THE STATE OF RESEARCH ENDEAVORS:

VIEW FROM THE ADMINISTRATIVE LEVEL

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The Apparent Teaching/Research Conflict

I believe much of the rhetoric that has suffused the debate about the conflict between teaching and research is based more on myth than on reality; however, these myths are persistent. One recurring belief is that the university's reward system is out of kilter. (Interestingly, one can hear this charge leveled against both "sides" of the argument). I believe we do a reasonably good job of rewarding both **outstanding researchers** and **outstanding teachers**. Conversely, we have little problem in withholding rewards from researchers and teachers who are clearly nonproductive. Not unreasonably, however, the bulk of our faculty fall somewhere between these two extremes, and the problem with our reward system is that we find it difficult to evaluate **both** activities in any meaningful fashion.

The question we need to ask is simple: Is teaching seen as an adjunct to, an integral partner with, or an intrusion upon the research enterprise of the university? The answer is complex and ephemeral, depending upon the individual researcher and the nature of the institution where he/she works. Nevertheless, much of the apparent conflict between teaching and research grows from our attempts to pigeon-hole these activities into separate percentages of faculty time rather than to see each "job" as an integrated whole.

In my view, faculty who choose to work at major research institutions, by the very nature of those institutions, are responsible for the "scientific literacy" of **all** students, not just those fortunate enough to "assist" in a faculty laboratory. Our research faculty must help us decide what that highfalutin term means and be willing to accept responsibility for seeing that students have the opportunity at the very least to learn how to find solutions for problems that are scientifically based. The research enterprise must be integral to the teaching enterprise, and vice versa. We commit resources and provide opportunities for faculty to do research primarily because we think students - undergraduate and graduate alike - will be better educated in that atmosphere and under the tutelage of a cadre of active researchers than they will at an institution where the faculty may read avidly about research but do almost none of it.

Faculties of departments at major research universities must exercise their responsibility to ask tough questions about the research enterprise. Nothing is exempt: Not the nature of the questions scholars and scientists undertake to answer; not the potential impact of research on the discipline; not the implications - if any - inherent in the source of funding for the research; and not the relevance of the research to the curriculum of the particular department and university within which it occurs. On the other hand, the research community of scholars has the same responsibility to ask equally tough questions about the way students are taught and the

curriculum that underpins that portion of the business of the university. Once these important responsibilities are accepted, the line between teaching and research blurs.

The Increasingly Interdisciplinary Nature of Research

Putting together interdisciplinary teams to find solutions to broad research questions is rapidly becoming the *sine qua non* for obtaining large grants in the hard sciences and the social sciences. Since I spend much of my time trying to erase the barriers created by the hard lines that have been drawn between disciplines and departments, I have become convinced that the department is no longer an administrative unit that can successfully manage today's academic enterprise.

In a flight of fancy, I once mused: What if we stripped departments of all administrative responsibilities except those best relegated to that level, such as the keeping of payroll and personnel records? We could deposit the names of all faculty in a large drum and draw out at random the number deemed to be the ideal size for such an administrative unit (say, 25?). The first group might be called the "Eagles," the next group the "Bears," etc., until all faculty were so assigned. It would then be up to faculty to find their own colleagues for all other aspects of their jobs that need collegial support. For instance, each person might associate with one particular group for research and quite a different group for teaching.

An interesting side question would be which group ought to be responsible for decisions about promotion and tenure. I would argue that the randomly assigned unit would be best, for unless faculty can convince colleagues who know little or nothing about their specialty of its value, their contributions to its knowledge base, and the effectiveness of their teaching, they may well not deserve advancement.

In all seriousness, tenure is not an entitlement; it must be earned and justified. If the very concept of tenure is to be preserved as a viable contract between faculty and the institution, we need to find ways to make our evaluation system less esoteric and to continue serious evaluation of faculty work after tenure has been granted. To do less will eventually lead to the undermining of public confidence in the university as a whole. By the same token, research is more often than not a multidisciplinary effort, and the best place to evaluate individual contributions to a project will probably not be the traditional department. In fact, the collegial research group may well shift from project to project, and individual faculty members may migrate to several groups during the course of a career.

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Any discussion of research goals and patterns must take into account changes currently occurring in graduate education, since graduate students comprise much of the staff of research activity on the one hand, and represent the researchers of the future on the other. In addition, teaching and research activities are inextricably connected parts of the process of learning, of discovering knowledge.

National conversation about graduate education has stressed, recently, concerns about the overproduction of Ph.D.'s. In many fields of the natural and social sciences, such overproduction is probably overstated: actual unemployment is low. But increase in "supply" has led to increased use length of post-doctoral appointments preliminary to eligibility for tenure-track academic positions. It has also led research universities, in the humanities and social sciences, to demand previous full-time teaching experience as well as significant research accomplishments of candidates for tenure-track assistant professorships. All this makes the progress to an academic career longer and more arduous. In some cases, it leads graduate students to do a "cost benefit analysis" and leave at some point (the M.A. level, the early Ph.D. level) for more lucrative or earlier careers outside the academy.

An additional issue, raised by Brian Foster, is that most positions in academia that will become available in the future will not be at Research I institutions, but rather at four-year colleges, community colleges, and comprehensive universities. Faculty members mentoring Ph.D. candidates should realize that they are preparing them for positions at such institutions more often than for positions at institutions comparable to their own. This suggests that they should pay attention to various skills in teaching and service, and also offer guidance on the variety of academic institutions to which a graduate might apply, and the advantages and disadvantages of all of them. (And to avoid communicating a sense that any position outside of a major research institution constitutes a career failure.)

In many disciplines, mentors should be alert to the career opportunities available outside academia – in governmental organizations and in industry. Mentoring and guidance of doctoral students, as well as the breadth of training recommended in the COSEPUP Report, are ever more important in the current setting. Also important will be each program's continued assessment of its graduates, and of their placement and career as they move on beyond their degrees.

Brian Foster, Ph.D., Dean
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My central theme is this: we have to learn to do high quality research and train researchers without dishonoring everything else we do. This is going to be the key to the success of research universities in the next decade or two.

Research universities have many constituencies which make legitimate, conflicting demands. We:

- train K-12 teachers
- provide post-graduate professional education
- train technicians
- provide non-credit professional development training
- train R&D people for industry
- train basic researchers
- do undergraduate education in arts and sciences
- do undergraduate preprofessional education
- train the post-secondary professoriate
- provide support for government (e.g., policy analysis)

All of this and much more is part of the mission of every major research university. In fact, for much of it, the research universities are the main (even the only) providers (e.g., post-baccalaureate professional education, training basic researchers and high-end R&D people, training the professoriate). Moreover, providing good undergraduate education is a prerequisite for being allowed to do the things for which we have an exclusive franchise.

But what have we done? We have honored research above all else except perhaps graduate education. Even in graduate programs we pretend to focus mainly on training research faculty for research universities--at best a distortion of our role in training the professoriate. We've dishonored undergraduate teaching, which has become punishment for not doing research. Service to the institution and society is ignored in our reward systems. All resources are skewed toward research. I think this is wrong as well as suicidal. We must do at least a credible job with our important obligations--and yes, I think these <u>are</u> obligations to our many constituencies.

Resources

We will continue to suffer from well known resource pressures: aging facilities, deferred maintenance, library acquisitions, and other problem areas will persist. They will get worse if we don't become more responsive to the constituents on whom we rely for resources. Our most important resource problems, however, are human resources. We must get past the belief that all faculty must do everything well. We must seek out, honor, and support excellence wherever we find it, not diluting it by insisting that people who are <u>really</u> good at one thing (e.g., teaching or research) spend a lot of their time doing something they are not very good at (e.g., research or teaching). This will require a revolutionary cultural change.

Cross-Disciplinary Flexibility

It is a truism that much of the most interesting intellectual activity is at disciplinary boundaries. The cultural differences among disciplines are important and difficult to negotiate. Often we confuse "interdisciplinary" with "interdepartmental"--the latter posing equally difficult organizational problems. There are many conservative forces protecting the boundaries--e.g., the rating games, disciplinary organizations, turf in the universities, and performance evaluations in units where tenure is lodged. These problems pose a bewildering array of organizational issues: joint appointments, assignment to centers, spatial separation from home units in research facilities, and participation in interdisciplinary degree programs, to name a few. Achieving programmatic cross-disciplinary programs is especially difficult organizationally--and it is critical.

Teaching and Research

The topic of undergraduate teaching has been discussed at length in many forums. I'd like to add that there is also much to say about graduate education, especially that we have conflated training researchers with training the professoriate. The fact is that 95% of higher education jobs are not in research universities; we have the responsibility to train all postsecondary faculty. We have dishonored most jobs other than those in research universities, doing both ourselves and higher education a terrible disservice. We MUST find a way to honor the positions that our graduates will be filling. If we don't, we'll be damaged greatly in the eyes of our most important constituents, and we'll have done terrible damage to the research and graduate training enterprise that we value so highly. That is, we risk further diminishing the pipeline of well trained undergraduate students who come into our graduate programs--undergraduate students who are trained by the professoriate that we have educated in the research universities.

Communication and Advocacy

We often say that if people only knew what we were doing, they would support us better. I fear that if they really knew what we do, they would be horrified. It is true, however, that we grossly overestimate how much people understand about universities. Their support is often premised on fundamental misunderstandings of what we do--e.g., "creating new knowledge" has something to do with facts, not with the research process as we know it.

This brings us back explicitly to where I began. We must learn to tell a compelling story to multiple constituencies with opposed, inconsistent interests and, therefore, with conflicting demands on us. Moreover, we must tell a consistent and true story to these many and diverse people. We can't fail to convince our many constituents that we are serving them well--and we have to actually do it, not just talk about it. Research is one of the things research universities are very much about. We need to find a way to do it well while not dishonoring the other things we do--in fact, while performing our other obligations with a high level of excellence and commitment.

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The investment that administrators, in particular deans, make is primarily in people. The most important resource we have is not our budget or any other money that happens to be available to us, it is the people that we work with who are actively engaged in teaching and research.

As deans, it is important to understand that our truly significant role in administration is one of facilitator. For example, we facilitate the hiring and mentoring of faculty, the recruitment of students, both graduate and undergraduate, and the acquisition of resources to sustain the academic enterprise. The topic we focused on at the Merrill conference dealt exclusively with the research enterprise, although it was argued effectively that to separate research and teaching at a research university is not an easy or desired objective. Consequently, my comments focus on research, but with the caveat that research and teaching are interwoven throughout the fabric of the entire academic enterprise.

Facilitation of the research enterprise is expensive, both in terms of time and resources. Salaries for new faculty in the humanities begin in the mid-$30K range but can extend well into the $40K range; in the natural and social sciences starting salaries begin at about $40K and can range up to or exceed $50K, all depending on the level of experience and discipline of the individual. Some disciplines, such as economics, can command starting salaries that exceed $50,000. The costs to initiate the research efforts of young faculty can also reach staggering proportions. Startup packages for new faculty in the sciences can range from $50,000 to $500,000; social scientists are commanding increasingly larger startup costs which may approach $50,000 or more in certain disciplines; even a person new to the humanities faculty comes to us not without significant cost in terms of computing capabilities and library resources. The pressure on deans and academic units to raise and allocate dollars for the recruitment of new faculty is enormous. The costs will continue to escalate along with the dangers that young faculty will fail to meet today's standards for promotion and tenure at research universities. Can a Chemistry Department with a $300,000+ investment afford to have a young physical chemist fail to be promoted, for example? And how does the dean respond to the request to hire yet another physical chemist with a similar startup investment when the return on the failed hire, in terms of research productivity, was minimal? These are dilemmas commonly faced by administrators today.

Consider next the needs of the faculty once they have joined a research university. In addition to startup costs, which typically include renovation of laboratory space and acquisition of equipment and supplies, there is great pressure to hire/find personnel who can assist in the research enterprise. This is especially critical in the sciences, where multiple "hands" are necessary to conduct complex arrays of experiments and operate sophisticated equipment. Graduate students, postdoctoral fellows, technicians, and even undergraduates have been the standard resources that scientists have relied on in the past, but while undergraduate interest in the sciences continues to increase, the opportunities for graduate and post-graduate students are

flagging. Many graduate programs are down-sizing - some by necessity and others by design - as the quality of programs is being assessed in conjunction with the apparent "glut" in the academic job market. Fewer graduate students will inevitably lead to fewer postdocs, and researchers will be forced to either scale back their own efforts or rely more significantly on training and sustaining technicians and undergraduates.

We hear increasingly that the trend now is to encourage and support interdisciplinary research. Large consortia of researchers from a variety of disciplines are collaborating to solve "big" problems, many of which have social, scientific, and even humanistic implications. Policy makers and administrators encourage these types of activities and have urged faculty to seek out collaborators and the large program project grants that might arise from such interactions. And yet our system of incentives, put in place largely by the faculty and governed by the faculty, continues to lag behind. Promotion and tenure committees still insist that an individual's contribution be devoted almost exclusively to a single, focused, or discipline-specific research initiative. Multiple collaborations are still not as highly valued as single-authored papers or the individual research grant. Despite the rhetoric of those in Washington and many here at home, the incentives and real rewards for large, interdisciplinary collaborations are best left for those who are tenured and fully promoted. This does not serve our young faculty well, nor does it encourage eventual changes in behavior toward collaborative interactions once the faculty member has established a career as a scholar. Indeed, we continue to encourage and reward the "independent contractor" and "individual entrepreneur," both terms that have been used to describe faculty and faculty behavior.

Amidst all this, the Dean sits in a most interesting place: close enough to the faculty to understand the drive and motivation behind research, scholarship, and the creative enterprise, and yet positioned to see and understand the "bigger picture" in terms of how research interfaces with the university and beyond. A dean is often confronted by a public that clearly has little appreciation for or understanding of the connection between research and teaching. Outreach and development activities have become essential roles for a Dean, and I would argue that they should be roles that faculty should at least appreciate and embrace as important to their long-term health and survival. The primary focus of the faculty should continue to be their involvement in the research and teaching that are essential to universities. At the same time, they should not be afraid to engage in active discourse with segments of the population outside the university for the purpose of sharing the passion and enthusiasm that comes with successful activities in the laboratory and classroom. Indeed, we hurt our cause and our image when students, parents, alums, or the public at large fail to understand the connection between research and teaching. When faculty fail or refuse to explain the significance of their scholarly endeavors publicly, we are not fully engaged in the multiple activities that are a part of our overall mission. If we look only inward, we miss opportunities to partner with business and the corporate world in ways that might be mutually beneficial. If we look only inward, we train students who are ill-prepared to face the rapidly changing times and technology that face us all now and in the future.

There is little room or reason for pessimism in today's society, especially where higher education is concerned. The ideas, opportunities, and investments that have been spawned from our research universities literally drive the world's economies. While the physical structure of our universities may not change significantly over the decades, the personnel involved in the

enterprise - faculty, students, administrators - and the world around us does and will continue to change, and with this dynamic flux will come new ideas, new technologies, and new ways of thinking and analyzing our world and its problems. I can think of no more exciting time in history to be involved in research and higher education than as we approach a new millenium.

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As a medical school dean, I would like to comment briefly on several areas which I believe must be addressed if the research enterprise in our state university academic medical centers is to survive in the 21st century. The order in which these are presented does not reflect necessarily the order of their importance.

Payment for Non-Funded Research

Research for faculty in academic medical centers is important for several reasons. Research by clinical faculty is important to advance our knowledge of disease as well as to advance the academic careers of the faculty. For many clinical faculty in academic medical centers however, the opportunities to develop significant extramural funding for research programs is limited. This is due to a variety of factors but a major determinant is that clinical faculty time is becoming increasingly directed toward patient care activities. Thus both teaching of medical students and residents and research activities are short changed. Many faculty however, still manage to remain academically productive in terms of publications and presentations.

Much of the funding for research activities resulting in these scholarly products has traditionally come from clinical income. Recently however, the advent of managed care as well as cuts in federally funded program reimbursements (i.e., Medicare) has resulted in somewhat traumatic decreases in clinical revenues. This has already been demonstrated to decrease the academic research productivity in areas of high managed care penetration.

The issue of how we are to maintain the non-funded research activities (particularly of our clinical faculty) which are vital to academic advancement and to their satisfaction with their careers in academic medical centers, is a critical problem that faces us today and I believe will continue to plague us in the 21st century. I do not believe that it is an option to relegate research to basic science departments and to a few basic scientists housed within clinical departments. We must address the issue of critical numbers of faculty and funding for clinical research, recognizing the need to keep our clinical faculty academically productive.

Maximizing Scarce Resources

Even extramurally funded research programs are feeling constraints due to the limitations of resources. It is important in academic medical centers that resources be maximized to further the research enterprise into the next century. Core facilities are important in this process since they can be shared by multiple users and can make expensive technology available to a large number of scientists. Core facilities which support a school or an entire medical center require not only major equipment but personnel and adequate oversight to run the facility. It is important that these facilities be of high quality and most importantly that they be centralized with the school or medical center so that we avoid duplication of costly services and technologies.

Centers of Excellence are another way of maximizing resources. Centers of Excellence allow mechanisms for clustering of faculty from diverse academic units around themes or programs of research interest. This can be valuable in maintaining the traditional departmental or other academic unit structure so vital for the advancement and mentoring of faculty, while allowing research collaboration to take place around a common theme of interest. If possible, it is important that centers be created so that scientists within the centers can share facilities, in close proximity, which allows for dynamic interactions. The concepts of centers bringing together investigators interested in a theme or subject from diverse academic backgrounds is important in developing multidisciplinary programs or projects, particularly where extramural funding sources are looking for a variety of approaches to a single disease related problem.

Introduction of New Paradigms for Research and Education

An important mechanism for expanding the research enterprise in the next century will be development of new multidisciplinary programmatic areas which will allow us to accept new paradigms for education and research, particularly in the basic sciences. We must recognize that while the academic disciplines of the sciences basic to medicine may remain separate, much of the scientific technology has blurred. Departments of Physiology, Biochemistry and Cell Biology, now and in the next century, are and will be composed of scientists utilizing similar technologies. This was not true twenty or thirty years ago. Because of the similarity of research technologies it is appropriate to reconsider traditional structures and develop multidisciplinary programs which allow us to consider new paradigms both for research and for education. It is important in this process to maintain some structural integrity of units which will allow for faculty growth and development as well as advancement and it is important also to recognize the separate nature of the academic disciplines. I believe that institutions that are able to develop acceptance of these new paradigms will be the most competitive for increasingly scarce extramural funding dollars.

Blending of the Teaching and Research Programs

It is important for the research enterprise to succeed in the next century that we consider the focus and purpose of both our teaching and research programs and the products they produce. Currently, in the basic biomedical sciences much of the research enterprise is intertwined with and in many instances dependent upon the graduate training programs. Many laboratories are run by graduate students and post-doctoral fellows who carry out much of the productive work of the laboratory. Nevertheless, it is becoming apparent that we may have been training too many Ph.D. graduates in the biomedical sciences and that these young professionals are having more and more difficulty in finding satisfying careers.

We must focus not only on the conduct of research but also on our role both as scientists and as teachers. It is important that in our graduate training programs we remember that our students are there to develop their own careers, to learn by doing, but not to have doing as their sole function for existence. We must concentrate on preparing our graduate students for successful careers whether in industry or academia. We must focus on training them both to be excellent technical research scientists and also to be independent thinkers, exhibiting scientific curiosity as well as to become able teachers of the next generation of scientists.

It is important for us to focus on separating the conduct of our research from the training of our students. We must continue to train outstanding basic scientists to follow in our footsteps and we must continue to run productive research laboratories, but we must have clearly in mind the goals and the conduct of each. We must staff our laboratories appropriately so that the research is done and we must train our students with the goals of our training programs clearly in mind. This will be an increasing challenge for us in the next century as we make sure that the supply of students emanating for our program is appropriate for the needs of the country as a whole.

Faculty Advancement

The research enterprise of the next century is dependent on our faculty. I have already mentioned briefly the demands on the time of clinical faculty for clinical patient care and teaching as well as research. At the very time that these demands are being increased, the need for disease related research both in the basic sciences and in the study of the outcomes of different interventions, therapies and health economics are critically important to the health of the nation and rightly should be the research portfolio of our academic faculty.

In the face of all this we are still, in many instances, enmeshed in traditional structures of promotion and tenure for faculty which were developed decades previously. We must question whether these remain appropriate for our faculty in the 21st century. For clinical faculty in medical schools, it is the security and structure of tenure, particularly the latter rather than economic issues, which continue to make non-tenure track faculty consider themselves as second-class citizens. In the systems in which we find ourselves currently, many young faculty members, particularly young women faculty are disadvantaged by the time of probationary periods. Consider the case of a young woman faculty member, a physician, who wishes to pursue an academic career with a research program. By the time this faculty member finishes residency training, say in internal medicine or pediatrics, she is on average between 26 and 28 years of age. This is presuming that she has also taken subspecialty training in a specific area of her chosen specialty. If she wishes to pursue an academic career and is accepted as an assistant professor, she will have six years to demonstrate her academic prowess before she must be either promoted or told she can not advance at her chosen institution. At the same time, if she desires to have children, this is precisely the time when she must begin her child rearing since there are compelling biological reasons why delaying child rearing into one's mid-thirties is less advantageous. For many young women faculty, the pressures of trying to deal with a young family and the demands of beginning a career in academic medicine with pressures to see patients, teach and develop a research program become overwhelming and they choose to leave academic careers where they may have shown great promise or to opt for non-tenure track clinical positions where they are able to maintain a more balanced life style. Clearly, we cannot afford to lose young academic scientists in this way. We must address some of the problems attendant upon traditional pathways to promotion and tenure, if we are to maintain and develop the careers of young faculty and maintain the excellence of our academic programs.