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# Don't Confuse a Tool with a Goal: Making Information Technology Serve Higher Education, Rather Than the Other Way Around

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# Don't Confuse a Tool with a Goal: Making Information Technology Serve Higher Education, Rather Than the Other Way Around

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# Don't Confuse a Tool with a Goal: Making Information Technology Serve Higher Education, Rather Than the Other Way Around

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## 01. INTRODUCTION ([Return to Index](#))

Where am I coming from, you have a right to ask? I am certainly not an expert on information technology, nor is it clear that I am much of an authority on higher education. I am simply a

liberal arts humanist, a specialist in history and law with some administrative experience. But I have been in higher education, one way or another, for almost exactly half a century. I have also just completed 12 years as a trustee of Southern Methodist University, and that experience has taught me a lot that I never learned as a professor or an administrator. My current perspective on higher education, and on the educational impact of information technology (IT), however, comes mainly from the eleven years I spent as the President of the American Council of Learned Societies, this country's national humanities organization. Almost from the moment I started to work at ACLS in 1986, and began to evaluate the national situation of the humanities fields, it became clear to me that the startling innovations in information constituted the single most important set of influences on humanities teaching and research. I was surprised by this realization, since I had assumed that new technology was important mainly in science and, to a lesser extent, social science. Humanists, after all, are the people of the book and the manuscript, workers with libraries, pencil and paper. But as I traveled and observed, I discovered the remarkable extent to which technology was changing the way humanists did their work.

Let me give just a few examples. In 1986 almost all were using word processing and were beginning to use e-mail. But perhaps the most obvious evidence of the emergence of IT was in the library, for we were already moving into the era of digital card catalogues and the creation of electronic texts. Greek scholars were expanding their capacities by using the CD-ROM Thesaurus *Linguae Graecae* (full text of all Greek literature from the earliest known writings well into the Common Era). The classicists were also learning how to teach about 5th century BCE Athens with Gregory Crane's wonderful [Perseus](#) project. Linguists were employing computers to create the important new field of computational linguistics. Geographers, historians and other scholars were using G.I.S. software to map human behavior. Robert Hollander at Princeton and his colleagues at Dartmouth were building the Dante database. Historians were creating simulation models for teaching purposes. Today, of course, we take all of these things, and more, for granted.

I should admit that during the course of my investigations of the impact of IT on the humanities, I became an ardent proponent of the use of IT in teaching and scholarship. Not, I hasten to add, that I am particularly adept myself as a practitioner; I am simply an increasingly well informed technology fellow traveler. I am also a long-time enthusiast for the academic potential of IT. Although I had been a university administrator of one sort or another since the mid-1970s, ACLS forced me for the first time to take a national view of the challenges to the humanities, and in particular the place of the humanities in higher education. I tried to institutionalize my interests in and commitment to the thoughtful use of IT in the arts and humanities by collaborating with the Getty Trust and the Coalition for Networked Information to form the National Initiative for a Networked Cultural Heritage (NINCH), which I currently serve as President. So much for autobiography and ancient history, but I thought you should understand how I have come to have fairly critical views about the impact of information technology on higher education.

And when I speak of higher education, I am thinking primarily of research universities, in which I have spent the whole of my forty years as a scholar-teacher. I am of course familiar with a much

wider range of institutions (both of my children are liberal arts college teachers), and I believe that I appreciate the bewildering diversity of the larger higher education sector. I understand that my persistent generalizing can easily be written off by each of you as not applying to your particular institution, but I would like you to think about the extent to which the generalizations do apply.

My subtitle, "Making IT Serve the University, Rather than the other way Around," should make it perfectly clear where I stand on the issue of current trends in the utilization of IT in higher education. To state my conclusion at the beginning, I believe that we are too often reacting to IT, rather than thinking creatively about how it might enrich our basic educational mission. As a few of you will know, my favorite quotation is drawn from Aristotle: "everything that is necessary is necessary upon some hypothesis." The purpose of this essay is to challenge you to articulate the educational goals around which your institution is planning its use of IT. We should not be planning for IT, but rather considering how IT can serve our educational goals.

A similar point has been made by the medievalist-technologist James O'Donnell in his intriguing *AVATARS OF THE WORD: FROM POPYRUS TO CYBERSPACE* (Cambridge, 1998). O'Donnell compares the current situation of IT application in higher education to the situation of American railroads in the 1950s: "If the railroads of the 1950s had known they were in the transportation business instead of the railroad business . . . more of them would still be in business." (pp.147-8) "If we [educational administrators] think we are in the information business, we make the same mistake of confusing a tool with a goal." (p.175) Later, O'Donnell makes the same point in even more straightforward terms: "To use our new technological tools to change education, we must know what it is we are trying to do – what the purpose of education is." (p.183) Bingo! Aristotle could not have put it better. IT is a tool. In itself it has nothing to do with higher education. But of course we can confuse subject and object, and draw education conclusions from IT, rather than the other way around. That is what I believe we are doing with IT in higher education, and I believe it is a profound mistake.

## **.02. A HISTORY OF THE IMPACT OF I.T. ON HIGHER EDUCATION** ([Return to Index](#))

But let us do a *tour d'horizon* of the impact of IT on higher education, remembering that IT is not a given, but rather a socially constructed phenomenon: garbage in, garbage out; bad applications, bad results; inappropriate design, inadequate performance.

First, let us think just a bit about the history of the introduction of IT into higher education. Here I can only give the personal impressions of a university professor. I suppose that the first impact of the technology was in the area of telecommunications – the increasing sophistication of telephone systems, the introduction of facsimile technology, and wired networking, especially in conjunction with video and television. At about the same time xerography and other photoreproductive technologies came into play. We take all of these largely for granted today (except in so far as wireless technology may revolutionize telecommunications), but they clearly have had a profound impact on how we teach, research and administer our universities.

But I am mostly interested in the introduction of computing into higher education. My discussion is informed by conversations with my Princeton colleague Michael Mahoney, an expert on the history of computing. The story here goes back to the mid-1950s and 1960s, when universities first began to rent or purchase computers – previously their scientists had built them. These early commercial machines, such as the IBM 650, were not necessarily very expensive. They were primarily used for scientific research, and of course they were paid for by research funders, principally the federal government. Indeed, in these early days, university administrations mostly played follow-along, paying for the percentage of computing time they used. The early machines were housed in engineering schools or scientific departments, and it was not until the later 1960s that most universities built centralized computer centers with increasingly powerful and costly machines, mostly for the benefit of physical scientists. At Princeton in the 1960s, for instance, the administration was still paying for whatever time it used for administrative computing, and there was no instructional computing. The university's attitude was that computing costs had to be recovered from users, the sole exception being the small amount of funding contributed by the university to make computing time available for general users (who could not afford the high hourly rates charged for CPU time). As Mahoney has pointed out to me, "The scientists could pay for it, so it was their machine." The computing environment began to change, however, when university departments began to buy their own minicomputers in the early 1980s, and of course it changed radically by the mid-1980s when the PC, microcomputing revolution took hold.

Mahoney tells me that by the early 1960s, discussion had begun about using computers for instructional purposes. Indeed, as of 1966-7, some 40% of computer time at 1200 universities was allocated to research, 30% to instructional use and 28% to administration (according to the Carnegie Foundation for the Advancement of Teaching reports of that era). By the late 1960s, critics such as Anthony Oettinger had already begun to focus on what he believed to be false claims for the utility of computers in teaching. I need to learn more about the subject, but I would be surprised if the bulk of this teaching was not confined to a few areas of the university, especially science, technology and language instruction. More imaginative and widespread development of instructional technology did not come along, for the most part, until the mid-1980s.

But one of the main parts of the university in which computing drove behavior was the library. From the 1960s libraries began to automate, struggling to buy or develop systems that would facilitate acquisition, cataloguing, circulation and other traditional functions. Later, libraries transformed their basic functions through the searching power of electronic catalogues and other digital tools, and through the access they provided to remote databases. Libraries hired technologists and built "systems" divisions to introduce and maintain the technology. They fairly quickly discovered that, far from decreasing costs by replacing librarians with machines, computers drove up costs and required the expansion of library staff. They also found that they had driven a wedge into the traditional authority structure of the library, since the new technologists were soon competing with old-style librarians for control of library administration, and the two groups were often at odds with one another.

Over time an increasing proportion of the faculty began to use computers, at least for word processing, while the increasing useability and range of software made new applications available to teachers and students. Then when Bitnet and, later, the Internet, combined the digital and telecommunications revolutions later in the '80s, there was a stunning expansion in the proportion of university personnel using computing, and in the range of purposes for which computing could be used. By the early 1990s we had access to the World Wide Web and, later, to Internet II. It was at this time, as I earlier suggested, that interest in instructional computing expanded and deepened. At the turn of the century, then, IT pervaded the campus, and the era of IT had arrived, in all its costly and confusing glory.

Looking back, we can see that by the 1980s, with the general emergence of campus-wide computing centers and the widespread move to the use of administrative computing for a broad range on interrelated purposes, the universities had begun to deal with computing technology in new ways. The fact that computing was frequently institutionalized in "computing centers" had implications not only for the centralization of campus computing, but also for the ways in which decisions about computing were made. There was, so far as I know, little broad discussion of the larger educational implications of computing in these years of the computer era, and even less about the implications of the rapidly expanding technological revolution to the fundamental educational purposes of the institution. At the same time, of course, administrative computing was becoming more and more important, and continued to be more and more costly. Educational institutions also had to expend vast sums of money to network their campuses, and to build new types of computing facilities to provide the distributed access everyone now demanded.

More recently, the pace of change has increased – it may be that something like Moore's Law applies to computing in higher education. Perhaps the most stunning recent development has been the revolution in administrative computing software – the PeopleSoft, Oracle, SAP revolution. Apart from the question of how long it will take to make these software systems work properly, and whether they will ever work well, there is the question of the incredible cost of the systems. Not just the continuing expenditures, for one of the unpleasant laws of computing turns out to be that it costs more to maintain systems than to build them, but the mindboggling unanticipated expense of installing a system like PeopleSoft. I assume that every institution represented in this symposium has its own sad story, but I can still remember the shock created during the SMU Board of Trustees meeting a year ago when the Financial Vice President revealed that there would be something like a \$13 million overrun for the installation of our PeopleSoft system. In a relatively small university, even these days \$13 million could buy a lot of books and could compensate a lot of professors. But because we are hooked on technology, we have wasted vast sums of money on a fool's quest for efficiency and savings. Mike Mahoney has argued that in IT:

Things seem out of control now, because something happened in the '90s to provoke a land-rush mentality. Surely the Internet and the Web are part of the reason, but so too is the hyping of computing by the Administration and Congress, and by the business community from whose

ranks the universities draw so many of their trustees. Universities have suspended their traditionally critical faculties (pun intended) and jumped on the bandwagon. And I mean "suspended," because they appear to have been thinking about these issues more critically thirty years ago than they are doing now. (E-mail communication, 14 August 2000).

I realize that this summary does not do justice to the history of IT in higher education, but I hope it does provide a tentative context for my discussion. I want to highlight both the tremendous impact IT has already made on our campuses, and the fact that this impact is the product of the specific manner in which IT was introduced to the campus. We can see the tangible presence of IT all around us and in every aspect of our institutions: administration, libraries, scholarship, teaching and more. But it is not so obvious that the technology did not have to be introduced to the campus as it was, that it had to be managed in the way it was, nor that very different sorts of financial decisions might have been made in the process of introducing IT. We need to think about who made (and makes) these decisions, and even harder about who determined (and determines) the standards according to which the decisions are made. What was the hypothesis? What were the educational goals? Above all, we need to put all strategic decisions about IT into the context of thoughtful and purposeful educational policy.

Let me illustrate this by one example – the emergence of the campus "computer czar." Whoever decreed that there should be a Vice President for Computing, or, more recently, for Information Services? Was the position created simply because nobody in the ordinary administrative structure knew enough in the 1980s to help shape decision-making? Or because the PC revolution so decentralized on-campus computing that there was a felt need for greater coordination of computing activities? How has the creation of such a position affected the administration of libraries, which are the second largest sites of computing on most campuses? What is the impact upon both research and instructional computing to have so much executive power in the hands of administrators who know little about either research or teaching? What is the relationship between computing and "information" technology?

My colleague David Dobkin, the Chair of our Computer Science Department, thinks that the CIO job (as it is now frequently called), should be thought of primarily as one dealing with academic computing (research and instructional) – leaving administrative computing and infrastructure management either outsourced or handled at different (and lower) levels. This would mean, according to Dobkin that the CIO should be ". . . an academic type. You need someone with the same DNA as the faculty." (E-mail communication, 17 August 2000) Perhaps one should only say that the CIO should have some real feel for the content of information. I will come back to the point, but I think that the command and control structure (the metaphor is deliberate) we have put in place for computing and digital information has had unanticipated and largely adverse consequences for the educational goals of the university.

### **.03. AREAS OF CONCERN REGARDING I.T. ([Return to Index](#))**

Now I want to survey briefly a number of particular areas of campus policy and practice that

seem to me to raise concern for the potentially adverse (or at least sub-optimal) effect of IT on educational policy and practice. This does not pretend to be an exhaustive list, and I will mention each area only briefly, but I hope these examples will illustrate my larger point – that we must not confuse tools with goals.

### 1. The Library ([Return to Index](#))

Surely one of the major educational activities most deeply affected by IT is the library, which is well along the road to being transformed by IT. It is now hard to imagine how we administered libraries before computers. Almost every step in the library process, from acquisitions to the delivery of books and journals is now automated. The electronic catalogue, and especially the capacity to search online across library catalogues, provides tremendous new research power. The library now provides online access to databases around the world so that networking has multiplied the power of computing, and so on. And, of course, remote access to library databases, the virtual library, means that the library as a place, as a physical facility, is potentially less important than it used to be.

As a technological enthusiast, I do not find the mechanics of the transformation of scholarly communication by IT problematic, although of course there is plenty of room for debate about strategies and structures. But I am convinced that on many campuses far too little thought has been given to how IT is being permitted to change libraries, as well as to how it is (or is not) also transforming the processes of teaching and scholarship. Do we know what we want the virtual library to be and to do? Is enough money and are appropriate personnel being allocated to libraries to perform their potentially expanded role in both teaching and scholarship? Do library directors have sufficient independence, resources and training to lead libraries into the new era? What is the most desirable relationship between the training of faculty and students to use IT and the expanded functional mandate of the library? Does the “teaching and learning center” belong in the library? This is to suggest that the library of the IT era needs to be broadly reconceptualized as we think our way into the university (or college) of the IT era. What is the goal of the library in this era? How should the library be restructured to attain this goal?

I could of course devote this entire talk to library problems, for I confess that they seem to me the most profound of all educational problems these days, but I will mention only one other aspect of the library situation — the rising cost of serials, mainly in the STM area. The emergence of e-journals has only intensified the problem, because e-publication is being carried on in a legal and commercial environment of licensing (rather than purchase and ownership), so that libraries have less and less control over the cost of individual serial titles. Price gouging by commercial STM publishers is not solely the product of IT, though the increased costs of licensing and product packaging are a large part of it. But the currently suggested university response SPARC the attempt by universities and their libraries to self-publish STM materials in competition with predatory commercial publishers, depends upon IT. Who does not want more information for less money, but do we know what will SPARC-like projects do to the quality of academic publication? Is there no relation between the current system of scientific publication and the quality of scientific research? Do scientific researchers prefer to have their universities own the copyright to

their work? I do not know the answers to any of these questions, but I think these questions deserve to be asked. Thus far the scholars themselves have not had a controlling voice in the discussion. Is this a matter to be left to provosts and librarians, to the AAU and ARL?

## 2. Intellectual Property ([Return to Index](#))

A closely related area that has been dramatically affected by IT is intellectual property. I have already mentioned the licensing problem in libraries in relation to the acquisition of electronic publications, but licensing also raises questions of "fair use," since it not so obvious that the traditional exceptions to intellectual property rights in behalf of fair use for scholarship and teaching will be protected under the emerging e-copyright regime. The library is also struggling to determine whether the law will permit the full development of e-reserves, or the copying of digital collections for educational purposes. The new licensing regime also creates comparable problems for individual scholars and everywhere else in the university that software is purchased and used.

At the moment, however, the hot button issue concerning intellectual property has nothing to do with the library, but it has everything to do with the development of educational software. Put too simply, the problem is that universities now want to control potentially profitable electronic publications of faculty members under university patent law policy rather than their previously existing copyright law policy. What this means is that for years universities have asserted that patents created by scientists and engineers are the intellectual property of the university, since they were created in expensive university laboratories. Faculty shares in the earnings of registered patents according to well-established formulae on each campus. In the past, however, faculty have been permitted (indeed encouraged) to copyright their own books and articles, and to retain any profits from royalties.

Now comes courseware – software used for teaching (though frequently also for research) – that has the potential for being highly profitable. It is also, one must say, also more closely related to the teaching function for which faculty are primarily employed. The response of university administrations has been to attempt to expand the patent policy to cover courseware, and to claim that the software belongs to the university (with a profit-sharing arrangement for the faculty). The faculty, as e-publishing scholars, is thereby being reconceptualized, without their consent, as "workers for hire." Big problem, many articles in the Chronicle. But how much enlightened contemplation has been given to what is educationally or intellectually at stake? How important is courseware to the educational mission of the institution? To what extent do we need to provide incentives for faculty production of high-quality software? Is a controversy over university by-laws the best way to think through educational policy? I think not. But the courseware copyright policy issue is one of the many ways the law of intellectual property, as applied to IT, is changing the way a university works and relates to its constituencies. I will not even mention Napster or the potential liabilities of universities as online service providers.

## 3. Distance Education ([Return to Index](#))

A third area of concern with respect to the impact of IT is distance education. Who would have

thought, only a few years ago, that our great universities would now be devoting so much apparent effort (and so much money) to what probably would have been called continuing education a decade ago? Most of the elite private universities, after all, thumbed their noses at adult or continuing education, unless they thought of it as useful for the cultivation of their alumni? Suddenly even the elite universities are hungry to get into what is currently called “distance education.” Would that have happened without the new IT? Not a chance, so far as I can see. Too much of what is now being called distance education in most institutions is not an educational idea; it is a business idea. I will come back to the implication of commercialization. The point I should like to make here is simply that distance education should be thought of as education. The new technology now gives us the opportunity to deliver education remotely (virtually), and that should be a cause for educators to celebrate. But I will only celebrate when I am convinced that our creative energy is going into using technology to deliver a better quality educational experience rather than fattening the university bottom line. Are we really thinking imaginatively enough about the pedagogical opportunities (and difficulties) of virtual education? Have we realized that we are engaged in “distance education” within our campuses, as well as without? How does virtual education on the campus differ from distance education? The power of IT is to empower us to provide access to information and guidance in every dormitory room on campus, after all, and we need to think how to use that power in conjunction with the physical presence of faculty and facilities. Is it a problem, by the way, that our libraries are emptier and emptier of students every evening? Is sitting in front of a terminal truly the best way to learn? Or for that matter, how does the use of interactive teleconferencing technology affect the learning process? This, I put to you, ought to be recognized as the educational problem of distance education.

#### 4. Commercialization ([Return to Index](#))

My fourth problem is, as I have just hinted, commercialization. Distance education is hardly the only evidence of the commercialization of higher education in response to IT. The emergence of a potentially thriving propriety virtual university sector (the University of Phoenix, Sylvan Learning Systems and, as of last month, DeVry) gives most of us pause. The change in university attitudes on copyright law given the commercial potential of software is another example of the phenomenon. But, more important, the general impulse to become the university.com is quite pervasive these days, however poorly understood and articulated it may be. Arthur Levine and other cheerleaders for commercialization have been quite clear about what is at stake –that if the universities do not act, the moment of opportunity will be lost. I believe they are dangerously wrong.

At one level, the universities are simply going through what all nonprofit cultural institutions are encountering as they seek to reinvent themselves as virtual institutions, living as much on the Web as they do as museums, libraries or historical societies. The problem in going virtual is not primarily in developing the technology, although that will always be a substantial challenge, but in constructing a viable business plan. How are the trustees and administrators to recover the enormous costs of digitization, equipment purchase and maintenance, and to retain high-priced high-tech employees? The development of business plans for digital collections in museums and

libraries, for instance, is extraordinarily complex – and it is not clear that anyone knows how to recover developmental and maintenance costs yet. It is difficult enough to develop income streams simply to maintain the databases created at such great cost. But when one attempts to move beyond cost recovery and attempts to produce surpluses (as we in the non-profit world call profits), the matter is more complex, and more troublesome. The problem is that few non-profits have the capital resources to develop ambitious digital programs, and that they are turning to for-profit alliances and the capital markets in order to make their move into the digital era. As I suspect David Kirp will ask in his conference paper, the larger question is whether the nonprofit university is not subverting its mission in its quest for IT-related income. Doesn't it matter that some of our finest universities are beginning to behave like proprietary educational institutions?

I have neither the time nor the knowledge to describe fully the multitude of ongoing strategies to build electronic programs and to enrich the university virtually. I am probably much too cynical, for doubtless some of these efforts are genuinely motivated by the desire to improve education through technology, but, judged by their press releases, none of the most highly touted schemes strikes me as being primarily motivated by educational policy. Again, the mood seems to be that if “we” do not do it, “they” will, taking the money with them. I am thinking about Fathom, e-Cornell, uNext and other for-profit consortia offering Web-based sites. Perhaps we should call this the era of U-Portal.com, or “the university as portal.” Question: what is the difference between Yahoo or AOL and Columbia University? Answer: less and less. The Chronicle (14 April 2000) quotes the “organizers” of Fathom.com as saying that the site “will transplant into cyberspace the intellectual milieu of academe – going beyond course offerings to include museum exhibitions, scholarly lectures, artistic performance and the like.” It sounds as though this aspires to be a very high-class entertainment portal, not unlike NFL.com. I fear that such an endeavor will experience the leveling effects of most media attempts to make money from scholarship. The History Channel, for example. But enough, this is, once again, David Kirp's subject. My point is only that such commercial efforts are evidence that the tool seems to have become the goal.

##### 5. Curricular Standards and Processes ([Return to Index](#))

I can think of many more examples, but one final problem I should like to discuss is the impact of IT on curricular standards and processes. I was intrigued to read in the 11 August Chronicle that a consortium of the higher education accrediting bodies “are near agreement on guidelines for evaluating distance education that differ from traditional accrediting standards by focusing on how much students learn.” One of the accreditors is quoted as saying that the advantage of the new standards is that they really focus on “. . . student learning instead of institutional preferences. . . . We view technology as a tool that can really enable people to learn in their own way.” Well, I think outcome assessment is an interesting development in higher education, but I think we should be a little worried if the accreditors take this to mean that students should set their own educational goals and be assessed accordingly. But what intrigues me is yet another piece of evidence that IT is overtly and covertly producing changes in educational standards. If so, the camel's nose is truly under the tent.

Another bit of evidence for this trend is the recent AAU-ARL announcement of a set of principles

“for Emerging Systems of Scholarly Publishing” ([Chronicle](#), 7, 16 June 2000). The AAU-ARL project is laudably focused on how to respond to the serials price crisis, but it also calls for reducing the emphasis on the quantity of publications in evaluating a professor's work, and for finding new approaches to peer reviews of electronic articles. Now excessive article publication is not exclusively a product of IT, though it is doubtless related to technological improvements of many kinds, but the new policy recommendation emerges from the efforts of the librarians and provosts to try to think through what to do about one important aspect of the IT era. Perhaps more significant is the extent to which the new e-publication of monographs (and even dissertations) will affect the ways in which their authors are evaluated for tenure and promotion. And we have barely begun to cope with the question of whether we will give scholarly “credit” for the production of courseware or scholarly databases. Will Harvard today promote to tenure a young Greg Crane who produces an online database comparable to [Perseus](#)? Perhaps less important, what do we do about online sites like [teacherreview.com](#) that mounted student teacher evaluations on the Web? Or with any one of the several Web-based commercial student note-taking services?

I could go on, but my point is simply that the new technology has unleashed such creative, frequently entrepreneurial activity that is so expensive, pervasive and difficult to manage that it has had an impact on some of our fundamental practices in teaching and scholarship. It will continue to do so, and it will drive us if we do not drive it. Have we established the mechanisms to review, monitor and evaluate these developments? Have we given enough thought to how we can employ IT thoughtfully and self-consciously to meet our explicit educational policy goals?

#### **.04. CONCLUSION: PROBLEMS THAT NEED ATTENTION** ([Return to Index](#))

What is to be done? I have simply tried to provide you with a series of examples of that I believe to be a general problem in the way the institutions of higher education are dealing with IT, but I do not pretend to have a program designed to cure all the ills. I would, however, like to propose a few specific problems that deserve attention in the near term.

1. I think that most institutions need to review their governing rules and formal educational policies in the context of the new technology in order to take into account the new relationships and dynamics created by IT. The one area in which action has begun is in intellectual property, for which some excellent university statements have been drafted. But we definitely need specification and clarification of the rights and responsibilities of faculty, students, staff and administration in this new environment. Our governing assumptions are still for the most part premised on an analog environment, and they do not take into account the educational ecology of the IT era. Some of the problems are already quite apparent: ownership of courseware; the legal terms of faculty employment; allocation of faculty time to outside dot.com activities; the copying of research and teaching materials; limits on the use of the Internet (and intranets) for faculty, staff and students; electronic privacy; rules governing the authority of research material taken from the Web; the implications of the use of university IT equipment. And many, many more. I am not here proposing a rule-bound environment, but rather advocating that educational

institutions put on the table some general propositions for roles and responsibilities in the IT era. We need to understand better how to relate to one another in this environment. What are our goals, and what are our guiding principles?

2. I think that we have to consider the reorganization of some aspects of the authority/command structure of the institution in order to get IT decision-making into educational perspective. I have already mentioned the emergence of the upper level administrator for information technology, a CIO, as one of the first university administrative responses to the need to cope with IT. I have also mentioned that this office is frequently in conflict with the campus librarian and, for that matter, with the administrators of other educational units. As my friend Barry Sullivan of Washington and Lee University has observed, for the most part "the IT people keep doing basically what they've been doing and the library keeps doing basically what it's been doing, each wanting to take over the other's empire, but not going to the trouble in either empire to look at the whole picture."(E-mail communication, 14 August 2000) The administrative theory has been that the buck has to stop somewhere, and that is sensible. But the operational result has been that, too often, the information czar focuses primarily on administrative computing since that has usually been the institutional priority. Some institutions are experimenting with combining the CIO and the librarian, and that may be a good solution. Even if it is, though I fear that instructional (and research, to a lesser extent) technology will tend to be ignored. While I do not know the answer, I think we must create authority structures that evaluate technology needs and opportunities more in terms of intellectual and educational needs rather than administrative imperatives. It might not be a bad idea to find CIOs who have real experience in teaching and research, so that they will be part of the academic culture themselves.

3. I believe that we need to rethink the institutional ecology of the university in the IT era. As I have indicated, I think that the role of the library is being steadily transformed, and I think it should probably play a larger role on the instructional side. Librarians are increasingly among those who have the technological capacity to bring faculty into the IT era, and to assist students in locating information far outside the walls of the library. They are also playing a role in identifying and mounting information on library servers. It is possible that the library should take on at least some of the tasks currently undertaken by teaching and learning centers, at least insofar as technology is concerned. We also need to rethink the function of computer centers in relation to both the library and academic units. We no longer live in the mainframe environment that seemed to require such centers, and we have to think how to retrofit them for current hardware and software needs.

4. A related observation is that institutions of higher education are underinvesting in the human resources necessary to bring the teaching and research functions of the university fully and quickly into the IT era. There are many good examples of how this can be done – the Institute for Advanced Technology in the Humanities at the University of Virginia being my personal favorite among them. But too many campuses are leaving it to students and faculty to educate themselves on how to use the technology to best effect. I am particularly concerned about instructional technology. As I have already suggested, we seem to think of IT instruction primarily

in the context of delivering education off-campus, whereas remote access to teacher and information is in fact the reality of all instructional technology, including education on-campus. There are serious questions here of the impact of technology on the learning process, and we need local experts to help us work them through. Who such experts are, where and how they are trained, and where they should be based on the campus are serious problems that require immediate attention.

5. Finally, we need to continue to pursue the collaborative possibilities that seem both feasible and urgently necessary in the IT environment. Libraries have collaborated for a very long time, and the new possibilities for digital collaboration are appealingly urgent. Distance education is another area in which inter-institutional collaboration for them is emerging, and rightly so. The technology makes teaching, reading and researching all rather easy to do in a multi-media, multi-institutional environment, and the tremendous costs of the technology may force us into the sort of collaboration to which we have in the past paid mostly lip-service. And, of course, the entire world is available in an era of virtual communities – we can now begin to make good on our aspirations to internationalize the campus. If we plan such consortial activities with thoughtful attention to the educational values involved, we will serve everyone better.

I am afraid that I have taken rather a long time to make a very simple point. It is that technology is not something that happens to us. It is something we create. We must not confuse a tool with a goal. We must, therefore, be sure that the technology serves the fundamental purposes of our sector, higher education. That means that on each campus we must determine what our fundamental educational goals are, and how technology can serve them. That will be more difficult than it sounds.

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