

Mixed Reactions to 'No New Einstein'

I enjoy looking through my husband's PHYSICS TODAY. Yes, MBAs and PhD physicists can coexist, though I've never caught him reading my *Forbes*. Lee Smolin's "Why No 'New Einstein'?" (PHYSICS TODAY, June 2005, page 56) presented compelling ideas about fostering creativity at the graduate level and beyond. However, I believe the problem starts far earlier than Smolin would believe. Our oldest daughter is finishing a double major in computer and software engineering. It's taken a lot of energy and focus to keep her creativity alive. When she was in first grade, her teacher handed out a rectangular sheet of paper and told the kids to "cut it in half the long way." My daughter cut it diagonally, from corner to corner. The teacher told her that was wrong. I don't doubt that it wasn't what the teacher intended, but it was clearly the more correct interpretation.

Can you imagine what a bright, creative teacher could have done with that situation? But that would mean a first-grade teacher with more than minimal math skills. It would mean throwing out the morning's lesson plan, "No Child Left Behind" tests be hanged. It would mean making education an adventure instead of a sentence.

Our daughters have also had some superlative teachers—one gave extra credit if you could solve the math problem another way and explain why. Talk about throwing down the gauntlet! And there was the teacher of advanced-placement history, who asked random extra-credit questions that had us reviewing each morning's newspaper, trying to second-guess what would catch his fancy that day. We guessed right only about half the time, but we had some interesting discussions about the morning's headlines.

I truly believe it is not nature versus nurture, but nature amplified by nurture, that fosters creative genius. Western culture has come to equate creativity with thinking of a new place to put a body piercing. Until we begin to value and nurture true creativity from infancy on, I fear the next Einstein will remain dormant.

Readers of PHYSICS TODAY are in a unique position to provide some of that nurturing. Certainly encourage creativity in your own home, but be willing to step outside those walls. My husband and I do liquid-nitrogen demonstrations for schools and scout troops. (A downside is that we are now personae non grata at a local school that received calls about gunfire after we blew up a 2-liter soda bottle.) And, with heavy consulting from the actual scientist in the family, I teach after-school science classes.

The benefits of nurturing creativity go far beyond a single Einstein. What about the next Bill Gates, or the next Sergey Brin? Okay, I admit to having a business bias, but can you imagine life without Microsoft Windows? or without Google?? Right now, the US is living off the creative capital of its past. If this country does not rededicate itself to investing in creativity, the future will be greatly diminished, intellectually and materially.

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While reading the June 2005 issue of PHYSICS TODAY, I was struck by Lee Smolin's comments, and by a brief news item on page 27, "Scientists Boycott Kansas Anti-evolution Hearings." I recalled that about 35 years ago, when I was young and idealistic, I applied to several universities for a junior faculty position, going out of my way to point out that I planned to spend a lot of time developing my courses, and that I felt quality teaching needed increased emphasis. I quickly discovered that virtually all science department heads viewed teaching as a necessary encumbrance, and wanted someone who would focus almost solely on research with quick and sure payoffs in terms of funding.

I eventually ended up as a researcher at Oak Ridge National Laboratory because I reasoned that if I was going to spend my life doing research, I should not plan to make a living at a university where the necessary encumbrance of teaching would detract from department goals. What struck me was that the reasons Smolin gave for no new Einstein were related to the anti-intellectual attitudes these days, especially toward the applied sciences. Those attitudes lead to a public that is unwilling and intellectually unprepared to accept the overwhelming evidence in favor of evolution. Basically, the quick dollar-payoff is what has been motivating science departments, to the exclusion of anything "risky" such as hiring the "independent and creative thinkers" Smolin mentions, or such long-term and vague payoffs as educating the next generation. Higher education in the US has "sown the wind" and it may be reaping the whirlwind.

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To the Opinion piece by Lee Smolin I would add a note on a related problem with the present system: Editors of the principal journals reject manuscripts that challenge prevailing theories or fall outside mainstream research. This practice eliminates new ideas in fundamental physics and encourages routine articles in established fields. The editors protect themselves from many crackpot submissions, but also from the few potentially great concepts. An organization or journal that screens original articles specifically to identify great ideas would be a valuable asset.

Another part of the equation is that original ideas can come from physicists who, like me, are retired. We no longer have a career to worry about, and may have received graduate training in broader, more fundamental physics. We do not have the pressure of publishing papers. The search for new Einsteins should not be limited, as Smolin suggests, to a few young scientists who are set aside to develop creativity. There are greater numbers of retired scientists,

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many having proven their creativity in diverse fields.

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I have a few things to add to Lee Smolin's reasons why no new Einsteins are coming forth today. Today's scientists are jet-setting, grant-swinging, favor-trading hustlers looking for civil servants who will provide them with a pipeline into the US Treasury. Not only do they get peer pressure to behave this way, they also get arm-twisting from the academic bureaucracy that wants to get its 50% to pay for its bloated overhead. You can't be a used-car salesman and have deep thoughts about the structure of the universe at the same time. You've got to move product—in the case of scientists it's reports and journal publications—and keep moving it even after tenure removes some of the pressure. As for the assorted Beltway Bandits (private industries fulfilling government contract work), some of whom are quite talented, there is no tenure, only the next contract.

Big Al Einstein was not like that. His personal life may have left some things to be desired, but he had professional integrity. Even Ezra Pound had something good to say about him. These days Einstein would be teaching at a third-rate local college in a lower-echelon state university system, if he got an academic position at all. Or he might wind up in a cubicle at some agency that serves as the employer-of-last-resort for physics PhDs. He might even be selling minivans.

One thing I regret about my career at the National Geodetic Survey is that I did not have my hand on the spigot of a pipe leading to the Treasury. Those who did had lots of friends doing them lots of favors, and got to see the world at taxpayers' expense. Everyone else counted the days until retirement.

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Lee Smolin's Opinion piece is wonderfully exciting and long overdue. His section on creativity and independence should be inspirational to all who believe that a university science program should be more than a sorcerer's apprenticeship.

My only disappointment, however, is his proposal for a source of fund-

ing for creative and independent researchers. That proposal misses the point that Einstein's research during his patent-office tenure must have been unfunded. Important questions might include the following: What was Einstein's relationship with his bosses? Did he have to do his research on the sly, as a "weekend problem"? Or did his bosses, like the Medici, encourage or even require that he pursue an independent research program, perhaps because Einstein and his bosses lived in a world as yet unconquered by cost accounting?

If Einstein's bosses were Medicean, then the funding for his research was his patent-office salary. Let's suppose his duties there were the equivalent of a full teaching load. That load would not have been increased as punishment if he had failed to pay for his research from outside sources. Neither would his job have been at risk. Apparently there existed no artificial barrier between teaching (or a teaching equivalency) and research. Until contaminated by federal and corporate dollars this must have been how most research was funded in major universities—and it may be how most research in the humanities is funded today, namely by university administrators who recognize that research is teaching.

Today we have the sorry situation that research must be funded either internally by committee decision or externally. If the researcher fails to pay for his research, then the teaching load (or teaching-equivalency load) is increased or he may lose his job. This state of affairs is accompanied by strong propaganda, to which the young researcher is likely to succumb, that unfunded research, to use the language of sport or business, is not competitive. Other language is used to suggest the worthlessness of unfunded research: It is "personal," or a "hobbyhorse," or a "sandbox."

The concept that research is teaching has vanished from the modern scene. In fact the successful grantee may eventually be coaxed away from research and teaching into administration, which is the apotheosis of all human endeavor whose worth, methods, performance, accomplishments, and *raison d'être* are beyond the reach of peer review. The highest risk in a research laboratory attaches to the research itself; one should do as little of it as possible and what is done should be sup-

ported with infinite protocol, planning, and caution. This requires administration.

It may surprise some to learn that this cost accounting of a researcher's university training and intellectual gift has paradoxically increased that researcher's level of idleness as a scientist. For example, at some of the national laboratories, a PhD-level scientist might be encouraged to occupy what I will call a technical sinecure—a job that is technical but not scientific, one that a person trained at a lower level could perform—in return for certain abstract quantities such as reputation as a scientist and the quality of degree in order to window-dress the laboratory without requiring a commitment to fund any research. Who could possibly take the responsibility for funding research? One obtains a glimpse of the erroneous research philosophy in play here. Anything for pay must be for real work. The *quid pro quo* is some free time and the use of the facilities to do some "personal" research. The paradox is that the cost of one's full-time equivalent does not buy the use of his or her training and talent in any meaningful way to carry out the mission of the laboratory.

Working for the Medici could also be hard. Giorgio Vasari, a biographer of some of the early Renaissance painters, has told how Lippo Lippi was locked in his room in a Medici palace to complete some pictures but escaped by knotting together his bedclothes and letting himself down to the street. Robert Browning imagines in "Fra Lippo Lippi" that the painter, on returning after a night's entertainment, was detained by the police just steps away from the palace. Lippi says to the police,

I am poor brother Lippo, by your leave!

You need not clap your torches to my face.

And here you catch me at an alley's end

Where sportive ladies leave their doors ajar.

Aha, you know your betters? Then you'll take

Your hand away that's fiddling on my throat,

And please to know me likewise.

Who am I?

Why, one, sir, who is lodging with a friend

Three streets off—he's certain . . . how d'ye call?

Master—a . . . Comiso of the Medici.

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