

## Editorials on Target

**Dear Editor:**

This is really getting spooky! Each month as I begin to read the editorial you have written for *The American Biology Teacher*, I have to glance around our middle school science office looking for the "bug" that you may have "planted" in there. The amount of coincidence is getting beyond the normal range. So far, after my colleagues (from my own as well as other departments in our school) and I end a lengthy discussion on some problem facing education today, I receive your publication in the mail only to find that you are addressing the same issue. You even share our feelings and opinions on it! Those subjects have ranged everywhere from the college preparation of teachers; to promoting more critical thinking and hands-on discovery methods in the classroom; to not using inflated grades as a way to build self-esteem in students; to lauding the benefits of teachers going to conferences; and, finally, to lamenting how students are allowed to use some learning "insufficiencies" as an excuse for laziness in the classroom.

Thanks, so much, Dr. Moore, for your timely writing and practical opinions on problems facing not just science, but all areas of education today. You truly have a talent for keeping in touch with those of us in the "trenches," making us feel that we are not alone and that our opinions are widespread and valued. Also, your editorials accomplish the task of publicizing our feelings to those who can do something about retaining what is good in teaching, purge us of what is unrealistic, and change the rest. Again, please accept our heartfelt thanks, as we eagerly await your next editorial.

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**Dear Editor:**

Having advocated theory-structured science courses for several years, I have begun to wonder if some "dysbiologia" (*ABT* editorial, May 1994) is not more widespread than in the minds of lazy freshmen. If a teacher knows the following two facts, how can he/she not think that the dozens of

theories in a general biology course are crucial for teaching and learning? Fact 1: The formulation and development of theories, small as well as large theories, are the central and most important activities in the growth of scientific knowledge. Fact 2: Embedded theories (fully developed and widely accepted theories) give logical structure to established knowledge.

To overcome dysbiologia, textbooks will need to give a clear, widely acceptable meaning to "theory" (see A. Gibbs and A.E. Lawson, *The American Biology Teacher*, 54: pp. 147-149, 1992, for textbook confusions about "theory") and teachers will need answers to these questions:

1. What are the embedded and developing theories included in this course? Identify all theories even though they are not commonly called theories, even though they lie hidden in the dogmatic language of textbooks.
2. What are the basic premises, the postulates, of each theory?
3. What are some examples of lines of reasoning used for support, for explanation and for prediction in each theory?
4. What is the range of applicability and what are the limitations, the boundaries, of each theory?

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## Debate on Biology Education Continues

**Dear Editor:**

I read with interest the editorial by Randy Moore in the January issue, regarding improving the quality of biology teaching in secondary schools. As expected, there were strong reactions by educators and scientists alike to what he wrote. I want to add another perspective to the discussion based on my observations.

First, it has been my impression that there must be something fundamentally wrong with a system of education that so emphasizes pedagogy over content. Educators feel learning "how" to teach is paramount, while scientists feel that knowing "what" to teach is all important. The truth, of course, lies somewhere in between.

However, without knowing the "what," it doesn't matter how much you know "how." I don't mean to suggest we eliminate all pedagogical courses from the curriculum, but I am suggesting that perhaps we expect too much out of these courses for students who want to be teachers. Perhaps we need to back off and reassess just what we require of students to teach at the secondary level.

Take my state, for example. North Carolina mandates competencies in various areas which the School of Education at Appalachian State University (one of the member institutions in the state system) interprets as requiring 10 courses for students to take, amounting to 35 credit hours. Twelve hours are devoted to student teaching, leaving a required 23 hours of classroom study. A student wanting to teach biology must first of all major in biology, and the education program in our department mandates 35-37 hours in biology, along with the required university and departmental distribution requirements.

Just this year, the Board of Governors declared that no major can exceed 128 semester hours (with only a few exceptions), beginning this fall. This meant that the current biology education program would be out of compliance because it required more than this amount. Biology education majors already have so many education courses to take that they have no free electives at all. When we began looking at bringing the education program into compliance with the 128-hour mandate, we found, to our dismay, that education students took the fewest hours of biology of any of our B.S. programs. To bring the program in at 128 hours by eliminating more biology was unacceptable, and the education school refused to compromise either by eliminating any of their courses, leading to what looked like an insurmountable impasse. Reluctantly, we capitulated and revamped our program, but without eliminating any more biology courses: We did reduce the distribution requirements somewhat.

It was sobering and discouraging because the Education School refused to compromise in this situation and because we were not able to bring the number of biology hours up to an acceptable level by our standards. It is

perplexing that the education school refuses to consider that the low number of hours in biology might be a hindrance to the development of quality teachers in that discipline. From my personal perspective, the fact that education majors take fewer hours than other biology majors is appalling. Yet, because of outside factors, we are powerless to do anything substantial about it.

Finally, I want to address a subject about education programs that is often ignored in these discussions. It is something that has puzzled me ever since my undergraduate days at Rutgers in the 1970s. Whenever I discuss education courses or curriculum with education students, no matter what university I am at, I always get the same response from the students—that their courses are mostly a waste of time, have little worth with regards to content, and that they hate (not my word, but the students' word) most of the courses required to be a teacher. Why is this so? I've seen it at Rutgers, at Georgia, and now here at Appalachian State. Is it student naivete? Probably not. I don't hear other students lambast their majors as much as education students do. Rather, I think the fault lies with the education schools themselves. Perhaps an overemphasis on theory, rather than practice, coupled with a failure to come up with material that is stimulating, leads to rejection and boredom on the part of the students. Alternatively, if education attracts students with lesser abilities, and there is some evidence that it does, course contents may be down-regulated to the extent that the talented students in education are deprived of the stimuli needed to challenge and attract them to the profession.

If a school of education can't devise a curriculum that interests their own students, that is intellectually challenging, and is regarded as useful by the students, how can we feel confident about their ability to teach the teachers? It makes me wonder why we have schools of education in the first place, and why so much emphasis is on classroom instruction, and not in-the-class experience. The only course that does routinely receive favorable reviews seems to be student teaching. Why not expand on that finding and reduce classroom study? Experience would seem to be the best teacher in this case.

I end by acknowledging that the situation is complex, and that the sad state regarding secondary teaching is not the sole province of schools of

education. But somewhere along this line of failure something must change. Why can't the universities be among the first to acknowledge the situation, and why can't they be among the first to change? Just think what might happen when you actually know "what" you are trying teach!

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#### Dear Editor:

I have enjoyed the debate concerning your January 1994 editorial about teaching science. I have taught biology at the secondary school level for 27 years. I consider myself an educator whose interest is in biology. I have my masters in biology, not education. The vast majority of my valuable education training has been done through seminars and conventions while I have been teaching. In reading the letters to the editor, I have several comments to make.

To William F. McComas, I would like to say back off. Read what you wrote and think about the job of an editor. I have never heard of an editor, in any format, who has to have peer review of his editorials. An editorial is an opinion, not scientific research. Good editorials stimulate public debate that results in discussion, information and changes beneficial to all.

To Randy Moore, keep up the good work, even though there are times that I don't agree with you.

To Susan Cameron and all other interested biology teachers, there is a summer masters program tailored for your needs at Emporia State University, Emporia, Kansas. I earned my masters in biology in four summers taking courses in field biology, microbiology genetics, human physiology, research design and analysis, fresh water ecology, prairie ecology, research problems, and others. All were geared to learning basic science knowledge but much was applicable to my teaching. Kansas is "The Land of Ahs" (not Oz), despite the rumors that it is just a place to drive through. Write the university's biology department for a brochure; it is exactly what you are looking for except that it is 1500 miles west of Boston.

Finally, I'll add my opinion to the debate. In any subject like this there is too much in the way of politics (whose philosophy wins the favor of the university president) and money (which department will get the bulk of the

money). From a high school teacher's point of view, I would advise prospective teachers to get an undergraduate degree in a subject area. Then get an internship with a working teacher while taking "more relevant" education courses from a university (closer to the secondary school if not located close enough to the home university) for another year. This student should be paid as a parateacher, which would help defray the costs of the university classes for the last year of the program. This student would experience teaching as it truly is and the veteran teacher would benefit from more modern information on the subject, as well as teaching help and the enthusiasm of the younger person. This program must not be a cop-out for the veteran to dump the work on the apprentice either to get more "free time" or become a "better coach." A program like this could develop into a win-win for all concerned. Could the paradigm be shifted in such a way that all parties are benefited?

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#### Who's Accountable?

##### Dear Editor:

In your January 1994 editorial you added your voice to those pointing at a problem of great concern to many in science education: How do we best train elementary education teachers to teach science? The American school system has a unique quality that sometimes impedes informed discussion. It is the system's seeming simplicity that promotes misunderstanding. Within the system of schools, things aren't what they first seem. To the casual observer the panda appears to be related to the brown bear, the peccary appears related to the pig, or high grades appear related to successful life accomplishments. But, as with our educational system, when the details of each are investigated, the perceived relationships are found not to be there.

Your proposal was to eliminate departments of education and to have students take only content courses from the science departments. The education departments teach pedagogy—how to teach—but this is done only after the students have learned subject content from the appropriate departments as university and education department prerequisites. When we look