

letters

More on physics teaching

One aspect of the secondary-school teacher crisis is an inability to retain superior science and math teachers. Your fine special issue in September highlighted this problem. Readers troubled by such problems may be interested in a special program that was initiated this last summer by five laboratories of the Illinois Research Corridor. The five laboratories united to select and recognize superior science and math teachers in our local area and make summer jobs available to them. The five (Amoco Research Center, Argonne National Lab, Bell Labs, Fermilab and Nalco Chemical Company) are a diverse group of private and government-funded laboratories. This was the first time these laboratories have combined resources in this way.

The purpose of the program was to provide summer technical employment for a select group of dedicated high-school science and math teachers. The employment was intended to be interesting and relevant to the science curricula. However, no formal attempt was made to increase specific teaching skills or to teach science material that might be used in the classroom.

Superintendents and principals from local school districts were invited to nominate outstanding teachers for the program. The nominated teachers went through a second phase of selection by representatives of the laboratories. This laboratory group ranked the candidates on the basis of their teaching excellence (as opposed to explicit laboratory-useful skills). Once the 21 top teachers were selected (corresponding to the number of openings), the laboratories divided them by draft.

This first summer's experience with the program has just been reviewed. Responses have been uniformly positive from both teachers and their summer supervisors. Teachers selected on teaching ability proved competent and enthusiastic in their laboratory functions. The jobs ranged from computer programming to environmental testing to electronics and chemistry projects. The teachers were paid for their work, and this remuneration is one part of the effort to help make their teaching

careers more attractive to them.

A growing number of laboratories plan to participate in an expanded program next summer. No outside funding is required since the teachers provide useful work for the laboratories. The teachers, all now back in school, report increased enthusiasm towards their teaching, increased confidence in their own abilities in their field, better understanding of the research environment and the kinds of careers that their students might anticipate and so on. Community response has also been very favorable. Newspapers have picked up the opportunity to highlight local teachers who are recognized as making a superior contribution in the face of all the less favorable publicity of recent months.

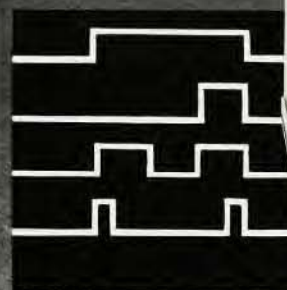
After this first summer, the responses recommend the program as a pilot effort for other groups to emulate. The kind of program described here can be adopted by a university, an industrial or government laboratory, or by a group of these. One interested person willing to spearhead such an effort may be as overwhelmed as we were by the receptiveness to this idea and the ease with which it can be fitted into existing normal hiring practices. A small kit of sample materials has been put together and can be made available to individuals interested in harnessing the current interest and doing something positive for the secondary-school science education in their own community.

JEFFREY A. APPEL

Fermi National Accelerator Laboratory
10/83
Batavia, Illinois

I hope that the series of articles on physics education will cause some number of us physicists to think about how we can help build a better understanding of science and scientists. I am dismayed along with many others that the general public thinks science and engineering careers are for eggheads. Much of the blame for this thinking lies with those of us who have made a career of science. We tend to allow others to have a misimpression of why we are in science. For the most part we

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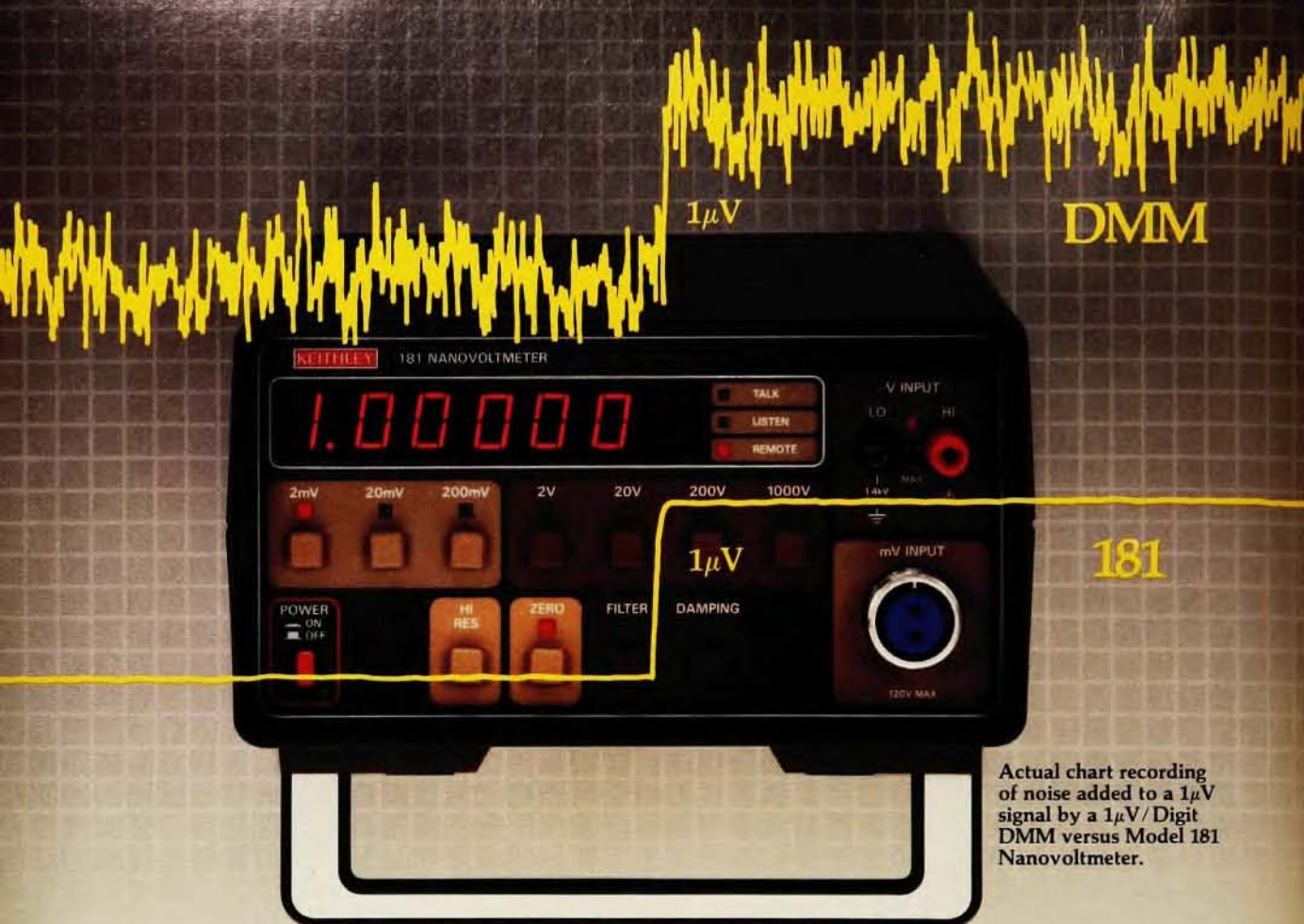
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are not scientists because we feel an obligation to pursue science, but because we enjoy our work. We are having fun being scientists. How many people can really say they have fun at work? I do not mean to imply that pursuing a technical career is always easy or is a constant emotional high, but the satisfaction and enjoyment that come from the career make the hard times easier to endure. By the way, it was clear that the teachers who were featured in the article "Places where things are right" were also having fun doing their teaching.

One topic that was not stressed in the articles is the quality of the texts used in teaching high-school science. I, for one, am a physicist because of the PSSC physics course I took in the 1959-1960 school year. My physics teacher was a very traditional sort, but the PSSC material allowed him to upgrade his course overnight. A very good instructor can overcome a poor text, but an outstanding text can help uncounted average or new or converted physics teachers.

Lastly, I would like to suggest that we all take part in a true grassroots effort to de-mystify science and technology. It does not take very much time to chat with the Girl Scout troop about what you do as a scientist, or to volunteer to help out in the school science program. There are dozens of ways we can contribute to a better understanding of both the subjects and the people in science and technology. Let's all take a few hours out to help.

CHARLES C. MOREHOUSE
Cupertino, California

I was heartened to learn from the September issue that the APS is once again becoming concerned about high-school physics teaching, but at the same time I am concerned that there is little evidence that we have learned from the past post-sputnik-mutnik experience.

As I see it, the crash programs of a little over two decades ago failed to have lasting effects on high-school curricula because we tried to do all of the science teaching by ourselves. We did not try to prevail upon the English and art teachers to introduce science appreciation into their courses and the history and social science teachers to stress more the role of science and technology in our way of life. This time if we want our efforts to succeed, we need to call upon them to help.

I am constantly appalled by the fact that very few, if any, of our students know that James Watt, of the steam engine, is enshrined in the Westminster Abbey. My students tell me that

their teachers had talked about Shakespeare, Sir Walter Scott and others in the Abbey, but not about James Watt. Unless we can change this—until every American school child has heard that James Watt's statue is also there and that Sir Walter Scott, one of the admirers of James Watt, was on the committee to raise funds for the statue—our efforts will be no more than a thin veneer of science that will erode away in a few short years.

My recommendation, therefore, is that the APS appoint a committee to search for ways to coordinate and integrate science instruction into the rest of school curricula, so that all students will have some appreciation, not just of literary and political, but also of our scientific and technological heritage.

CHIHIRO KIKUCHI
University of Michigan
Ann Arbor, Michigan

10/83

I was delighted with the special issue in September on "The crisis in high-school physics education." The reports were properly addressed to the long overdue recognition of "some excellent [though often brand-X] physics programs" as well as problems and solutions. The articles were well thought out and accurately stated. You have performed an important service by presenting these reports in a medium that reaches the entire physics community.

HARRY MANOS
Montebello High School
Montebello, California

11/83

Congratulations on the Guest Comment "High school physics—why doesn't somebody do something?" in September (page 9).

As one who participated in the revival of interest that took place in the "Sputnik Era," I have had some reactions:

- ▶ Do not assume that *money* alone will solve the problem.
- ▶ Devise some method of discovering *talented teachers* of science who have the *love of science* and an unstoppable desire to teach it.
- ▶ Relieve teachers of *clerical duties* so that they may have time to devote to their *laboratory* and science *demonstration work*.
- ▶ Science is not Science without *equipment*: Lord Kelvin said that he could not understand a phenomenon unless he could make a model of it.
- ▶ Have *homework* in science. Science fairs help in this area. I used to visit the *homes* of my science students. The parents did not object, and welcomed my visits to their home. (One student had ruined the family porcelain sink with acid.)

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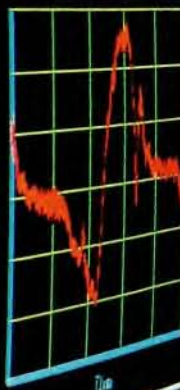
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letters

► Use *industry* and *museums* for field trips! Saturdays, holidays and summers can be spent in most interesting field trips and camps.

► Encourage *science hobbies* such as amateur radio, crystal growing, collecting of scientific things and so on.

I rode the wave of "excitement over science" in the 1950s and I took a leave of absence from teaching to be the acting operations manager for the Chicago Museum of Science and Industry for a period of two years and two months before returning to physics teaching.

I was a consultant to the Welch Scientific School Supply Company during my teaching years. I learned more about science teaching from inspecting their science teaching equipment than by any other method.

To stimulate interest in science and help the US to maintain its leadership in science, the US government donated funds to schools for buying science equipment in amounts matching the money the schools themselves spent on such equipment. The science supply companies were "caught with their inventories down" and were not able to keep up with the orders. Perhaps there is a lesson here?

DWIGHT L. BARR SR
Retired Chicago High School
physics teacher, on pension
from the City of Chicago

11/83

Your articles on the crisis in physics education were excellent. Two reasons why it occurs are: the difficulty of the subject turns many away, and to get a position, one usually must get an advanced degree.

However, according to *Help Wanted*, by Sue Hoover, there will be openings for 1.1 million electronics technicians by 1990. A qualified technician with a two-year associate degree or two years of study in an engineering school must be well trained in physics as well as electronics, laser optics, mechanics, and robotics.

As stated in the book, a technician today must know as much as an engineer did several years ago.

With increased integration of technologies, such as electronic systems that also use complex optic systems, physics will be even more important in community college programs.

GLEN SPIELBAUER
Dallas, Texas

11/83

In defense of PSSC

I strongly disagree with the letter from James Faller that appeared in September (page 120). As one who has taught

all editions of the PSSC Physics since 1959 and who is not a School of Education graduate, I believe the quality of this text has not been compromised but improved with each edition.

I was drawn to PSSC originally because it communicated the spirit and nature of science far better than any course I had seen. I think it still does, but the text exists in a different educational setting than it did in 1959. The first four chapters were dropped in more recent editions because other courses that normally precede physics and were developed by many of the same people who wrote PSSC, such as IPS and PSII, provide students with a sense of the nature of science that was found in the first four chapters of the original edition. By the time these students begin physics, they are already familiar with orders of magnitude, scientific notation, the atomic model of matter, and the fundamental laws of chemistry that were also present in PSSC's first four chapters.

If Faller will take a closer look at the fifth edition (the sixth is yet to be published, although I hope it will be), as well as the fourth and third, which did not include the first four chapters either, I think he will find that PSSC remains a first-rate text that meets the original goals of the project: one "in which physics is presented not as a mere body of facts but basically as a continuing process by which men (and women) seek to understand the nature of the physical world." It has been updated to address recent developments in physics and in response to feedback from capable and thoughtful teachers, but I believe that Francis Friedman, were he alive, would still be pleased to have his name associated with recent editions of this text.

ROBERT GARDNER
Salisbury School
Salisbury, Connecticut

10/83

I take exception to James Faller's comments in September, page 120.

I am a high-school physics teacher with a Master's of Science in Physics from Manhattan College and have been teaching high-school physics full-time since 1966. I keep current, attend AAPF meetings, read *PHYSICS TODAY* and *The Physics Teacher*, and this past summer earned graduate credit from Boston University in Teaching Skills for Physics conducted by Uri Haber-Schaim, an author of the text being criticized by Faller.

I wish to ask him several questions:

- This is the fifth edition of the text. Has he noted the constant changes in the book as well as the additional advanced topics added over the years?
- Has he ever tried to teach this text?

continued on page 86

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