

in class and pushes both sexes to excel equally. I plan to take an active role in the education of both of my daughters (ages 5 years and 7 months). I tell my 5-year-old she can do anything she wants to. She must be taking me literally, because she wants to be both a cosmetologist and a veterinarian!

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The tenet that women are being turned away from physics by physics faculty at major institutions, possibly in high schools, by parents and perhaps even by society as a whole may have some basis in fact. But I—a woman undergraduate majoring in electrical engineering—think the point is a bit more subtle than “girls are discouraged because boys do better in math” or “physics is a male-dominated field” (the first statement of which is not entirely true and the second of which obviously is). It is a question that might best be left to “so-called” sociobiologists.

The significant thing, as I see it, is that physics at any level requires a great deal of commitment. Certainly, many students who undertake the study of physics at the college level (in the standard core calculus-based sequence), even having had the necessary prerequisites, are put off by the “atmosphere,” grading and approach to subject matter,” as Mary Fehrs and Roman Czujko point out. Further, many students are indeed disappointed by the failure of most introductory physics courses to convey the “beauty and excitement of physics and its relevance to students’ social concerns and intellectual interests.” But while it’s one thing to see and appreciate the “beauty and excitement” in relativity, for example, it’s a completely different matter to go through the long derivations needed to have real understanding. Thus the physics atmosphere is often dry, to say the least. The point seems obvious: If we cannot make physics attractive to the majority of students (and it’s not clear to me that we should), how can we expect to make physics attractive to a single group, such as women?

Physics is not for everybody. In general I think there is far too much emphasis placed on turning out physicists and engineers in this country—this when the majority of the population lacks the basic capacity to undertake such lofty career goals. A more reasonable goal would be to turn out students who are science literate, so that when an informal poll is

taken on a university campus, students confronted with the question “What does a physicist do?” will give a reply with a bit more depth than “Make bombs,” and when the word “nuclear” (as in “nuclear power”) comes up in conversation, we won’t have people running for cover. A populace that has some understanding of the beauty and excitement in science will ensure that science claims its preeminent place in our lives.

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I am enthusiastic about the goals of the authors of “Women in Physics,” but I don’t quite share their conventional assumptions. As they mention, physics is not such an easy or lucrative way of making a living that being excluded is really that big a hardship. I feel equally concerned about men like myself who must work much of the time in a nearly all-male environment. I have had women as fellow students, colleagues, assistants and bosses, and I always welcome the relief from the monotony of so many men. I believe that most male physicists feel similarly and that most of the problems are due to a few who are uncomfortable with women in one way or another.

The assumption that mathematical and spatial ability is the one relevant biological difference between men and women is questionable. Communication deficits, which often force men into fields such as physics, are much less common in women.

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FEHRS AND CZUJKO REPLY: The critical comments on our article seem to arise from a misunderstanding of its aim and basis. Our focus in the article was purposely narrow. First, our statistical work emphasizes differentials between physics and related fields: We study the success of those fields in attracting and graduating female students relative to that of physics. Our assumption is that in intellectual challenge and required commitment, such related fields as mathematics, chemistry and so forth are fundamentally similar to physics. The data show that regardless of the complex societal factors that discourage women from careers in science, physics does less well than its allied fields in attracting and keeping women students. Most of the reasons for the differential attrition rate of women physics students have nothing to do with competence in the

field. Thus the number of women lost reflects not only lost opportunity but lost quality.

The second thrust of our article was to suggest that individual physicists and physics departments have the power to recoup the lost opportunity—to reverse the differential losses relative to allied fields. The challenge is for individual physicists and physics departments to accept responsibility for doing what is within their control rather than wait for solution of the broader societal problems or the general remaking of society. In line with this challenge, we discussed success stories and offered concrete suggestions for reversing the differential loss of female physicists.

The suggestions for departmental and personal action were obtained in large part from the topical conference “The Recruitment and Retention of Women in Physics” (of which we were cochairs). That conference, held in November 1990 in Chevy Chase, Maryland, was supported by grants from the NSF, APS, AIP and AAPT. It was attended by over 100 female faculty, graduate students and undergraduate students as well as over 20 male physicists, many of whom were physics department chairs. The overall tone of the conference was positive, and the discussions there were based on the specific experiences of those who have made a strong commitment to physics but still see barriers to the participation of women.

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Is Africa Ignored in ‘International Science’?

It is amazing how the issues of international scientific education, contact and funding manage to evoke great discussion when they concern the former Soviet Union, Europe, the United Kingdom, the Middle and Far East, and Australia. I suggest looking at a map of the world and observing a very large continent called Africa. The many suggestions, often good, on promoting international science are consistent in omitting Africa. If there is any place on our planet that is in dire need of international contact and aid for scientific education and research, it is Africa.

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