative needs of youth.

In Chapter III of this study the writer gives a tabulation of the results of the questionnaires given to the students and the interviews with the parents in an attempt to show that a course in electricity is both needed and desired in the Merkel community.

\(^3\) Schmitt, op. cit., p. 3.
CHAPTER III

RESULTS OF QUESTIONNAIRES AND INTERVIEWS

The results from which the tabulations in this chapter are made were obtained from the questionnaires given to fifty boys and fifty girls of the Merkel High School, and from the interviews conducted with one hundred people of the Merkel community who have children of school age.

On the following pages each question which was asked on the questionnaires and each question asked in the interviews is given and the answers received are discussed briefly.

The first question which the students were asked is: "Are you interested in electricity? If your answer is yes, are you interested in it as a hobby or as a vocation?" Ninety-four per cent of the boys and 62 per cent of the girls stated that they were interested in it. Seventy per cent of the boys were interested in it as a hobby and 30 per cent as a vocation, whereas, 93 per cent of the girls who were interested in electricity at all were interested in it as a hobby. It was noted by the writer that although some of the girls stated that they were not interested in electricity they did check some of the projects which they would like to make.
The second question which the students were asked is: "Have you ever been enrolled in a course which dealt with the fundamentals of electricity?" Fifty-six per cent of the boys and 26 per cent of the girls had been enrolled in such a course. It is significant to note that almost all of both the girls and boys who had had any previous experience with the fundamentals of electricity were interested in continuing their study.

The third question is: "What phases of electricity do you want to study? Check two of the following: house wiring, amateur radio, radio repair, motor rewinding, lineman, television, automotive electrical systems, household appliance repairs." Heading the list of the choice of the boys was housewiring with 46 per cent, next in line was amateur radio with 38 per cent, third was television with 27 per cent. The boys were least interested in studying to be a lineman as shown by the 11 per cent who checked that as their choice. The girls were vastly more interested in television and household appliance repairs than any other phase of electricity. Ninety-three per cent of the girls who were interested in electricity wanted to study television and 81 per cent of them wanted to study household appliance repairs. The third choice made by the girls was amateur radio with 48 per cent of them choosing this field.

The fourth question listed is: "What projects would
you want to make if you were enrolled in an electricity course? Check one of the following: electric motor, telegraph key, telegraph sounder, crystal radio, one-tube radio, two-tube radio, electric bathroom heater, portable floodlight for the yard, transformer, wire a wiring frame that represents for you the type of wiring done in a small house, buzzer bell." The projects chosen under this question brought out the individual differences of the students—all of the projects listed were chosen at least once by one of the boys. The most checked project of the boys was the electric motor with 30 per cent desiring to make it; next in line was the two-tube radio listed as the choice of 26 per cent of them. Twenty-seven and one half per cent of the girls want to make the telegraph key. The buzzer bell and the portable floodlight for the yard each drew twenty-two and one half per cent of the girls' opinions.

Question number five: "Do your parents work in the electrical field?" checked as follows, 90 per cent of the boys answered no to this question and 98 per cent of the parents of the girls were not working in this field. It was noted by the writer that all of the 10 per cent of the boys whose parents do work in the electrical field chose electricity as a vocation also.

A question—"What electrical devices or appliances do you have in your home?"—was answered in the following manner:
the students were asked to check the following: fan (ordinary oscillating or attic), iron, toaster, heater, stove, refrigerator, ironer, desk lamp, floor lamp, radio, vacuum cleaner, razor, soldering iron, electric mixer, others. An iron and a radio were the two articles which were found in the homes of all of the girls and boys contacted by this questionnaire--not a single home was without them. Eighty-six per cent of the girls and 82 per cent of the boys stated that they had an electric refrigerator, and the appliance listed next in line by both the girls and the boys was the desk lamp. Very few of the homes had attic fans. Some of the other electrical appliances which were listed were: sewing machine, washing machine, broiler, electric pump, heating pad, electric saw, electric blanket, clock and churn.

The last question asked on the student questionnaire was: "What electrical appliances are most needed in your home? Check the following: fan (ordinary oscillating or attic), iron, toaster, heater, stove, refrigerator, ironer, desk lamp, floor lamp, radio, vacuum cleaner, razor, sewing machine, soldering iron, electric mixer, others." The boys listed the sewing machine as the most needed appliance in their home (46 per cent chose this appliance), with the vacuum cleaner running a close second with 42 per cent listing it. The girls listed the ironer, vacuum cleaner and sewing machine as the most needed appliances in their homes. Fifty-two per cent listed the vacuum cleaner, 50 per cent the
ironer, and 48 per cent listed the sewing machine as the most needed appliance. One boy, obviously an amateur radio fan, stated that the most needed appliance in his home was an amateur radio receiver, and one girl stated that a hair dryer was the most needed appliance in her home.

Interviews were conducted with one hundred people of the Merkel community who had children of school age and a tabulation of the results obtained from these interviews follows. The one hundred people interviewed were broken down into six different categories in an attempt to get a cross-section of the people living in this locality. The six categories into which these people were placed are: land owners living on their own farms, tenant farmers living on rented land, business men whose establishments are their sole support, the unskilled laborer, the skilled laborer and the professional man. Roughly speaking, the number of people interviewed from each category is proportional to the number of people in the Merkel community that actually fit in these divided groups. For example, more people make their living as farmers and unskilled laborers than any other occupation; therefore, more farmers and unskilled laborers were interviewed. Out of the one hundred people interviewed 20 per cent are unskilled laborers, 20 per cent are farmers living on their own farms, 18 per cent are tenant farmers living on rented land, 19 per cent are skilled laborers in this
locality, 16 per cent of the total are business men and 7 per cent are professional men.

The first question which was asked when interviewing these people was: "Have you had any trouble with the electrical system of your car in the past two years? Did you make the repair yourself? Would you have made the repair yourself if you had known how?" Out of the twenty people interviewed as farmers living on their own farms, 35 per cent of them stated that they had had trouble with the electrical system of their car; 35 per cent of them stated that they did not do the work themselves, and 45 per cent said that they would have done the job themselves had they known how.

From the eighteen people interviewed as skilled laborers, 67\(\frac{1}{2}\) per cent of them had trouble; 33 \(\frac{1}{3}\) per cent did not do the work themselves, and 33 \(\frac{1}{3}\) per cent of them would have done the work had they known how.

Fifteen tenant farmers were interviewed and 50 per cent of them had trouble; 33 \(\frac{1}{3}\) per cent had done the repair work themselves; 37\(\frac{1}{2}\) per cent of them would have done the work had they known how. Twenty unskilled laborers were interviewed and 50 per cent had trouble; 35 per cent had done the work themselves; 35 per cent would have done the work had they known how.

From the seven professional men to which the writer talked, 14 per cent had trouble; none had done the work
himself; and 28 per cent stated that had they had trouble
and if they had known how they would have done the repair
work themselves. It was noted by the writer that the pro-
fessional man was the least interested in doing the repair
work himself, even if he had known how. The reason given
by these men for not wanting to do this work was their lack
of time in that they felt that their time was more valuable
on their own job, and that when their day's work was over
they wanted some leisure time in which to do what they de-
sired.

Fifty per cent of the sixteen business men interviewed
stated that they had trouble; 12½ per cent had done the work
themselves; 37½ per cent would have done the work had they
known how.

The questions—"Did you wire your tractor or combine for
lights during the last two years? Did you do the work your-
self? Would you have done the work had you known how?"—was
answered in the following manner by only three of the afore
mentioned categories as none of the others owned tractors or
combines. Thirty-five per cent of the farmers stated that
they had had their tractor or combine wired for lights; 30
per cent of them had done the work themselves, and 40 per cent
would have done the work if they had known how. Approximately
5 per cent of the skilled laborers had had this done; 5 per
cent had done the work themselves, and 5 per cent would have
done the work had they known how. Approximately 11 per cent
of the tenant farmers answered yes; 11 per cent had done the work themselves; 27 per cent would have done the work had they known how.

The people were then asked --- "Have any branch circuits been added to your original house wiring job? Did you do this work yourself? Would you have done this work had you known how?" Forty-five per cent of the farmers gave a positive answer to this question; 40 per cent of them did not do the work themselves, and 35 per cent would have done the work had they known how. Forty-two per cent of the skilled laborers gave a positive answer to the question; 21 per cent did not do the work themselves and 15 per cent would have done the work had they known how. Thirty-one per cent of the business men answered yes to the question, 31 per cent of them did the work themselves, and 12 per cent of them would have done the work if they had known how. Sixty-one per cent of the tenant farmers gave a positive answer; 42 per cent of them had done the work themselves, and 22 per cent would have done the work if they had known how. Forty-five per cent of the unskilled laborers gave a positive answer; 20 per cent would have done the work if they had known how, and 20 per cent did do the work themselves. Thirty-three and one third per cent of the professional men answered "yes" to the question; 16\(\frac{1}{2}\) per cent of them had done the work themselves, and 16\(\frac{1}{2}\) would have
done the work of installing new circuits in their homes if they had known how.

When asked the questions—"Has an electric pump ever been installed at your residence? Would you have done the work had you known how?"—positive answers on the first question were given by 40 per cent of the farmers, 26 per cent of the skilled laborers, 62 per cent of the business men, 28 per cent of the tenant farmers, 45 per cent of the unskilled laborers, and 28 per cent of the professional men. Twenty per cent of the farmers, 26 per cent of the skilled laborers, 31 per cent of the business men, 33 1/3 per cent of the tenant farmers, 40 per cent of the non-skilled laborers, and 28 per cent of the professional men would have done the work had they known how.

"Are you able to estimate the cost of operating your household appliances?" This was the question which the people were asked next. Positive answers were received from 70 per cent of the farmers, 78 per cent of the skilled laborers, 69 per cent of the business men, 72 per cent of the tenant farmers, 60 per cent of the unskilled laborers, and 28 per cent of the professional men.

Eighty per cent of the farmers, 63 per cent of the skilled laborers, 56 per cent of the business men, 77 per cent of the tenant farmers, 40 per cent of the unskilled laborers and 71 per cent of the professional men answered
yes to the question—"can you read the electric meter and figure your monthly electrical bill?"

When talking with the people, they were asked—"Do you know what size fuse with which to replace a burned out one?" Positive answers were given by 70 per cent of the farmers, 89 per cent of the skilled laborers, 100 per cent of the business men, 89 per cent of the tenant farmers, 65 per cent of the unskilled laborers, and 57 per cent of the professional men.

The next question which was asked—"Do you know how to locate and eliminate the causes of blown out fuses?"—was answered with a positive answer by 55 per cent of the farmers, by 85 per cent of the skilled laborers, by 81 per cent of the business men, by 77 per cent of the tenant farmers, by 60 per cent of the unskilled laborers, and by 57 per cent of the professional men.

The last question which the people were asked was: "Do you have an electric fencer on your farm? Did you connect it yourself?" This question applied to the farmers and tenant farmers only. Fifty per cent of the farmers stated that they did have a fencer on their farms and 50 per cent of them had connected them themselves. Fifty per cent of the tenant farmers stated that they did have fencers and 44 per cent of them did the work themselves.

On the following pages a number of graphs are given to record some of the results of the questionnaires and interviews.
Fig. 1.--This is a graphic representation of the boys interested in electricity as recorded from the questionnaires received.
Fig. 2.—This is a graphic representation showing the number of girls interested in electricity as recorded from the questionnaires received.

Fig. 3.—This is a graphic representation of the people contacted by the interviews.
Fig. 4.--This is a graphic representation of the number of boys interested in the different phases of electricity.
Fig. 5.--This is a graphic representation of the number of girls interested in the different phases of electricity.
CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of the study was to determine the needs and interests of the Merkel community concerning the formulation of a course in electricity for the secondary school. If it were found that such a course was needed and desired, some of the contents of such a course would be determined.

Chapter I of the study served as an introduction and contained statements of the problem, delimitations, definitions of terms, and the method of procedure.

Chapter II presented data which would show that such a course in electricity would be educationally sound. Recent studies in the field of electricity were discussed and the imperative needs of youth were listed. Three of the needs of youth—(1) a need for salable skills, (2) a need to know how to purchase and use goods and services intelligently, (3) leisure time,—were discussed at length to show that a course in electricity would definitely contribute toward them.

In the third chapter of this study a tabulation of the results of the questionnaires given to the students and of the results of the interviews with the people of this
community was given and graphs were presented to give a clearer picture of the results.

Conclusions

As a result of this study it is felt that the following conclusions can be made concerning the need and desirability of a course in electricity in the Merkel community:

1. A course in electricity would definitely be educationally sound by meeting the imperative needs of youth.

2. Because of the large percentage of the students stating that they were interested in electricity, such a course is desirable.

3. Such a course would be beneficial not only to boys but to girls as well.

4. The farmers, tenant farmers, skilled laborers, and unskilled laborers showed a desire for more knowledge of electricity and that they would have made electrical repairs if they had known how.

5. The professional men and the business men were least interested in doing electrical repairs themselves.

6. Each of the homes contained a large number of electrical appliances.

7. The students were more interested in electricity as a hobby than as a vocation.

8. A very small percentage of the parents of the students worked in the electrical field.
Recommendations

In view of this study to determine the needs and interests of the Merkel community concerning the formulation of a course in electricity for the secondary school and from the conclusions drawn, the following recommendations are made:

1. An electricity course in the secondary school should be planned around the interests of the students.

2. The course should be planned in such a way as to give the student consumer education in electricity, vocational education in electricity and electricity as a hobby.

3. Another study should be made to determine which phases of electricity the parents think the students should study.

4. A course in electricity should be included in the curriculum of the Merkel High School.

5. Such a course should be open to both boys and girls of the secondary school.
BIBLIOGRAPHY

Books


Collins, Morie D., Projects in Electricity, Illinois, McKnight & McKnight, 1941.


Dragoo, W. A. and Kenneth L., General Shop Electricity, Illinois, McKnight & McKnight, 1941.


Reports


**Articles**


Kurland, Bernard, "Industrial Arts Curriculum to Improve Housing," *Industrial Arts and Vocational Education, XXXIX* (November, 1950), 351.


Unpublished Materials


