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Introduction

Assuming a teacher to be well trained in educational theory and methods, and in the subject matter of physics, he meets in the practical situation many problems which he must solve as best he can. His classes may be too small; his text somewhat outdated; his equipment inadequate; and his subject matter used in other courses. These problems can be made less acute if he can interest all of the students in school as well as those in his physics classes and help those who take physics to understand enough to meet their needs.

Interest Outside the Classroom

Interests can be developed in a student. The interests of the students in the student body outside of the physics classes can be stimulated by many different methods. A prospective student should not be discouraged because he is deficient in mathematics. The mathematics needed in physics in high school can be taught in the physics classes. Those students with mathematical training should accomplish more than the others, however. Bulletin boards may be posted with articles from papers and magazines, with science pictures and charts, and other materials. Programs may be given for the student body, for students in other schools which feed into the high school, for the P.T.A., for faculty meetings, and for public groups interested. Displays may be made at science meetings, in store windows, at fairs, at a central location in school, and at teachers' professional meetings. At the time of enrollment, home room teachers and counsellors may crystallize interests in the sciences as well as in other subjects which meet the students' needs. Field trips by the physics students and perhaps their friends arouse a certain amount of envy and interest. Projects which benefit the whole school are worthwhile. Write-ups in the school paper or in the community papers are always noticed. Scientific projects which draw students not taking physics, such as repairing personal equipment, making models, servicing school apparatus, or running audio-visual equipment develop friendly attitudes toward physics.

Interest Inside the Classroom

Inside the classroom, interests can be aroused and maintained by the careful selection of materials, organization, and methods. Motivation, attitudes, inspiration, applications, needs, scientific method, and appreciation must be kept in mind by the teacher and emphasized by him as he utilizes the laws of learning and the subject matter of physics to discover with the student the basic facts and principles about moving matter. It seems probable that there may be one, best way to teach a given lesson but variety and a spiral approach in method help to keep interest from lagging. Unusual experiments and equipment as well as the standard materials may be utilized whenever possible because of interest.
Demonstrations:

1. Tape recording
2. Motion picture
3. 3¼ by 4 inch slides
4. 2 by 2 inch slides
5. Film strips
6. Radio
7. Television
8. Portable telephone
9. Toy engine
10. Model airplane
11. Opaque projector
12. Charts
13. Drawings
14. Unusual experiment
15. Ultra-violet light
16. Phonograph
17. Oscilloscope
18. Fluorescent light
19. Viewmaster

Cultural Lag in Text-books

Students lose interest in physics when it teaches material which is little needed. Any physics teacher of experience can remember the emphasis given in the past to the complexity of the English system of units, to the many different kinds of cells, to the many ways of determining specific gravity, and to obsolete methods of studying sound. He can see at present the lack of information concerning modern units in the metric system such as the Angstrom unit, the decibel, or the electron volt, concerning the air cell or the nickel-cadmium cell, concerning the Baume scale, or concerning the many modern developments in the field of sound — acoustics, the production of sound, and the reproduction of sound. Some of the many ways not already mentioned in which the text-book may be supplemented are the following: lectures, oral and written reports, library references, class discussions, maps, demonstrations by students or by the teacher, home-made equipment, work-books, projects, mock-ups, job sheets, transvisions, diagrams, kits, experiments, ridiculous inventions, university lecture demonstrations, hobby groups, and visiting specialists.

Equipment

Equipment may be bought outright, made from raw materials, built from kits, or given to the school. It is necessary to buy many of the articles which go into a laboratory, but students will work very hard at making a model, at assembling a kit, at mounting an engine, at fixing a radio, or at making the real thing such as an electric furnace. Most of the apparatus in a high school laboratory is selected to teach a principle or to show how a certain quantity is measured. The use of these principles and quantities in building, testing, studying, and repairing equipment promotes interest and understanding. Greater emphasis than is given at present on the tools of physics and on the opportunities to use these tools is therefore desirable. The metal shop, the wood shop, and the drawing department can be very helpful.

Demonstrations:

1. Purchased equipment — gyroscope
2. Apparatus from raw materials — venturi model
3. Apparatus built from kits — oscilloscope
4. Apparatus given to the school — carburetor

Subject Matter Used in Other Courses

Interest lags when a student discovers that the subject matter discussed in physics is a repetition of something he has learned in general science, social science, sophomore science, or some other subject. A pre-test will help the instructor provide for individual differences. A student who is especially strong in one phase of physics may be assigned the responsibility for the organization of materials for the instruction of that phase, and he may be asked to lead the discussion concerning it. However, a unit in physics may be enriched to such an extent as to keep any student gainfully occupied. The applications of physics in daily life provide an endless source of material for enrichment.

Summary

Some of the various procedures used to interest and help pupils to understand physics are:

1. Worthwhile activities which may be witnessed by the whole student body.
2. Varied activities in the classroom that arouse curiosity, provide a sense of achievement, and satisfy real needs.
3. Careful selection and organization of subject matter to emphasize the more significant material.
4. Emphasis on the use of equipment to build, test, maintain, and repair other equipment.
5. Provision for individual differences.