

Re: Are There Any Actual Physicists/Scientists Here?

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- *From:* Andy Resnick <andy.resnick@xxxxxxxxxxxx>
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Paul Stowe wrote:

On Thu, 11 Aug 2005 08:27:00 -0400, Andy Resnick <andy.resnick@xxxxxxxxxxxx> wrote:

consider the course content of the majority of undergraduate Physics curricula.

There are other, independent avenues for study. The greatest gift that can be provided to a student is teaching them HOW to find and categorize any desired information. NOT! any specific topic. With the first gift, and with guidance (in the form of supportive mentoring) the student can excel by finding their OWN voice.

That's all fine and dandy, but not realistic. The issue is the effect of dogmatic thinking on scientific progress, but also how to tell the difference between correct scientific inquiry and crackpottery. And how I, a student, can properly navigate unfamiliar territory with guides that I have no independent method of trusting. And that I don't have an infinite amount of time to learn- my research career spans at most 40 years (the average age of NIH R-01 awards, the traditional first PI award, is around 35 and has been increasing with time), roughly equivalent to 7 rounds of proposals. That means I have at most 7 or 8 chances to make real contributions. That's it.

Now, if my main goal is personal fulfillment, and what matters to me is my self-actualization, I may not care if I make a discovery that is useful to others or not. But, if I want to make a contribution to

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science, something that will end up in a textbook one day, then I need to deal with reality. And that reality means learning what is dogmatically accepted, and then finding (and filling) the holes.

All students are to learn how to solve a set number of physical or abstract systems, and those specific systems have remained unchanged in more than 60 years.

Ah, but what is the motivation?

There's a range of reasons, from "This is the standard toolkit" to "Intellectual laziness".

It is clear that physics curricula has not kept pace with new research. New concepts are not being introduced, or introduced slowly, in fits and starts.

There is danger in uncontrolled dissemination of certain knowledge. In a very real sense, knowledge IS power (in the political and economic sense).

I'm not sure what you mean here, and what is this "certain knowledge". I doubt you mean numerical methods of PDE solutions, renormalization/scaling, viscoelasticity, image formation, or contact line motion. All of these are active areas of research, and AFAIK, none of these (with the possible scattered exception to the first) are presented in undergraduate courses. Even in graduate school, the student sometimes must take courses elsewhere: the materials science department, EE or computer science department, etc etc.

All I mean is that in science, any branch, there is dogmatism. To wish it away is nonproductive. As soon as there is a generally accepted abstract model to base some natural phenomena upon, there is dogmatism. Learning how to navigate it is far more useful.

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And in terms of funded research: who funds it? Peer review drives the process. How to peers evaluate proposals? Based on what they (the reviewers) consider to be useful and do-able. How do they come to their conclusions? Based on their subjective point of view: to be sure, multiple reviewers and checks-and-balances exist, but the point is the same: research gets funded if similar research has been funded before.

IMO peer review as practiced today is anti-science. But, to devise a system of checks as well as balance would be daunting.

I disagree with this- my feeling is that it's like Churchill's definition of democracy: "It has been said that democracy is the worst form of government except all the others that have been tried." Our chair just left to spearhead a renovation of the NIH peer review system. I am curious as to what will result. He's definitely the right person for the job.

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