

## UG Notes

### Themes

Research and Education: NSF's Impact  
Research "vs" Education...or, better yet, "learning"

### Miscellaneous Quotes

- "The language of the academy is revealing: professors speak of teaching loads and research opportunities, never the reverse."
- "The sign of real success is not having to teach at all. Teaching is looked at not as the advancement of knowledge, but the interruption of research."
- "The exclusive concern with research in the training of PhD students--to the neglect of any concern with teaching or with any professional responsibility other than to scholarship--has encouraged college faculties to abandon the sense of corporate responsibility."
- "The public has a right to know that it is getting...the right to know and understand the quality of undergraduate education. They have a right to know that their resources are being wisely invested and committed."
- "The faculty in research institutions admit that teaching is of less important to them than research...that their interests are in research. I am not attempting to make a value judgment but wish to convey that there must be a balance if our institutions are held accountable to the public." (Governor James Thompson, Illinois)
- "Let me be blunt: universities are not fulfilling their obligations. Universities have to return to giving more than lip service to the importance of teaching. Ezra Cornell declared that he was founding "an institution where any person could find instruction in any study." His stated intention was not to found an institution where any researcher could find grants from any funding source. We at the federal level have to figure out some way to structure research grants so that they do not become disincentives to teach."  
(Rep Sherwood Boehlert, NY)
- "We need new approaches to UG education that are less focused on the transmission of knowledge and more sensitive to the need to infuse students with both the excitement of discovery and a capacity for analysis and continued learning. This may require that faculty separate their teaching functions from their research responsibilities." (Harold Shapiro, Princeton)
- "Research is called "my work" while teaching is called "my load". Students contend that professors are so busy pursuing their research interests that they neglect undergraduate life. Most frequently mentioned as missing are little things like keeping regular office hours to see students, volunteering to be academic advisors, and just having a cup of coffee with students.
- "The professors--working steadily and systematically--have destroyed the university as a center of learning and have desolated higher education, which no longer is higher or much of an education."
- "Higher education is underaccountability and underproductive, in a sickening tailspin and a national disgrace."
- "Undergraduate education has been accused of "winding down toward mediocrity with a curriculum described as 'chaotic', a "disaster area", or "rotten to the core".
- Critics condemn the bulk of scholarly writing either as the sterile product of requirements imposed by philistine administrators or as a form of private pleasure that

selfish professors enjoy at the expense of their students.  
Havel of 5,000 faculty members

### **Washington Post**

The tension between research and teaching in universities goes back almost as far as the American research university itself. But that tension has been higher than usual lately, what with cost-cutting pressures on campuses and increasingly sharp scrutiny by outsiders on the quality of undergraduate learning.

Despite frequent affirmations of the importance of teaching, most of the prestigious research universities still emphasize research and publication--not teaching ability--for tenure, for promotion and in the general ethos that shapes reputations.

Despite widespread lip service to the notion that teaching ability is just as important as research, and that it ought to be commensurately rewarded, the opposite emphasis persists to a dramatic extent in graduate schools and academic departments.

It begins with the way graduate students are recruited, trained, and funded--with, for instance, the most attractive fellowships offered so students can afford to finish their dissertations without the distraction of teaching to earn money.

### **Shapiro**

There is a growing sense that the competitive demands of specialized scholarship and other developments have placed an irreparable rift between graduate and undergraduate education and may have impaired the capacity of research universities both to remain centers of modern scholarship and to fulfill their broader educational functions.

The "research driven" nature of education requires us to invest a lot more capital for each student, scholar, degree if we are to continue to operate at the scholarly frontier (e.g., 5% increase per year during 1980s)

However, although we lack a theory of the speed of scholarly progress, I would not be surprised in productivity were proportional to the access time to information. If this is true, the computer and associated technologies are about to transform the world of scholarship in a way that can only be guessed at.

Biggest issue relates to the meaning of changes for the relationship between scholarly commitments and undergraduate education...and to our obligations to research and our responsibility for graduate education. One increasingly hears from faculty that they would rather work with postdoctoral students than with graduate research assistants because it allows them to accomplish their immediate scholarly objectives. Moreover, the increased disciplinary specialization of the faculty also has an important impact on the structure of our educational programs.

Of course there is a great deal of misguided rhetoric on the tensions between research and teaching. Countless distinguished researchers are devoted to teaching and do a marvelous job.

The predicament is that they are transmitting what they know--and love--with little awareness of what the student needs to learn.

The real problem is that teaching and research are TOO CLOSELY RELATED. At the root of our unmet challenge in undergraduate education is the failure to distinguish between the transmission of knowledge and the development of a capacity for inquiry, discovery, and continued learning.

The difficulty is that the specialized focus of our scholarship may have given us a misguided notion of what teaching is supposed to be. We need to focus our pedagogical efforts on the spirit and capacity for learning, and on the excitement of inquiry and discovery, rather than on the transmission of knowledge.

We need new approaches to undergraduate education that are less focused on the transmission of knowledge and more sensitive to the need to infuse students with both the excitement of discovery and a capacity for analysis and continued learning.

This may require that faculty separate their teaching functions from their research responsibilities.

Will we have to choose between a key role in the nation's research enterprise and our traditional educational functions?

Who will set the research agenda and what impact will this have on the university's role in society?

#### **Sigma Xi:**

"Undergraduate education is trapped in an infrastructure that rewards research and denies those same rewards to those fulfilling the mission of undergraduate programs. The practices of the research community, college and university administrators, state and federal governments and agencies, and private foundations have created and reinforced the value system that produced and sustains this dichotomy."

There has been a serious erosion in science education over past 20 years. Science majors have developed an alarming tendency to alienate students, resulting in the decline of over 50% of freshman interest and 60% of science majors.

Undergraduate education is trapped in an infrastructure that rewards those who devote their resources to research and denies those same rewards to those who devote a significant portion of their resources to fulfilling the mission of undergraduate education.

Many freshmen view entry-level courses in science, mathematics, and engineering as inaccessible-- or if accessible, unrewarding to them.

The common practice of using entry-level courses as barriers to protect more advanced from all except the most able and the most committed still persists, and at worst, students view these classroom environments as destructive and hostile.

In charting policy for undergraduate education in science, mathematics, and engineering, bringing about changes in attitudes and perceptions must be a part of any effective policy.

#### **NSF Concerns**

"The most important thing the NSF can do for science education is to increase the prestige and respectability of teaching."

"There is an unfortunate (pernicious) tendency both inside and outside of NSF to regard activity in research as more valuable than activity in education."

"A number of strong factors have had major impacts on UG

education at Cornell and similar institutions during the past 20 years. A push toward excellence in research and the phase-out of several NSF programs for support of undergraduate in science and engineering.”

(Joe Ballantyne, VP Research, Cornell)

“The worth of a faculty member is often judged by his or her success in the competitive process of seeking research grants. A national competitive process for seeking funds for innovative teaching and curriculum improvements would also give young faculty visibility and “credit” in the tenure process. Without this there is less incentive for faculty to participate in innovative teaching.”

“Another major concern is the increasing tendency at NSF and other federal agencies to require cost-sharing or matching on grants. This, in effect, prys funds away from other priorities such as teaching.”

### **EHR Discussions**

Cultural factors in the academic community now place a low premium on teaching, and the philosophy of teaching as a “weeding out” process were obstacles that must be addressed.

The question of NSF’s effect in helping (or hindering) the ability of faculty and institutions to develop human resources and teaching was discussed.

How can the NSF influence a change in the campus ambience that would lead to a proper balance between education and research.

Possible attack points:

- Criteria for promotion and tenure
- NSF sponsored teaching awards
- Having NSF speak out on teaching

Drucker:

- How do we ensure that research grants have a positive rather than a negative impact on teaching?

- Has NSF investment in “glitter”, in itself, driven students away?

- How can we change the present approach of “sorting people out” from “educating” people.

### **JJD Questions**

What should be NSF role in addressing balance of teaching and research?

- UG programs?

  - (curriculum, labs, faculty develop, UG research)

- “Sponsored research culture”?...what should be changed

- How do we take advantage of the extraordinary nature of the research university to benefit UG experience?

- Is NSF asking the right questions, gathering the right data, understanding what is really going on?

- Is the NSF asking the right questions and gathering the relevant data to understand what is really going on?

- What is the impact of the NSF programs directed at UG education (curriculum and laboratory development, UG research participation)

- Should we develop programs aimed at modifying somewhat the present university culture which is heavily biased toward research?

- How might one design programs which take advantage of the extraordinary nature of the environment provided by research education in a way that the UG experience would be benefited.

### **NSF Questions**

- Should the NSF try to influence the culture of academe

to help define a proper balance between UG teaching and research?

If yes, then what should be done and who in the Foundation should do it?

What information is available on the effect that faculty research on the quality of undergraduate education? Do we need additional studies?

Is a major study needed to clarify the issues?

If there is a study, what would be its products?

a comprehensive report (e.g., the "Neal-II" report)

A policy statement for consideration by the NSF

A public statement directed at NSF and universities?

Changes to particular NSF programs/

First questions:

Does having lots of research in an institution disadvantage undergraduates? (Data strongly suggests NO!)

Should the NSF study be extended to other measures...

LSATs, GMATs, ...

Related questions

What is the impact of research on quality of teaching?

What is the impact of research on student preferences?

Attrition in majors

Postgraduate career decisions

What is the impact of NSF policies on UG instruction?

Other questions:

1. Are professors who are good researchers also good teachers. (While there is not strong evidence that research and teaching are highly correlated, there certainly is not evidence that a good researcher is necessarily a bad teacher.)
2. Can a university do good research and good teaching? NSF data suggests that the answer to this question is yes. However we need to look at specific cases.
3. What happens to undergraduate education when one increases research? (a dynamic question). (Studies indicate that when a faculty member increases time spent on research activity, it usually does not come from teaching but rather from their private lives.)
4. Should the study be focused on undergraduate teaching or also on the effects of the research funding system on graduate education.

Some possible data:

Longitudinal Studies:

How much of NSF research \$\$\$ going to:

i) student support

ii) PI support

iii) equipment and supplies

iv) overhead

Other time trends

i) number of UGs supported per grant

ii) number of Grads supported per grant

iii) number of postdocs supported per grant

iv) fraction of grant for PI support

(both summer and academic year)

Could it be that the imbalance between the research and educational role within the NSF...and other federal agencies...have led to the imbalance in our academic institutions?

### **Perceptions**

The university research enterprise places too much emphasis on research at the expense of teaching.

Grant-funded research has seriously distorted the faculty culture in such a way as to erode the quality of undergraduate education.

Major changes in the “corporate culture” of universities are necessary to rebalance the relative priorities of teaching and research.

Competition among universities is creating situations in which teaching load has now become a negotiable item in luring star faculty.

At some doctoral institutions leading researchers have no obligation to teach...or they teach only graduate seminars. Even in non-doctoral institutions, there is encouragement for faculty to compete for grants to “buy release time” from teaching.

### **Dangers**

While American research university is clearly the envy of the rest of the world, its unique character and role are clearly neither understood nor appreciated by the American public at large--or by most of their elected public leaders.

### **Suggested NSF actions**

Actions taken thus far:

Requirements in proposals:

A statement specifying the potential of the proposed research to contribution to education at the postdoctoral, graduate, and especially undergraduate levels.

A list of graduate students and postdoctoral scholars with whom the PI has had an association over the past five years, and

A limit of 10 publications, etc listed in PIs cv.

National awards for outstanding teaching

Presidential Young Teacher Awards

Presidential Science Teacher-Scholar Awards

NSF Medal of Excellence in Teaching

NSF Distinguished Professor

Competitive programs for teaching

Alter NSF programs to include an emphasis

on the commitment to combined teaching

and research for producing the scholarly leaders in academe.

Fellowships

NSF Graduate Teaching Fellowships

Teaching Postdoctoral Fellowships

TA Training Workshops