

**HOW TO MAKE PHYSICS MORE INSPIRING TO PUPILS.**

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Just exactly what do we mean by this subject? Is there something, are there perhaps, many things essential to the subject which unfit it for a place in High School work? Are we assembled to some sort of a memorial service for a lost and unloved cause? Do we come together at one time to "simplify" Physics and again to-day to make it "interesting?" Let us note a distinction which will enable us to think more clearly on the subject.

After enumerating the changes in the second edition of his text-book of Physics Professor Crew says, "The purpose of these changes has been to 'simplify' the *treatment*. The subject cannot be simplified." And truly how can a subject be simplified which must give account of the infinitely varied phenomena of nature, from the motions and composition of the furthest star in space to the genealogy of the illustrious radio-active descendants of the chemical atom? And, conversely, how can we make a subject interesting which is so already, and increasingly so as each new fact throws clearer light on the workings of nature's forces? For man is born with desire for knowledge of the world about him. And not for knowledge merely, but to establish the relation between cause and effect in the phenomena of nature, to grasp not only the "hows" but the "whys" of the physical world, this has been and still is his desire.

The field then is ours, with all its opportunity. There is still need for the work we are doing. Let this meeting be our fall campaign and not a funeral. We simplify our treatment of the subject when we select the less complex problems for discussion and endeavor to present them in a logical manner. How can we fashion our courses this coming year so that the student may find in them, in larger measure than ever before the interest, the inspiration, which are the birthright of Physics?

The High Schools have suffered much from the over-lordship of the Universities and Colleges, and yet I trust my words will ring true to both when I say that there is one essential factor in any successful course, which far outweighs all others in importance. Without this, laboratory and all material equipment

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\*Read before Pacific Coast Association of Physics and Chemistry Teachers.

is but so much cork and sealing wax and glassware and paraffined blocks and iron. This one essential for an interesting and inspiring course in Physics is *an enthusiastic teacher inspired by a knowledge of the subject.*

It is knowledge which gives power. And if the teacher speak from personal intimate experience with the phenomena at first hand or has devised means for presenting them in a clearer light, then is the interest aroused all the greater.

The text-book is not an Aladdin's lamp which furnishes the required inspiration when you rub it, in the classroom. No teacher is thoroughly competent to hold a recitation who could not conduct it without a book. If you have not tried it, do so, if you have you will agree that it gives more time, as well as both eyes, for attention to the students, it inspires confidence and respect, it insures attention. From the student's point of view it is the only fair way, it is a final and sufficient answer to the look which says, "I could answer that question myself if I held the book." Let me urge you to try this plan if you do not already follow it. Try it until your classroom use of the book is not for the information which it contains. Then go back if you like. I doubt if many return. The freedom you will have gained will be inspiring.

Knowledge of the immediate subject matter in the student's assignment should be amplified by a study of the topic as presented in other text-books, especially those to which the student has access. Seek to acquire variety of method in presenting each topic. One explanation may not reach all students. Collect a fund of commonplace illustrations so that the student, each student, may see the new fact amid familiar surroundings. In giving out problems for the first time on any topic, select such data that the numerical work requires no special effort, leaving the attention free to concentrate on the real problem at hand. Bring in historical and human interest by reading the history of science and the biographies of its noted men, and draw upon this reading for anecdotes of famous men, actual facts concerning famous discoveries, reasons for the rapid development of the subject along particular lines.

Make the laboratory an attractive place. Adorn the walls with pictures of famous men, of buildings where important discoveries have been made. Collect a museum of articles, toys or models when the real article is not to be had, illustrating the

various principles taught. Ask the local dealers to contribute articles or loan them for a week or two. Put this collection at the disposal of students outside regular hours, not as an extra work for recitation purposes necessarily, but to give those interested an opportunity to study to advantage applications of physical principles in which they are interested.

So much for the teacher's immediate usefulness in the classroom and laboratory. But I would have you take a broader view of your calling. You are the apostles of science in the communities to which you go and you do well when you consider your opportunities and duties to this wider circle. It means much for any High School in stimulating the student's interest, as well as in material equipment, to have the community backing its efforts. And the science teacher can do much toward arousing a lively public interest in scientific affairs. Let me suggest that you follow some line of reading, and let this culminate each year in some sort of a public lecture. Would it not be better to treat the recent advances of science, X-rays, wireless telegraphy, electron theory, radio-activity, etc., in this way than to try and crowd so much material into the regular classroom work?

While you are building up your school reference library for your students do not neglect your wider public and be ready with suggestions for the town library and see that science is well represented there by the authors whose presentation appeals to such readers.

Foucault's pendulum experiment, showing the rotation of the earth might be repeated in public, the class taking the matter in charge.

We cannot give to others what we do not possess ourselves and so let us seek first the inspiration which comes from a thorough knowledge of our subject, and then we may find ourselves coming each year nearer to the goal of our calling, to put our students and the community in which we live on familiar terms with the physical world about them.