

## Teaching AND Research 2.1

### Introduction

For much of history, the university was a protected enclave respected well enough but mostly unnoticed and allowed to go about its business unchallenged and largely unfettered.

What a contrast today, when the university finds itself considered a key social economic, political, social and cultural institution.

And we are rapidly evolving into a new post-industrial society, in which the key strategic resource necessary for prosperity and social well-being has become knowledge itself.

In all advanced societies, our future depends to an ever increasing extent on new discoveries, expert knowlege, and highly trained people. Like it or not, universities are our principal source of all three ingredients. (Bok)

“The solution of virtually all the problems with which government is concerned: health, education, environment, energy, urban development, international relationships, space, economic competitiveness, and defense and national security, all depend on creating new knowledge---and hence

upon the health of America's research universities" (Bloch)

But, ironically enough, our increasingly critical role has not brought with it increased prestige, public confidence or respect.

Instead, like so many other institutions in our society we are roundly criticized by right, left and center and from even from within by many faculty, students and staff for flaws large and small, fundamental and trivial.

The American research university is clearly under attack...

...attacked by parents and students for uncontrolled escalation of tuition

...they are criticized by governors for financial irresponsibility

...investigated by the Department of Justice for collusion in tuition and financial aid fixing

...critized by both Washington and their own faculties for rising indirect costs

...attacked by Congress for alleged conflicts of interest or providing easy access of foreign firms to government-supported research

...attacked by legislatures for the tenure system,

...and attack by the left and the right for the quality of undergraduate education

Particular Concern: Teaching vs. Research

Next to college curriculum, no aspect of university education has provoked more complaints than the faculty's preoccupation with research at the expense of teaching.

It is widely believed that institutions slight their students when they emphasize research in making appointments and refuse to promote unproductive professors even though they are highly successful classroom teachers.

Critics condemn the bulk of scholarly activity either as a 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.

## **Concerns**

...From outside the academy

The titles of the books by some of our critics reveal this:

...*"The Moral Collapse of the University"*

...*"Tenured Radicals"*

...*"Killing the Spirit"*

...*"Profscam"*

...and, yes, Virginia, *"The Closing of the American Mind"*

*"Higher education is underaccountable and underproductive..."*

in a sickening tailspin...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”.

“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”.

“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, with with

cost-cutting pressures on campuses and increasingly sharp

scrutiny by outsiders on the quality of UG 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.” (Washington Post)

“The public has a right to know what 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.”

(National Governors’ Association)

...From within the academy

“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.”

(Sigma Xi)

Students contend that professors are so busy pursuing their

research interests that they neglect undergraduate life.

“The language of the academy is revealing: professors speak of

teaching loads and research opportunities, never the reverse.”

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. (HTS)

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. (HTS)

The predicament is that they are transmitting what they know--

and love--with little awareness of what the student needs

to learn. (HTS)

...About the Feds

“There is increasing speculation that the imbalance between the

research and educational roles within the NSF...and other

federal agencies...has been a factor contributing to the growing

imbalance in academic institutions.”

“Another major concern is the increasing tendency at NSF and

other federal agencies to require cost-sharing or matching on grants.

This, in effect, diverts funds away from other priorities such

as teaching.”

A summary

It might be easy to answer and dismiss these critics one by one

with logic, or a righteous dismissal of any

who would question our purposes and privileges.

But I believe it is a mistake to simply dismiss our critics.

To the extent their criticism is constructive,

we should try to hear it.

To the extent they are wrong, we should try to answer them

with a compelling affirmation,

a renewal of our vision and purposes, a confirmation

of our unique community rights and responsibilities

arrived at through extensive debate and discussion among ourselves and with our many constituents.

Caveat 1:

Note: marketplace is NOT telling us that teaching is a problem-- rather media, critics, and parents are!

David Gardner notes that numerous studies over past 30 years

indicate that students from research universities tend to be the most satisfied.

Hanna Gray believes UG education has improved dramatically

over the years--but we really should now dwell on past and

0present (as critics have) but rather focus on the future.

We should avoid be reactive.

Caveat 2:

Most public criticisms fall into two categories:

i) cost: by assuming all universities cost \$20 K/y

ii) research: all universities do too much research

In reality, most universities (2,900) are inexpensive and

do NO research. Only the most elite privates

are expensive...and only the research universities

do significant research.

Perhaps fewer than 10% of universities do this.



Taxonomy of higher education: 3,500 institutions

- 4-year colleges
- comprehensive universities
- research universities
- AAU universities--55 in number

Hence, in reality, the public attack is suggesting that

we make these few universities like all the rest...

That we make Harvard more like South Dakota State...

In a sense, the public wants to convert those few

institutions they really respect...into those they do not.

If the Harvards and Michigans are doing things so poorly,

then why does everyone want their children to attend

them...and why do employers always want to hire

their graduates?

Those who speak up for teaching tend to dismiss research

with hardly a word about the reasons that have led

society to devote so many billions of dollars to

its pursuit.

Little is said about its importance to society or

its potential benefits for teaching.

Instead critics condemn the bulk of scholarly

activity either as a sterile product of requirements

imposed by philistine administrators or as a

form of private pleasure that selfish professions

enjoy at the expense of their students.

## **EHR Study**

The Education and Human Resources Committee of the National Science Board is conducting a major study to examine

the impact of research on undergraduate education:

i) An examination of the “folklore” concerning the impact of

research on teaching in an effort to separate myth from reality.

ii) An assessment of the impact of federal research policies on undergraduate education--e.g., possible distortion of the academic culture to draw faculty effort and institutional resources away from teaching.

iii) An assessment of ongoing federal programs (primarily NSF)

aimed at improving the quality of undergraduate education.

iv) Recommendations for policies and programs aimed at improving the quality of undergraduate education.

While much of our interest will be focused on undergraduate programs in science, mathematics, and engineering, we also

believe that aspects of the study will span all disciplines.

Further, since there is such a wide diversity in institutional types,

we will likely focus our first efforts on two classes of institutions:

- Comprehensive research universities (AAU set)
- Private liberal arts colleges (“Oberlin 40”)

## **The Folklore Concerning UG Education in the Research University**

### Folklore Concerning the Impact of Research on Teaching

1. The quality of undergraduate education in research universities has deteriorated over the past couple of decades.
2. Small liberal arts colleges which stress teaching do much better in educating undergraduates than do large research universities.
3. Undergraduates rarely see faculty. They are instead taught primarily by teaching assistants, most of whom are second-rate instructors and many of whom cannot even speak English.
4. Faculty are teaching less these days, devoting more and more of their time to sterile research in unimportant areas.
5. Undergraduates in large research universities are herded from one large lecture course to another, rarely getting an opportunity to interact directly with faculty.
6. There is some concern that part of the reason

for the decline in student majors in science, mathematics, and engineering has to do with the demanding curriculum and rigorous grading practices in these fields compared to majors in the humanities and social sciences. Students therefore may be selecting the “path of least resistance” to postgraduate professional programs by majoring in these latter fields.

7. The reward structure (salary, promotion, tenure) of the research university stresses research activity at expense of teaching.
8. Students and parents aren't getting their money's worth at these large research factories.  
The universities are taking tuition dollars and diverting them to support research.
9. The lack of faculty role models in the classroom have discouraged students from considering careers in college teaching.
10. Little thought and even less effort has been given to the design and implementation of an undergraduate curriculum (or UG experience) which takes advantages of the resources of the modern research university.  
Instead, these institutions generally approach teaching much like small liberal arts colleges--although they clearly

cannot provide the personalized attention that characterizes these latter institutions.

11. The best graduate students come from small liberal arts colleges

### Folklore Concerning the Impact of Sponsored Research Policies

1. The importance of sponsored research dollars for the support and prestige of universities has distorted the academic culture and faculty reward system in the research university.
2. Teaching has viewed as a “labor”, not an “opportunity”.  
As a result, teaching load has now become a factor in hiring/retention negotiations.
3. Cost-sharing and leveraging requirements have distorted institutional priorities, resulting in the shift of institutional resources away from teaching and into research.
4. The increasing degree to which federal research dollars are used to support people with no direct involvement in teaching (e.g., permanent research staff, postdocs) has distorted academic priorities, building a para academic subculture (and supporting bureaucracy) with no relationship to the teaching function of

the institution.

5. Faculty effort has been diverted away from teaching by the excessive requirements of grantsmanship-- proposal writing, etc.
6. The shift of federal research support into massive centers-- many of which are quite separated both physically and organizationally from the teaching units-- has further diluted institutional teaching priorities.
7. The need for graduate student labor to build research productivity of faculty and departments has led to the buildup to teaching assistantships as primary mechanism to support graduate student populations rather than to meet teaching loads. Further, since US nationals generally can acquire fellowship or RA support, foreign nationals are increasingly populating the ranks of TAs.
8. The NSF--and other federal agencies--have sent out clear signals over the years that research is more valuable--to them, at least--than education.

### **What are the Key Issues?**

General relationship and balance between teaching and research.

Of course there is a great deal of misguided rhetoric concerning

the perceived tensions between teaching and research. Indeed, there is even some evidence suggesting that the presence of research can actually enhance the learning environment for undergraduates (e.g., NSF's SAT/GRE correlations).

Nevertheless, it is also clear, that at least in some institutions,

the strong pressures generated by the sponsored research culture have distorted the balance between teaching and research.

Distortion of the "faculty culture" (reward structure, etc.)

There are growing concerns about the distortion of the faculty culture by sponsored research policies and the impact they have had on faculty rewards (hiring, promotion, salary, recognition).

These have led to an increasing withdrawal of faculty from undergraduate and graduate instruction.

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

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

## Nature of undergraduate education

Harold Shapiro suggests that part of the problem may be that the teaching and research activities of faculty may be TOO closely related.

The specialized focus of our scholarship has propagated into the undergraduate curriculum, distorting it away from the goal of a liberal education.

The faculty tends to focus more on the transmission of the knowledge they know--and love--with little awareness of what the student needs to learn (e.g., the excitement of discovery and a capacity for analysis and continued learning).

## Quality of undergraduate education

Hanna Gray believes UG education has improved dramatically

over the years--but we really should now dwell on past and

0present (as critics have) but rather focus on the future.

We should avoid be reactive.

## Cost considerations

National emphasis on excellence in university research may have negative effects on UG education in some universities.

Financial and other resources may be diverted from UG



instruction, or a climate in which research accomplishments

are valued above educational ones may cause instruction

of UGs to be shortchanged.

The “research driven” nature of education requires institutions

to invest increasing levels of capital (equipment, support, etc.) per student if they are to continue to operate

at the scholarly frontier. (Throughout the 1980s, instructional costs have risen at 5% per year above inflation.)

The increasing tendency to leverage institutional support of

research by the cost-sharing policies of federal agencies has

drawn resources away from instructional programs.

## **What We Know Thus Far**

### A Taxonomy of Colleges and Universities

#### Numbers of Institutions

Doc 1: 20 largest R&D performers

Doc 2: 40 next largest R&D

Doc3: 125 remaining doctoral institutions

Ed 1: 28 highly rated liberal arts colleges (“Oberlin group”)

Ed 2: 78 largest feeders into NS&E PhD pipeline

Ed 3: 356

Ed 4: 755

2-y: 1,330

Doctoral institutions are only 13% of all institutions, but account for:

...45% of total enrollment

...nearly 50% of total degrees

...over 90% of academic R&D

### Faculty Characteristics

One indicator of the quality of education at the undergraduate level is

the relative number of PhDs on the faculty. Across all 4-year

colleges, these average 70% of the full-time teaching faculty.

Because none of the full time faculty grew at a rate commensurate with enrollment in the 1970s and 1980s, it has taken a growth in the number of teaching assistants

to maintain a relatively constant student-teacher ratio.

More specifically, student-teacher ratios for PhD level faculty

crept up from 21:1 in the late 1970s to 23:1 in the late 1980s.

The percentage of non-US citizens among faculty ranges from 3% to 8%. In general, the higher the selectivity,

the greater the propensity for hiring non-citizens.

However, the majority of foreign born doctorates teaching in U.S. academic institutions are naturalized citizens. (Figure)

The average age of doctoral faculty has increased steadily since

1973. This is primarily the result of hiring and tenure practices of the 1960s. Further aging of the faculty stock can

be expected to continue through the mid-1990s.

The age distributions show a shift in modal age toward the mid-40s, but also reveal differences in the hiring practices

of different classes of doctoral institutions; the more selective ones have hired proportionately more young faculty than the others.

Put another way, the most selective institutions tend to have

faculty with a much more balanced age structure than others.

#### Faculty Activity (Teaching vs. Research)

Total student/teacher ratios appear to have been steady for a

decade at 11:1. Student/PhD teacher ratios (excluding teaching assistants) appear to have crept up over this period.

The number of teaching assistants per 1000 FTE UGs declined

for all doctoral types through much of the 1970s, then increased steadily back to 1973 levels except for the smaller research universities, which remain well below their past level.

The declining proportion of new PhD students with primary

support from teaching assistantships reflects the increasing emphasis received by research. At the same time, a perhaps worrisome trend indicates that an increasing percentage of new PhDs with primary support from TAs are non-US citizens.

In chemistry, physics, and mathematics, the percentage of foreign

doctoral students increased by 12% to 36% in the 1980s.

Over the same period, the fraction of PhD students supported by TAs declined from 31% to 23%, but the fraction of the declining share of TAs awarded to non-US citizens roughly doubled.

The portion of time spent on teaching relative to research

appears to have declined in the past several years for all

types of institutions, after increasing during the 1970s for the

education institutions.

Over the past decade or so, there has been a gradual decline in

the proportion of time doctoral faculty in universities and

colleges spend on teaching. On the other hand, the

proportion of time spent on research decreased through the

1970s but has increased again through the 1980s, in part

because institutions with traditionally low levels of research

activity are seeing a growing number of their faculty

involved in this endeavor.

R&D intensity as measured by R&D dollars spent per UG falls

off sharply through the doctoral institutions to very small

amounts for education institutions. This reflects the research

focus of the large doctoral institutions, and the more singly

education-oriented approach of the other institutions.

Carnegie surveys over two decades show:

...decline in prevalence of belief that teaching should be the

primary criterion for promotion

...increase in agreement that tenure is difficult to achieve

without publishing

In research/doctoral institutions

...only 30% of faculty agree that teaching should be the primary promotion criterion (60% for all institutions)

...90% agree that tenure without publishing is difficult (50% for all institutions)

Are professors who are good researchers also good teachers?

Major myth is the alleged conflict between research and teaching is that a professor cannot be good at both.

The view that teaching and research have been and must

remain separate and unequal is more myth than reality.

Are research activity and teaching quality correlated?

The best research universities...like Michigan...can and should demand of faculty members both "superb research and superb teaching".

(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.)

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.)

### Expenditures

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) (HTS)

Both of the principal cost components of UG education (faculty compensation and capital expenditures) have increased considerably over the past decade--personnel by 12%, facilities by 22% on a per-student basis in constant dollars.

The federal contribution to higher education revenues has dropped significantly over the past two decades at all types of institutions. The difference has been made up through increases in tuition, private gifts, and creative financing.

The public doctoral's R&D growth exceeded that of any of their private counterparts; conversely, their growth of education spending lagged behind (Doc2 and Doc3)

Surveys suggest that university decision mechanisms and incentive systems lead to the funding of additional research

with university funds, instead of spending allocations in the face of greatly increased marginal costs. For example,

20% of faculty research time dollars went into research related categories rather than substitute teaching.

Testimony shows that faced with inadequate resources to meet

many simultaneous funding possibilities, some universities

strain to provide for research programs at the expense of

education--especially undergraduate education:

i) the underrecovery of costs of research from the federal

government leads to reduction in resources for education, as the university is now obliged to come up

with resources to complement those from external sources

ii) currently available resources, including federal funds, are



not sufficient for the balanced support of schools current educational and research aspirations, but old

patterns of behavior have lead to misallocations of resources, overextending research budgets.

iii) research is simply such a preeminent value of universities

and the nation that temptations to divert funds from

education are likely to remain irresistable at some institutions.

## Degree Production

### Enrollment

Total undergraduate enrollment has doubled since 1967,

to 11.5 million in 1988, although the growth since the

mid-1970s has slowed.

There has been a shift towards attending public institutions,

whose enrollment share rose from 72% in 1967 to 80% in 1988. This shift reflects in part the rapid growth of 2-year colleges which are overwhelming public.

The number of undergraduates in research universities has essentially been stable since the mid-1970s.

## Science Degrees

### Popular Myth

Small liberal arts colleges produce an unusually large

share of science degrees

The research universities as a group are far more focused on

NS&E than 4-year comprehensive institutions.

They

award about 55% of all NS&E.

Doctoral institutions are only 13 of all institutions, but

account for

...45% of total enrollment

...50% of total degrees

...over 90% of academic R&D

Doc1 and Ed1 tend to be more S&E intensive than others,

producing at least as many S&E degrees as BAs in other fields.

### PhD Success

NS&E baccalaureate holders tend to earn NS&E PhDs in

the same class of institution in which they earned their BS. More graduates of Ed and Doc2,3 tend to earn PhDs in Doc2,3 than in Doc 1. (Hence suggesting

there is little climbing ability)

There has been no change in the 1980s in the choice of NS&E

PhD institutions by BS degree holders from the top research universities. These BS are 70% to 80% more

likely to earn their doctorates in Doc1s compared to a

proportional distribution among doctoral institutions.

The propensity to earn a PhD on the part of BS students from the most highly selective liberal arts colleges declined throughout the 1970s and early 1980s, but appears to be increasing again. These students are much

more likely to earn doctorates than even the bachelors

graduates of Doc1 universities.

The proclivity of NS&E bachelors to earn a PhD has fallen

most sharply for BS holders from Doc1.

The "Value-Added" by an Undergraduate Education

Peter House, Division of Policy Research and Analysis (STIA)

Study

Sample: Over 50,000 students majoring in S&E whose 1987 GRE score (quantitative and verbal) could be

matched by ETS with SAT score

Variables: GRE, SAT, gender, race, UG major, UG school

Value Added: Average addition to a student's total GRE score associated with going to a particular school, irrespective of SAT, gender, minority, or UG major.

Taxonomy of Academic Institutions:

Doctoral 1: 20 largest R&D Performers

Doctoral 2: next 40 R&D performers

Doctoral 3: 125 remaining doctoral institutions

Education 1: 24 highly rated liberal arts colleges

Education 2: 80 largest feeders into NS&E PhD pipeline

Education 3: 1112 remaining 4-year colleges

Raw Results of Value Added

Doc 1: 43

Doc 2: 37

Doc 3: 19

Edu 1: 37

Edu 2: 12

Edu 3: 0

Results:

1. The most prominent research institutions have the highest

average scholarly quality rating.

2. Doc 1 had the highest value-added, followed by Doc 2

(Note that even Doc 2 were higher than Edu 1)

3. Average education index is positively related to average number of S&E bachelors degrees awarded, except for institutions granting more than 3,000 degrees annually (note that UM awards about 2,500, so it peaks for UM and UCB)

4. Average education index is positively related to R&D

intensity as measured by R&D spending per undergraduate

5. Average education index is positively related to scholarly quality of faculty (1980 NRC reputational survey)

#### Conclusions:

There is no quantitative evidence which supports the supposition that, in general, strong emphasis on research hinders the education of undergraduates.

Reeach university policies strongly emphasize research achieveemnts for tenure decisions, but this philosophy has not apparently degraded the quality of their B.S graduates compared to undergraduate colleges where teaching skills weigh more heavily in tenure decisions.

Measures which could be associated with quality of UG education are generally positively correlated with research intensity indicators.

This analysis does not conclude that NO institutions exist where research emphasis degrades the quality of undergraduate education--only that such a phenomenon is not strong and pervasive.

The analysis also does NOT conclude that the quality of teaching is better at research universities--only that the total educational experience, including peers, intellectual environment, and role models, appears to produce baccalaureate graduates of equal or better quality than those from institutions where education is heavily stressed.

“Substantial differences in cost (expenditures per student) do not necessarily connote significant differences in educational outcomes.”

Another Interesting Point:

It is well-known that SAT scores have been declining for the

past 20 years

...due to broadening composition of college entry population

...due to deterioration of K-12 education

Yet the GRE scores have been increasing over this period:

From 1977 to 1988

...verbal: 500 -> 520

...analytic: 510 --> 540

...quantitative: 520 --> 580

This suggests that undergraduate education is taking a lower

quality input and producing even a higher quality output

...that is, that the value-added has increased substantially

### **What Actions Have Been Suggested?**

Changes in the nature of the research university:

Don Kennedy:

“We need to talk about teaching more, respect and reward those who do it well, make it the first among our labors. It should be our labor of love and the personal responsibility of each of us.

LS&A Planning Committee on UG Experience

Called for a reconstruction of UG education that focuses on the role of the college faculty member as a teacher rather than as a research scholar.

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. (HTS)

Perhaps faculty should separate their teaching functions from their research responsibilities...

Perhaps universities will have to choose between playing a key role in our nation's research enterprise and their traditional educational functions...

Perhaps we should re-examine who determines the research

agenda for our universities...

There has been a serious erosion in student interest in science

education over the past 20 years:

...proportion of freshmen intending to major in science

and math has dropped from 11.5% to 5.8%

...40% of those entering college intending to major

in science drop out after entry level courses

...another 20% drop out before completing major.

We have design undergraduate education as a filter...and what

we need is a pump for the pipeline.

Changes in the faculty culture:



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. (HTS)

The critical question is whether universities are doing what they can to develop incentives and rewards for good teaching that will help to restore a healthier balance between teaching and research.

NOTE: At the fall AAU meeting, several presidents with backgrounds in economics noted that the discussion about the faculty reward structure was very superficial. High prices (e.g., salaries) do not reflect importance. Rather prices are just "production signals" reflect the imbalance

between supply and demand. If we demand good teaching,  
then it will happen. We do not need to influence this by  
artificial pricing (salary) adjustments...

Emphasize that all faculty are expected to be involved in teaching (e.g., teaching responsibilities are “non-negotiable”)

Foster a more systematic effort to evaluate teaching and implement steps to improve it.

Create a climate that favors teaching (e.g., hiring, promotion, tenure, salary criteria)

“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.”

Possible NSF Actions:

What can NSF do?

NSF sets the tone for basic research support.

Hence NSF should be an integral part of the process of improvement of education at both the UG and graduate level...otherwise teaching will be thought of as an inferior activity instead of as

the natural key accompaniment to research in a college or university setting.

Important that NSF research policies actively encourage rather than passively discourage attention to teaching by the researchers NSF supports

Research with students is clearly part of the teaching function at the graduate level and is or should be becoming increasingly so at the UG level.

Perhaps NSF should experiment with a variety of approaches to involve the research community in the improvement of education and to discourage the cultural trends that are so disturbing.

Examples of interventions:

i) Require each PYI to teach a one semester UG course each year, a one semester grad course, and serve as the research advisor for 2 graduate students as a minimum on average over 3 to 5 years.

ii) Could also have a minimum educational commitment

to instruction and the guidance of graduate students of PIs.

iii) Might also encourage increased instructional participation by giving preference to instructional proposals by highly qualified research, in an

effort to send the strongest possible signal that research and education are an integrated whole in the view of NSF.

Develop national awards for outstanding teaching:

Presidential Young Teaching Awards

Presidential Science Teacher-Scholar Awards

NSF Medal of Excellence In teaching

NSF Distinguished Professor

Modify the way in which graduate students are recruited, trained,

and funded to enhance their teaching:

NSF Graduate Teaching Fellowships

NSF Postdoctoral Teaching Fellowships

Teaching Assistant Training Workshops

### **A More Positive Approach**

How do we take advantage of extraordinary learning environment offered by the research university?

What we are...and what we are not!...

UM is not a small liberal arts college...

**It is a great research university.**

It is also very large, complex, and exciting place.

In a sense, the strength of our institution depends upon our efforts to achieve an optimum blend of quality, breadth, and scale.

We attempt to do a great many things, to involve and benefit a great many people, and we attempt to do everything very well.

Furthermore, we attempt to achieve a balance among teaching, research, and service, as well as undergraduate education, graduate education, professional education, and faculty scholarship and development.

It is important to note that we do not view achieving this balance as a conflict between competing goals.

Rather we view it as an opportunity to exploit an important creative tension.

It is this blend of missions which provides our research universities with such a unique environment for undergraduate education.

We are not--nor should we try to imitate--  
a small liberal arts college, with a faculty chosen primarily for their teaching skills, and with a curriculum limited both by design and resources.

Rather, we are a large, comprehensive university, spanning almost every intellectual discipline and profession.

We have the capacity to attract and sustain many of the world's leading scholars.

We provide intellectual resources unmatched elsewhere

in our society, whether in the extent of our library and museum collections, or in the laboratory facilities

we provide, or in the exotic new tools of our intellectual

trades ranging from supercomputers, to the sophisticated equipment required for solid state electronics and recombinant DNA research, to the expensive instrumentation used for positron emission tomography in our medical centers.

Real advantage of our institutions is linkage between different levels and types of learning--also diversity of

approaches, different strokes for different folks.

Our philosophy is to use these extraordinary

resources not simply to teach facts...indeed, students of your ability can learn facts, content, pretty much on your own.

Furthermore, In many fields, the knowledge base is doubling

every five years...hence an undergraduate education only

serves as the stepping stone to a process of lifelong education

Moreover, save for the most basic information, it is no longer

necessary at the college level to commit vast amounts of knowledge to memory. Indeed, we now live in a world where knowledge and information can literally be plucked out of the air...or off your computer terminal.

Hence, of more lasting value are the broadly applicable skills and wide-ranging perspective that is characteristic of a liberal education .

Thus our goal is to expose our students to the world's leading scholars, people who are struggling every day with creating new knowledge and interpreting and transmitted the accumulated knowledge of the past

Our goal is to teach methods of inquiry...methods of critical analysis and thought...and beyond that, to expose you to the most fundamental of human values which are essential to our civilization.

This style of education can be frustrating at times, but we are convinced as are the other great research universities of this nation...that our students will be far better prepared to assume the role of leadership in society with this type of an education.

But rather, a college education is a time of challenge  
and discovery, of curiosity and intellectual growth,  
of learning about yourself.

It is a time to learn the art of life...

From this perspective, it is critical that to realize that

**our students probably learn more  
OUTSIDE of the classroom than in it!**

This University is designed to provide a rich  
environment

of intellectual experiences...

Whether it be through the wealth of formal instruction  
we

provide, or through the array of cultural, social,  
athletic activities.

In fact, I suspect that most of you will end up learning  
more

from your interaction with other students than you  
will from faculty!

A Michigan education is not designed to be a passive  
process.

While our students probably have more opportunities  
to

learn on this campus than any other university in  
the

nation, it is also true that these opportunities are not  
presented to them on a silver platter.



We expect them to play an active role in their education!

To explore, to discover, even to challenge themselves.

After all, life is one of those do-it-yourself experiences...

But we can do...and must do...even better...

by recommitting ourselves to several key objectives:

(1) We should provide our undergraduates with an experience

which draws on the vast intellectual resources of the modern research university: its scholars, its libraries and museums, its laboratories, its professional schools, its remarkable diversity of people, ideas, and endeavors.

(2) We should expose our students to the excitement of great minds extending the bounds of knowledge.

Of course we recognize that the scholars we place in the classroom may not always be the best teachers of knowledge in the traditional sense.

But research universities benefit from the presence of a cadre of excellent, stimulating teachers, and we are convinced that only by drawing into the classrooms faculty

with strong commitments to scholarship can we stimulate

our students to develop the skill at inquiry across the broad range of scholarly disciplines that is so essential to life in an age of rapidly expanding knowledge.

- (3) We should develop in our students both the ability and will to strive for knowledge.

We believe that a critical component of an undergraduate education in a research university is the development of the will to seek and the skill to find.

- (4) We should expose our students to the diversity, the complexity, the pluralism of peoples, cultures, races, and ideas that can only be found in the intellectual melting pot of the modern research university.

- (5) And we must also accept our mission to educate the leaders of American society.

Indeed, if past experience is any guide most of the leaders of this nation will continue to be produced by our great research universities.

### **Final Comments**

In his recent book, "A User's Manual for the University"

Henry Rosovsky notes that:

"The college within the university, in which a selected group of

undergraduates works within and among a challenging array of activities in scholarship and advanced education, offers a unique set of opportunities.

“The university professor is not a teacher who is expected to confine himself to the transmission of received knowledge to generations of students. He is assumed to be a PRODUCER of new knowledge, frequently with the assistance of apprentice graduate students, who transmits state-of-the-art knowledge to students at all levels.

“Undergraduate education at research institutions is further enriched by a constant flow of people and ideas from outside the university.

“Further, in leading university colleges, student bodies are national and international in scope. They are also contentious and accomplished, mirroring the faculty in the diversity of its interests and the range of political and social views.

“At their best, university colleges are among the most exciting places on earth. Their professors have written the books that people talk about; they have engaged in public controversies and have held vital

public post.

“They are at the center of the action.”

I certain agree...

...and I hope most of you do as well...