

To the leaders of the Physics First movement:

I have been following the post SLC meeting discussions with interest. Here I would like to restate my position. PF (I called it ARISE) is much more than a revision of the sequence from BCP to PCB. It is much more than a change in the curriculum generated by starting with conceptual physics, ending with "capstone" biology (Bybee's term at BSCS – new biology for all students who have had a year of chemistry and a year of physics).

It is, if we do it right, a true revolution in science education. The integrity of the three core disciplines is preserved, but now with the disciplines correctly organized, they can be connected to form a coherent and overarching wholeness which we call science. The disciplines support each other. There are many possible variations to this revision but the essential hierarchy and coherence need to be preserved. This implies the necessity of continuous and collegial professional development. I believe this should ultimately occupy about 20% of teacher time (yes, expensive!).

To emphasize that science is a social undertaking, we must recognize that in science, ideas and people stream across the disciplines sharing, where needed, computational and analytic methods and instruments to observe and measure. This is what I call "story telling", so that in this three year sequence, we must teach the process of science; how it works, what it can and cannot do, who did what and how, etc.

Then we must tell about the awesome technologies, beholden to science but then enabling more science and creating wealth to more than pay the required costs of major teacher enhancements and laboratory improvements. I believe that as we gradually implement these (and surely other) reforms, we will create a population of high school graduates who will have acquired a sense of science or a science way of thinking with huge economic and cultural benefits to the nation.

To emphasize Physics First without reference to a three-year sequence may be a mistake. The sense of science is to seek for underlying order in apparent chaos, to see connections and hidden likenesses, it is to change the graduate forever: to install an intuition as to how things work, an attitude of expectation and skepticism, a habit of thought, an encouragement of curiosity, and a respect for innovation and imagination. This sounds like a tall order, but can't we agree on our objectives and can't we find out why it cannot be done?

We are aware that we are, perhaps more than ever, a nation at risk. The eloquent appeals of the CEOs of Microsoft, Intel, IBM, Motorola, and many other technological leaders should give us encouragement to do it right. There is also the terrifying attack on the teaching of science in our schools. This irrational onslaught now affects biology, but it will not be limited to biology. It becomes essential to the preservation of a rational and economically strong society that we be more ambitious. Not all changes can happen at once. The reform we envision must eventually include K-8 and even the first years of college. Our success is bound to influence the social sciences and the humanities. Physics First is a great battle flag; dare we say it leads an evolution of science education?

I will of course welcome comments.