

# Education ambivalence

*Nature* **465**, 525–526 (03 June 2010) doi:10.1038/465525b

Published online 02 June 2010

## Academic scientists value teaching as much as research — but universities apparently don't.

Complaints about the poor quality of science education are a familiar refrain in many countries, as are national anxieties about falling behind the rest of the world. What's not so familiar is that pretty much everyone feels this way. Nature Publishing Group's educational division, Nature Education, last year conducted a survey of 450 university-level science faculty members from more than 30 countries. The first report from that survey, freely available at <http://go.nature.com/5wEKij>, focuses on 'postsecondary' university- and college-level education. It finds that more than half of the respondents in Europe, Asia and North America feel that the quality of undergraduate science education in their country is mediocre, poor or very poor.

Despite agreeing that inadequate secondary-school science education is the major problem, respondents concurred on how they could help contribute to a solution: by having professors provide better college-level teaching. Moreover, 77% of respondents indicated that they considered their teaching responsibilities to be just as important as their research — and 16% said teaching was more important.

Yet although there was general agreement about the low quality of undergraduate education, a substantial majority of the respondents felt that their own teaching was highly effective. This suggests that at least some of the respondents are fooling themselves.

Certainly, that apparent complacency would help to account for the notably slow uptake of pedagogical innovations in the teaching of science to undergraduates. But there is strong evidence that talking at students isn't nearly as effective as engaging them with cooperative, hands-on learning activities. A prime example of the latter approach is Process Oriented Guided Inquiry Learning (<http://pogil.org>), which originated in US college chemistry departments in 1994, and which is now used in many other subject areas.

But the biggest barrier to improvement is the pervasive perception that academic institutions — and the prevailing rewards structure of science — value research far more than teaching. That perception was apparent in one of the survey's most striking contradictions: despite their beliefs that teaching was at least as important as research, many respondents said that they would choose to appoint a researcher rather than a teacher to an open tenured position.

To correct this misalignment of values, two things are required. The first is to establish a standardized system of teaching evaluation. This would give universities and professors alike the feedback they need to improve. Undergraduate student outcomes can already be measured in a variety of innovative ways, such as the 'concept inventory' system developed in physics. But more research is needed in this area.

The second requirement is to improve the support and rewards for university-level teaching. For example, universities and professional societies could offer staff systematic training in how to teach well — something less than a two-year degree, but more than a two-hour workshop. Universities could encourage donors to endow professorships based on teaching excellence. And funding agencies could make teaching more of a financial priority, as does the private Howard Hughes Medical Institute in Chevy Chase, Maryland, which offers scientists up to US\$1 million over four years to innovate in science education.

Correcting the misalignment will be neither quick nor easy. But by showering so many rewards on research instead of on teaching, universities and funding agencies risk undermining the educational quality that is required for research to flourish in the long term. They need to find a more balanced way to allocate their resources — and in the process allow the majority of academic scientists to act on their conviction that teaching and research are equally important.

## Comments

2010-06-02 02:34 AM

**Mark Thompson said:** The concept inventory system isn't used only developed in physics, it is used in many different fields (for example, see [bioliteracy.org](http://bioliteracy.org)). I also don't agree with the idea that we need "to establish a standardized system of teaching evaluation." As soon as I read the word 'standardized' I screamed!!! This is the problem, not the solution. We need innovation and variation through an appreciation for the independently minded individual thinker. If nature is our guide, ecosystems are not sustained by standardizing its methods, competition and variation is what yields production in biodiversity. It depends on what the author really meant by standardized, but we've all experienced the new 'band-wagon' teaching standards that are going to change everything – oh bother! I prefer the educational reform methods using new leadership theory and professional learning organizational techniques, it fits more in tune with the recent philosophical understanding of group selection through the guided promotion or shared vision for prosocial behaviour. See Edward Wilson & David Sloan Wilson for the social group selection theory and Van Vugt and Andy Hargreaves for leadership in relation to sustainable learning organizations. It is also in line with the Process Oriented Guided Inquiry Learning presented in this article. However, the POGIL website is not really all that complete – many links say 'coming soon'. Get it done first before promoting it.

2010-06-02 04:59 AM

**Michael Palin said:** Certainly a "standardized system of teaching evaluation" is the last thing that would improve science education. And while I agree that hands-on-learning is important, content is also important. There is no easy way around the fact that science is hard stuff and requires a good foundation in math to fully appreciate. Today's students have been sold a bill of goods in their primary and secondary schools (and TV) that science is "fun". It is, but only after a lot of content has been learned and skills mastered. Finally, I find it interesting that, as more new teaching innovations haven been implemented, the perception of the quality of undergraduate science education has steadily dropped. Perhaps what was good enough to us to the Moon and back was not such a bad system after all.

2010-06-02 10:08 AM

**RAMESH KUMAR LALWANI said:** It is very true that research has overtaken good teaching practice in many universities I have worked in Asia, Africa and Europe. This is mainly due to the ranking of universities. We all academician know that research plays a vital role in imparting good education to our young dynamic generation. The time has come when we have to take steps to balance our teaching, research and innovation segments. We should aim at reasonably well imparted science education which forms the backbone of all the major disciplines like medicine, engineering and science. We must also do good research both basic as well as applied and be innovative in both research and teaching. For example in my classes at undergraduate level I have started the concept of START, STOP and Continue where the students are encourage to actively participate in the class room teaching. This is a part of our action research for empowerment of our students.

### Subscribe to comments

This is a public forum. Please keep to our Community Guidelines. You can be controversial, but please don't get personal or offensive and do keep it brief. Remember our threads are for feedback and discussion - not for publishing

papers, press releases or advertisements. If you find something abusive or inappropriate or which does not otherwise comply with our Terms or Community Guidelines, please select the relevant 'Report this comment' link.

You need to be registered with Nature and agree to our Community Guidelines to leave a comment. Please log in or register as a new user. You will be re-directed back to this page.

**Nature** ISSN 0028-0836 EISSN 1476-4687

© 2010 Nature Publishing Group, a division of Macmillan Publishers Limited. All Rights Reserved.  
partner of AGORA, HINARI, OARE, INASP, CrossRef and COUNTER