this responsibility will greatly overbalance the weary hours spent on it.

Values

The questionnaire included a question concerning the values of the annual. The content of the answers by the editors may be summarized by giving the points presented by the editor of *The Virginian.* It was as follows: "It leaves something worth while to the college"; it acts as a memory book to the students; it gives the members of the staff an opportunity to display their creative, artistic, literary, and business abilities; and it "makes school life more interesting."

Summary

This study of annuals has covered a narrow sphere, but I have tried through it to present a general view of annuals in regard to organization, division, finances, faculty assistance, distribution, academic credit, and values.

Thelma Eberhart

A PLEA FOR PHYSICS

IT IS the purpose of education to contribute as much as possible toward social progress, and in order to do this it must give a practical, as well as a theoretical, knowledge of the things which are vital in social life.

Among the many courses in the curriculum there is one which, to my mind, stands out as the immediate channel through which this purpose can be brought to a realization. This subject is science. Youth seeks an explanation of life in all of its phases; and as life is permeated with, and influenced by, science, we may let this explanation come through science and be a true one. Man, because of his grasp of science, has subdued the forces of nature, has freed the mind of superstition, and has furnished himself with methods which ultimately aid him in solving the more complex problems of life and society. But science must not only result in economic advantage; it must also create a broader knowledge and vision, and an appreciation of life's values, to be obtained in no other way.[1]

It is my purpose to treat a special subject in the field of science so as to bring out its practical value toward the advancement of social progress. This subject is physics. I have chosen it because I feel that in past years in the teaching of physics, the emphasis has been more on the theoretical side with little notice of its practical application to real life situations. I do not mean to imply that the theoretical is less important and should be neglected, because it should not. It is very important and essential, but the practical should not be crowded out by the theoretical. Interest is the basis of all thorough study, and this can better be gained through a study of the practical side of physics.

A study of physics is necessary to the well rounded education of both the boy and the girl, because it is not only an exceedingly valuable subject in itself, but it contributes to social progress by modifying the physical circumstances of one's environment, by revealing some of the conditions and processes to which life is subject, by helping to prepare individuals for living, and by training in the skillful use of objective materials.[1]

A practical study of the subject enriches the life of the boy in that it teaches him to understand the mechanics and operation of the vast amount of machinery common to him in everyday life, and thus makes him more independent in that field. It gives him an insight into the forces of nature and enables him to better understand the great phenomena about him. It stimulates him to do research work in the field of science —one thing that America needs to consider in the education of its youth. Can a boy, today, afford to go through life and not understand the underlying principles of the

---

[1]Rusk—*How to Teach Physics,* p. 34.

mechanics of his automobile; the wonders of his radio; the marvelous achievements of communication revealed in the telephone and telegraph; the structure and operation of the great steam locomotive, and the power of steam to operate this vast machinery; the far-reaching power of electricity as it is manifest in electric lighting systems, heating appliances, and numerous other forms; the great power and extensive use of water, and how it is supplied to the necessities and comforts of life; the phenomenon of heat and all that includes; moving picture machines; the underlying principles of our naval and air machinery; and all the common farm and home equipment which aids in making life more worth while? There is hardly a class in the curriculum which has a wider appeal to the youth of today than has an intelligent study of physics.

There seems to be a current idea among girls that physics was made for boys and that it has no place in the life of girls. This is an erroneous idea which has for some reason permeated their minds, and it must be eradicated, because girls cannot afford to miss the opportunities offered to them through a study of physics. It is almost, if not quite, as practical for the girl as for the boy, because it teaches her how to plan a home on a scientific basis, with due consideration for lighting, heating, and ventilation. In order to do this efficiently she must have a clear idea of reflection and refraction of light, the phenomena of heat, gases, and liquids. The intelligent use of the various appliances in and around the home also demands an intensive knowledge of physics. The principles of physics are applicable to the use of the camera, the radio set, the care and use of the piano, electric iron, toaster, and stove. Can a girl be educated and not have a sound understanding of these interesting problems?

Physics, which many years ago was only a theoretical science, has today come to be a necessary part of the mental equipment of every intelligent citizen. Because the study of physics is of great importance to all high school pupils, I have prepared a questionnaire relating to the subject and have sent copies of it to seventy-five representative high schools in Virginia. With the results of these at hand, I feel that I shall be able to show wherein and why the study of physics has been neglected, and to offer suggestions for improving the situation. The following represents a tabulation of the results of the questionnaires:

Number of high schools interviewed 75
Number of high schools returning questionnaires 40
Number of schools offering a course of physics.17
Number of schools not offering a course in physics 23
Number of schools offering physics every year.10
Number of schools alternating 7
Textbook used—Millikan and Gale 17
Manual used in laboratory work ...yes 16—no 1
Physics a required subject .....yes 3—no 14
Number enrolled in physics courses
boys 234—girls 72
Number beginning physics and later discontinuing it .....boys 28—girls 33
Reasons for discontinuing it as given by the instructors
(1) Lack of mathematics boys 5, girls 1
(2) Failed .....boys 8, girls 0
(3) Conflicts ..boys 2, girls 1
(4) Too difficult boys 5, girls 1
(5) Left school, boys 8, girls 1
(6) Disliked ...boys 0, girls 1
(7) Overworked boys 1, girls 1

Class worked out big problems in applied physics? .....yes 9, no 8

Samples
(1) Making radio sets .....number of schools 1
(2) Studying local plants ... " " " 4
(3) Studying automobiles ... " " " 3
(4) Examining a heating system ..... " " " 4

Science magazines available to the class
(1) Popular Science Monthly number of schools 13
(2) Science and Invention ... " " " 4
(3) Literary Digest ..... " " " 1
(4) Scientific American. " " " 7
(5) National Geographic .... " " " 1
(6) Chicago Engineering ... " " " 1

(7) Science ..... " " " 1
(8) Popular Mechanics ..... " " " 2
(9) Mathematics and Science Teacher .... " " " 1

Number of instructors assigning topics for study in these 8
Number not assigning topics for study 9
Number requiring reports on these topics ... 9
Number not requiring reports 8
Hard to interest pupils in physics? ..yes 3, no 14
Laboratory adequately equipped?
fair 6, yes 7, no 4

Additional apparatus needed—
(1) $500 worth of apparatus
(2) Sound and light apparatus
(3) Radio receivers
(4) Old machinery
(5) Old telephone
(6) Old Ford
(7) Electrical apparatus

Do pupils think physics is of immediate value to them?
Boys .....yes 216, no 0
Girls .....yes 32, no 31

Some reasons offered by instructors:
(1) Practical applications to life
(2) For engineering
(3) College preparatory
(4) For information
(5) Interested in mechanics
(6) Household applications
(7) Educational satisfaction

Constructive suggestions as given by physics instructors
(1) Emphasize present day needs
(2) Demand better foundation in mathematics
(3) Provide well equipped laboratory
(4) Provide better informed teachers
(5) Associate class work with experience
(6) Tell students interesting facts not found in the text
(7) Make trips to plants and factories
(8) Interest students in the lives of great scientists
(9) Work out practical problems
(10) Make it a laboratory course
(11) Have frequent class demonstrations
(12) Watch for outside principles and apply physics laws to these
(13) State institutions should offer a summer course in the methods of teaching physics

It is a striking fact that so few of the high schools returning answers offer a course in physics. Why is this true? A subject so full of educational value should not be neglected. The child who has adequate training in the physical principles makes a better equipped citizen both mentally, morally, and physically. The manipulation of delicate apparatus, careful and exact experimentation, accuracy of measurement, and all the scientific skills which the pupil develops tend to foster straight thinking and to strengthen the analytical and critical point of view. "No other subject surpasses physics in the scope offered for practice in systematic original thinking and true student-activity."[2] Training in physics emphasizes the fact that truth, alone, counts toward the building up of science; that falsehood not only is valueless in this regard, but actually harmful, since it often requires the expenditure of more energy, which properly used at the beginning would have caused much more rapid advancement.[3] A student of physics appreciates downright honesty.

Physics is also rich in vocational training. One who does not know the applications of the principles of physics is at the mercy of the mechanic, the garage man, or one who has acquired a knowledge of these principles. Not only is this true of the mechanics of physics, but also of other equally important problems—ventilation, lighting, heating, and so on. Physics teaches social co-operation in that it produces a feeling on the part of the pupil that he is dependent on his fellowmen, and they on him, for success in any work. Group work in the laboratory and through big jobs strengthens this feeling considerably. Here he is taught through practice the rudiments of efficient citizenship. This, if nothing else, should be sufficient proof that physics is of the utmost importance to the high school pupil.

It is observed from the questionnaire that considerably more than half of the schools reporting alternate in teaching physics, that is, they offer a course every other year. This is much better than not offering it at

[2]Millis and Millis—*The Teaching of High School Subjects*, p. 264.
[3]Millis and Millis—*The Teaching of High School Subjects*, p. 262.

all, but it is evident that some interest is lost when the subject is offered one year and excluded the next. It may lead one to think that physics is of little importance. There is a need for a course in physics every year in every high school if the subject is to accomplish its task.

Why is it—and I believe this is typical—that the boys taking physics outnumber the girls three to one? It is evident the girl does not realize that physics is of much importance to her. Is it possible to show her that there is a vital relation and immediate connection of the principles of physics to practical living in her case as well as in that of the boy? In order to do this it will be necessary that the relation of the study to the child's environment be emphasized sufficiently well that her interest and enthusiasm may be gained for it.

The majority of the replies reveal the fact that it is not hard to interest pupils in physics, but why do so many begin the course and later discontinue it? Physics is a subject which, when so presented as to arouse the interest of the pupil, attracts him and creates in him a desire to investigate, and to search for the truth in life. And only as this desire is created and developed does he become the broad-minded citizen that he should be. It should be the object of the instructor to create in the pupil a feeling for the need of a knowledge of the subject, because only as he is lead to realize this will he have a desire to pursue it. The most logical means of bringing this about is by the presentation of facts and principles through the consideration of real problems in the pupil's daily life. Investigation in the field of General Science has shown that pupils do not discontinue the course after they have begun it.[4] Is it possible to make this true of physics? Since we have at hand some of the basic reasons why pupils drop out of the course, it seems that we could work toward the elimination of these.

[4]Eikenberry—*The Teaching of General Science*, p. 119.

I find that many of the physics classes do not carry out any big jobs or projects in connection with the course. The one definite way to interest a pupil in physics is to let him work out a big problem bearing directly on his daily experiences. Then he sees that physics is practical. There are numerous problems which can be handled in this way, and which will give the pupil a better understanding of physics within that field than he could possibly get in the classroom alone.

It is very encouraging to find that so many science magazines are available to the physics classes. If the pupils are encouraged to read these regularly, and if they become interested, it will certainly help to lead to an appreciation of physics as well as the other sciences.

One great handicap in the teaching of physics is the inadequate laboratory. However, much can be accomplished in the way of overcoming this by having the pupils construct simple apparatus. It is surprising how much they can construct. This not only provides apparatus, but also serves as a means of interesting the pupil in his work. It gives him something concrete and practical to do. A boy or girl appreciates and values something which he makes much more than something that is handed out to him "on a silver waiter," as it were. Science Clubs can often make money to buy some of the apparatus also.

I have learned from the answers to my questions that in a great many of our high schools excellent work is being done in the physics classes, but I have also learned that there is a very great need for improvement in the majority of these schools interviewed. Following the information already presented, I shall make some suggestions for a big unit in physics which may prove helpful to those teaching the subject, either as a suggestion or as a unit to be used.

The purpose of this unit is to reveal to the child his need of a knowledge of physics in connection with a very definite municipal

problem which affects the community as well as the individual.

The instructor may be able to make a direct appeal to the pupil by asking the question, "What do you consider to be the most beneficial and universal use to which electricity has been put since the time of Franklin?" In all probability the answer will be, "Electric lighting." Then the question, "Do you know anything about electric lighting?" A few answers will reveal the fact that perhaps the pupils know the general principles, but little beyond that. The instructor may venture farther, "Suppose the lights should suddenly go out in your home one dark night, what would you do?" The answer, most likely, would be, "I would send for someone to fix them." Then "Wouldn't you like to know just what made those lights go out? Probably you would be able to fix them yourself." We trust that the answer would be something to this effect, "Why can't we study it then?"

I. *What the children do.*

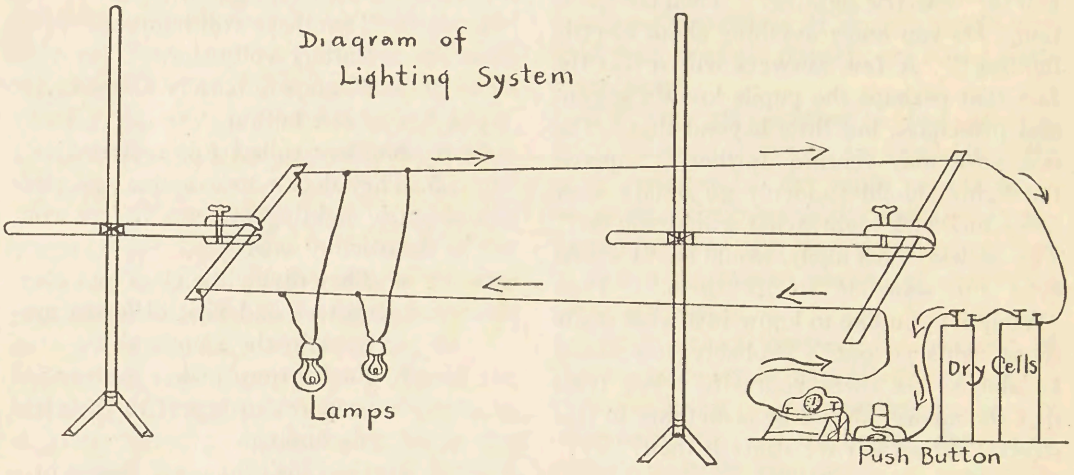
a. They decide to make a study of the electric lighting system by construct- a miniature system.

1. They make a collection of books and magazines pertaining to the subject, and after leafing through these, set up the following problems:
   a. What makes the light come on when the button is turned?
   b. Where does the electricity come from?
   c. What causes the electricity to flow through the wires?
   d. Why do we use copper wire?
   e. Why does the light sometimes fail to come on?
   f. Of what use is a fuse?
   g. Why is the wire insulated?
2. They determine and make a list of the apparatus necessary for erecting the system.
   a. They list the following as necessary:
      Two ring stands and two clamps.
      Two crossbars of wood or glass, each 5 inches long.
      Two dry cells.
      Number 24 copper wire (insulated).
      Two three-volt lamps.
      Battery voltmeter.
      35-ampere battery ammeter.
      Push button.
   b. They collect this material.
3. They decide to examine real electric lighting systems before constructing one.
   a. They divide the class into committees and visit different systems in the community.
   b. Each group makes notes and prepares to report to the class his findings.
   c. They visit the power house or a Delco system and report to the class.
   d. They keep a record of all findings which they intend to incorporate in book form and leave for the use of future classes in physics.
4. They set up a miniature electric lighting system.
   a. Using two ring stands as supports, they attach two wooden crossbars by means of clamps. From each end of these they lead two number 24 insulated wires about one yard long, fastening them in small holes at the ends of the bars. They then attach the other ends of these wires to two dry cells connected in series. At the two opposite points they remove, with a knife, the insulation and attach two lamps

across. They put in a 35-ampere ammeter and a push button between one battery and the crossbar. They push the button and the lights come on.[5]

b. They make a diagram of the system to put in their books.

5. They decide to demonstrate and explain this system to other classes in school especially the science science classes.



II. *Information Gained.*

a. They learn the essential principles of electric lighting.

1. How electricity is generated.
2. What kind of wire is used and its size.
3. What strength bulb is used and why.
4. How to measure an electric current.
5. How to wire a house.
6. How to connect lamps to the main line.
7. The method of connecting dry cells to obtain the best results.
8. The use of the ammeter.
9. The principle of the electric light bulb.
10. How much strength it takes to operate a certain number of bulbs.
11. How a short circuit can be remedied.
12. What is meant by a fuse.
13. The meaning of ampere, volt, and current.
14. How a current is produced and the direction in which it flows.

b. They learn to apply this to the home lighting system.

III. *Skills Strengthened.*

a. They strengthen the ability:

1. To do extensive research work on a topic, and to organize such material for immediate use.
2. To secure material from companies interested in their line of work.
3. To work efficiently in groups and in committees.
4. To make successful excursions.
5. To make interesting and instructive reports.
6. To secure material not found in the laboratory.
7. To make clear explanations to visitors.
8. To manipulate delicate apparatus.
9. To work out successfully a big problem.

[5]Good—*Laboratory Projects in Physics*, p. 48.

IV. *Ideals Strengthened.*

a. They realize more the responsibility of each member in the group to every other member as they work together.

b. They develop a critical attitude toward their work; if the light does not come on they know that they have made a mistake somewhere.

c. They learn to realize that practical problems in life should be met and worked out by each individual; they apply their findings to the home lighting system.

d. They realize that knowledge is a step toward success; they cannot correct the fault in the light unless they know how to find it.

e. They develop an attitude of carefulness and attention in little things; one little mistake in the system may cause the whole thing not to work.

f. They are lead to feel that their knowledge in this field is not complete and to study other problems which branch out from this study; they find that electricity can be used for many other things besides electric lighting.

Practically every problem in physics can be worked out in this way, and by so doing the pupil will develop an interest in the subject and will see that it has an immediate value for him in everyday life. I believe the one hope for physics is through pupil activity in practical problems. In order to carry out this kind of work it is necessary that the teachers of physics be well trained and that they be enthusiastic for the success of the subject.

BIBLIOGRAPHY

Rusk, Rogers D.—*How to Teach Physics.* J. B., Lippincott Co., Philadelphia.

Twiss, Geo. R.—*Science Teaching.* The Macmillan Co., New York.

Smith, A., and Hall, E. H.—*The Teaching of Chemistry and Physics.* Longmans, Green and Co., New York.

Lynde, C. J.—*Physics of the Household.* The Macmillan Co., New York.

Smith, Lillian J.—*Everyday Science Projects.* Houghton Mifflin Co., New York.

Good, F. F.—*Laboratory Projects in Physics.* The Macmillan Co., New York.

Brechner, C. H.—*Household Physics.* Allyn and Bacon, New York.

Eikenberry, W. L.—*The Teaching of General Science.* The University of Chicago Press, Chicago.

Millis, A. W., and Millis, H. H.—*The Teaching of High School Subjects.* The Century Co., New York.

SADIE WILLIAMS

THE SUPERVISION OF EXTRA-CURRICULAR ACTIVITIES BY TEACHERS OF ENGLISH IN THE HIGH SCHOOL OF VIRGINIA

WITHIN the last few years there has been considerable discussion concerning extra-curricular activities in the high schools. Teachers have been asked to aid and have volunteered their services in trying to encourage and foster certain activities, and English teachers have been given their share of this extra responsibility.

The problem of controlling student activities is a very perplexing one. In some schools the teachers handle these activities completely, "leaving nothing for the students to do. This method loses some of the biggest advantages of school life in that it deprives the students of the opportunity to acquire an actual, first-hand knowledge of the work of public governing bodies."[1] In other schools the pupils have almost complete control of these organizations, but this has not proven satisfactory, "as dishonesty, irresponsibility, and lack of training of the pupil"[2] caused the activities which should bring about good results to function otherwise. It has been shown that the co-operation of faculty and students is necessary for

[1]Carden—"The Control of Student Activities." *Education,* September, 1917, p. 14.

[2]Reed—"Extra-Curricular Activities in High School." *Virginia Teacher,* November 1922, p. 258.