LETTERS

A dedicated teacher . . .

I read your March issue on physics education and the letters it generated with great interest. As a sophomore physics major, I feel your articles and the resulting letters left out the most important aspect of learning physics. A dedicated teacher can make physics exciting and easy to learn regardless of the textbook or general approach.

A teacher who is genuinely interested in teaching and willing to spend time will get his material across. A teacher who looks upon teaching as an interruption from his research will not teach well no matter what the approach. I feel that with two equally good teachers someone who took "conventional" physics would know as much as someone who took "new" physics.

STEVEN MEYER
Stanford University

Selling high-school physics

How encouraging it was for me as a high-school physics teacher to read Mark Zemansky's comments on the new college physics programs in the March issue (page 71)—particularly his statement that he met a good part of the material in Edward Purcell's book for the first time in graduate school. I must humbly confess that occasionally my students ask me about things I encountered not only for the first time in graduate school but also only after I had been teaching physics for several years.

Finally after nine years of teaching high-school physics, one academic-year institute (at Harvard), two summer institutes (one under August C. Helmholtz at Berkeley) and two local in-service institutes (all through the courtesy of the National Science Foundation), I feel moderately well prepared to teach a good solid high-school physics course, mostly PSSC. But during those years while I was acquiring competence, how many poorly prepared high-school students did I turn out into colleges over the United States? I was not a physics major, but perhaps in that way I am typical of most high-school physics teachers; for very few of them *do* have a major in physics—at least the ones in Idaho don't. Would it have been better if physics hadn't even been offered in our school until I had adequate training, or is a course taught by a poorly prepared teacher better than no course at all? This is a problem that has to be faced in many schools—including some colleges—whether the professors are willing to admit it or not.

In view of the declining physics enrollment over the US, it might be of interest that in our school (about 750 students), the physics enrollment is finally beginning to climb. This is due not to a change in the course or the teacher but primarily, I believe, because I enlisted the coöperation of our counselors and got them to "sell" physics to the students. Let's face it—the counselors have tremendous control over what courses are chosen, and in some schools can literally break or make a department by guiding students away from or into those courses. The physics teacher must work harder to build up his department than the chemistry or biology teacher even if all three courses are electives; for the very name "physics" sounds harder than "chemistry" or "bio" and many are scared away. I have a pet theory that if we changed the title of the course to something like "Physical Science 10" this change would also increase the enrollment.

(MRS) DONNA PARSONS
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High-school physics enrollments

For some time I have been gathering data concerning enrollments in high-school physics, particularly with regard to the acceptance of PSSC. I am primarily interested in obtaining an accurate picture of how any innovation in physics is accepted. These data are summarized in a paper recently completed, which is not likely to be published for several months.

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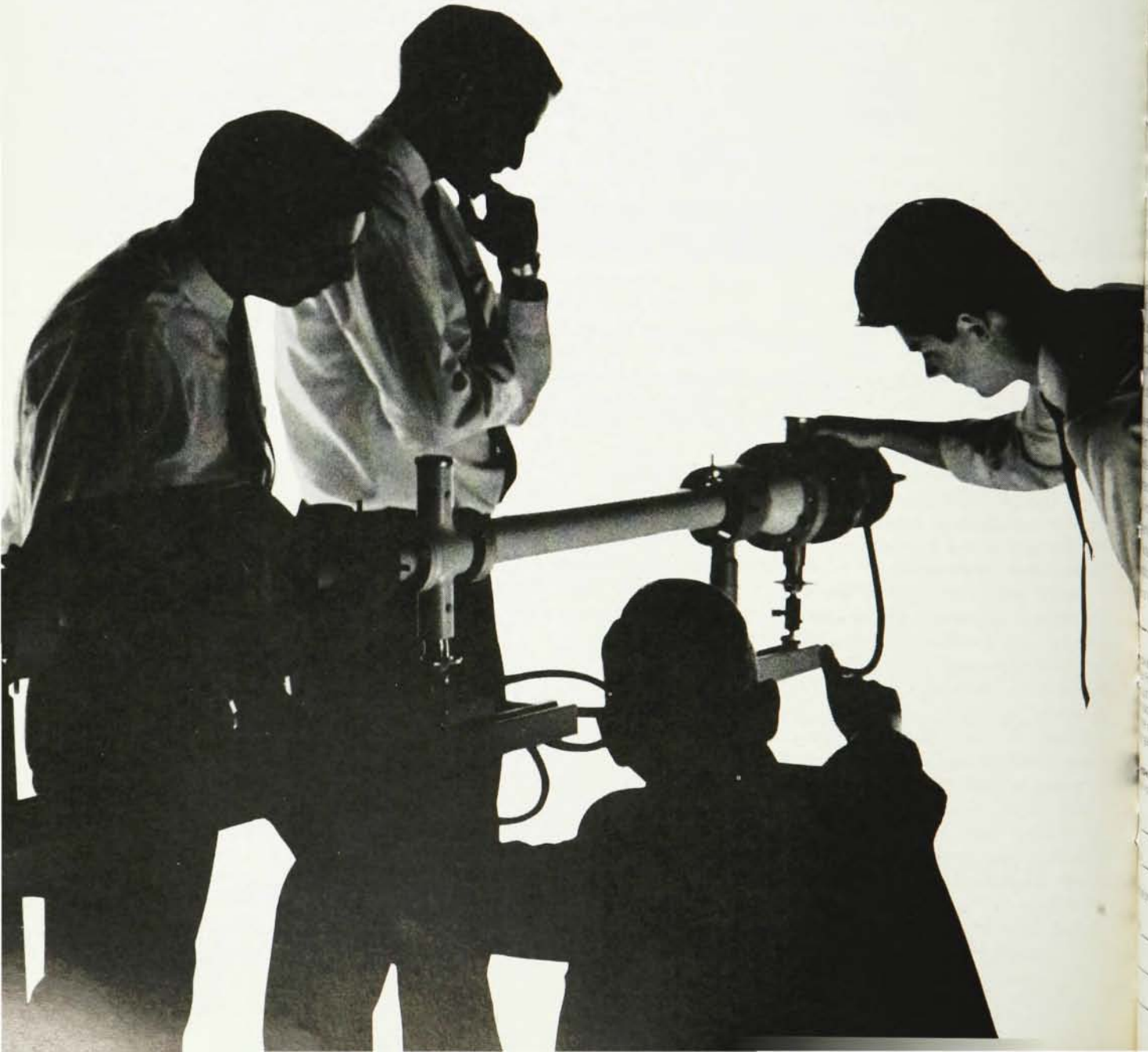

LETTERS

However, I feel I must comment on Leonard S. Craven's letter (PHYSICS TODAY, June, page 9) at this time because part of my findings directly pertain to his statement.

A discrepancy exists with regard to figures reported on PSSC acceptance; for example, data obtained by the United States Office of Education indicate that 99 900 students[1] were enrolled in PSSC courses during the academic year 1964-65. However, the National Science Foundation and Educational Services Inc. report that "more than 200 000 students were using the PSSC course,"[2] for the same year. Data reported elsewhere are likely to give figures different from either of the above estimates.[3] Additionally, in the fall of 1966 I sent questionnaires to 124 physics teachers selected randomly from a list of 16 911 physics teachers maintained by the National Science Teachers Association. Followup phone calls and mailed responses resulted in 117 questionnaires returned. The seven who did not respond were no longer teaching physics. Hence, the response was effectively 100%.

One of the several questions asked of these teachers was "What text(s) are you currently using in your physics classes?" The responses are for the school year 1966-67. In summary, 117 teachers used a total of 136 physics texts (17 teachers used two and sometimes three different texts for different classes). This breakdown is listed in table 1.

Table 1. Texts Used by Teachers

Text	*Number of teachers*	*%*
Modern Physics	68	50.0
PSSC	36	26.5
Other	32	23.5

Modern Physics is by Dull, Metcalf and Williams and is published by Holt. *PSSC* is published by D. C. Heath. The "Other" category included ten different published texts; no one of them, however, was used by more than three teachers.

The question asked referred not to number of copies used, but to teacher decision. An examination of the number of students using each of these texts gives somewhat different results. The number and percentage of students actually using the various texts is found in table 2.

Here, the percentage of the students using the *Modern Physics* is 37.9% while the PSSC percentage has risen to 34.1%. If the number of students using *Foundations of Physics* by Lehrman and Schwartz (also published by Holt) is included, the percentage in the study using Holt books is 41.2% while the "Other" category drops to 24.7%. Evidently those teachers using the *Modern Physics* text have smaller classes than the PSSC or some of the other "traditional" texts. Thus, in this small sample, the claim that "sales figures prove beyond any doubt that more than half of the high schools in the country are using Holt textbooks in physics" is not supported. Similarly, the claim published by PHYSICS TODAY, March 1967, that the "PSSC course in physics is used in its entirety by more than half the high school students taking physics in the United States" is not supported. Although the results of this random sample are only indicative of the national picture, I would suggest that text sales figures are not a valid basis for estimating the number of students enrolled in a particular course. There are too many unmeasurable variables—free examination copies, texts used for reference, use of two texts, and life of a text.

Table 2. Texts Used by Students

Text	*Number of students*	*%*
Modern Physics	2085	37.9
PSSC	1875	34.1
Other	1539	28.0
Totals	5499	100.0

Therefore, I heartily agree with Craven that a disinterested agency such as the American Institute of Physics, the American Association for the Advancement of Science, or the United States Office of Education should support a periodic assessment of physics enrollment. In addition, valuable information concerning such important questions as the impact of

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national curriculum projects and the apparent decline in physics enrollments would be obtained.

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1. F. Boercker, *Preliminary Data on Enrollments in Science and Mathematics in US Public High Schools, 1964-65,* National Research Council Communication, Washington, DC (3 Dec. 1966).
2. *Independent Offices Appropriations for 1966.* Hearings before a Sub-Committee of the Committee on Appropriations, 89th Congress. Document no. 5-828, US Government Printing Office, Washington, DC (1965), p. 797.
3. W. W. Welch, *The Impact of National Curriculum Projects—The Need for Accurate Assessment,* unpublished manuscript, Harvard University, Cambridge, Mass. (1967).

WAYNE W. WELCH
Harvard University

Labs for nonscientists

I am somewhat at a loss to account for Enos R. Wicher's concern (PHYSICS TODAY, July, page 9) about the "paradox" between the PSNS (Physical Science for Nonscientists) emphasis on experiment in its course *An Approach to Physical Science* and Robert I. Hulsizer's statement (PHYSICS TODAY, March, page 55) about the place of laboratory work in introductory courses. In these days when introductory or general courses are often plagued with large numbers of students, there is a tendency to defer laboratory work to later more specialized courses. The situation is particularly troublesome with courses in general physics and general chemistry. One may question the advisability of the present tendency, but this is not the question here.

The PSNS course is not intended to be an introductory course. It is designed as a terminal course for students who may have a very limited background in secondary-school science, but who may later have the responsibility of introducing young minds to the nature of physical science and to the thinking and working habits of physical scientists. I do not wish to repeat the arguments of the article. It seems to me that the second and third paragraphs of the section of the article which present the philosophy of the project are quite clear in explaining the emphasis on experiment in a course such as ours.

LEWIS G. BASSETT
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Work for master's candidates

The March issue of PHYSICS TODAY carries further discussion regarding the purpose of the master's degree in G.W. Brindley's letter (on page 11). Having completed a master's degree in physics and one in mathematics before doing the PhD degree, I have strong feelings that the quality of the master's degree should be upheld. However, it may be that the purpose of the master's-degree research should be changed to conform to the more crowded conditions in graduate school and the growth of physics. Therefore I have the following suggestions for those who would direct master's-degree candidates and who desire to make these candidates contributors to the field of physics while doing respectable theses.

Noting that the first step in PhD research work is a survey of the literature of the field together with a study of the instrumentation needed to do work in the field, I suggest that problems for master's-degree candidates may be profitably assigned if they constitute a review of the literature in a field or a study of instrumentation for research in a given field. As an encouragement to master's-degree candidates to do an outstanding work, it might be good to establish an annual publication containing those reviews that are judged best to meet the needs of the physics community and to be of high quality.

I recognize that this is the reverse of the procedure normally used in obtaining review articles; for the desire to have an expert to do the critical review of an area is, indeed, strong. However, a fresh, unbiased review of the work that has been done in an area of physics could lead to interesting results. Of course, the time limits placed on the supervision of a master's candidate must be considered whatever type problem is chosen.

There is one other area of thesis ma-