

STEVEN MULLER

## THE POST-GUTENBERG UNIVERSITY

“The Post-Gutenberg University” as a title is rather interesting because it raises the question of the extent to which the present university could be fairly characterized as the Gutenberg University. In view of the fact that the lecturing technique has successfully endured four centuries of writing, it might be that we will move directly from the pre-Gutenberg to the post-Gutenberg era.

What I would like to suggest is that we are, whether fully conscious of it or not, already in an environment for higher education that represents the most drastic change since the founding of the Universities of Paris and Bologna and the other great universities some eight or nine centuries ago. Our problems are, therefore, fundamental and radical.

There are four major areas in which the colleges and universities of the very near future are going to be radically different from where we still are and where we have been in the last 20 or 25 years: we are going to serve a substantially altered clientele; we are going to deliver our services in new ways; the content of our services is going to be different; and the style in which we operate is going to change.

The one given is, of course, that we are all short of money now and no matter how well we do in the future, we will always be short of money. That is the only constant on which we should count.

Even though the clientele will change, the audience for higher education in American society in the years ahead will continue to some extent to consist of people who have emerged from school and have not yet entered careers. This may be only because we really have to continue serving one of our primary social roles, which is to provide a place where that generation can aggregate in a peer group context for two primary reasons: on the one hand, it is intolerable for them to continue to live at home, intolerable both for them and for their parents; and, on the other hand, it is intolerable for the economy to absorb them into the labor force. In some sense, we render a social service by keeping them out of the labor market and away from

their families. And since there is no evident replacement for that, we will continue to serve them. They will, however, for a variety of reasons, constitute a significantly lesser fraction of our clientele, and over the longer run, it may be that our service to them will be less than half of what we do at the collegiate and university level.

### THE NEW CLIENTELE

An increasingly greater fraction of our clientele will be older people, many of whom will have gone through at least a collegiate state of higher education earlier, many of whom will also have gone through advanced professional or graduate education, but who will be looking to institutions of higher education for retraining in their own field. That is going to be mandatory because the state of knowledge now dates itself so rapidly that it is inconceivable that someone who emerges with the latest learning in any field is going to stay in command of that latest learning for more than a decade. And if that person is going to be engaged professionally for longer than ten years, that person is going to seek relearning. At least a part-time exposure to reacquaintance with one's own discipline is going to be a given in all careers. It is beginning to be that way now and that growing audience, therefore, will look more and more to us to deliver these services in the future.

Along with the demand for up-to-date knowledge comes the fact that Americans are living longer. It is likely that life expectancy will increase even more. We will have a large part of our population quite vigorously active through the ages of 70 to 80. This population of people may or may not be actively engaged professionally but will have active minds and will presumably want to occupy part of their time with educational activities, but not necessarily for professional or credentialing purposes.

Underlying that is a more important phenomenon, which is that we are living now and will live in the future, to a greater degree, in a society where leisure is a part of virtually everyone's life. This is not to suggest that present levels of unemployment will remain indefinitely as high as they are and that it will be the leisure of the unemployed. Rather, if we examine the way we live today, the least noticed aspect of our American civilization, which we share with the most

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highly developed countries of the world, is the degree to which leisure, which as little as a century ago was the privilege of a small aristocracy, has been democratized.

It is not really possible any longer for people to spend much of their lives effectively in what used to be called toil. Farming, for example, is still an occupation that takes a lot of time, but it is not as physically exhausting anymore because most of the physical labor now is done by machinery. Production has become and will continue to be an automated process, and it is predictable that the robotics which we already are witnessing will increasingly take over the manufacturing and production process. If we look at the American home, it is difficult to conceive of a homemaker, male or female, really slaving in a kitchen because one does not slave over a microwave oven. We are not far, presumably, from the home computer where you put your order into the market and the meat carved by computer or robot arrives at your door. Presumably it will still be delivered by hand.

Almost every adult now has time on his or her hands which can be considered prime time because it is not the few minutes at the end of 12 or 14 hours of exhausting labor. It is time after labor which has not been exhausting. It is time during which one has the energy to be alert. It is also potentially dangerous time because, for many people, leisure spells boredom and their problem is how to occupy that time. But that leisure is present.

It is interesting to note that just in the last two decades in this society and in other societies like ours, a whole new industry has been formed which is designed to produce something jobs no longer produce: namely, sweat and exercise. It is inconceivable that nineteenth century Welsh miners would spend their free time jogging. They presumably did not need to worry about keeping physically fit. But the fact that we have everything from European health spas to enterprises that are springing up everywhere which are designed to tune you physically means that we no longer get that from the working day.

Think not about the money to be made in that industry or whether you should join in this happy group of exercisers, but think about what it means in terms of the existence of leisure in our society. The fundamental character of human beings is not going to change all that much, nor will everyone who has leisure have an appetite for education. But out of sheer boredom alone, some people are going to look at education as a potential means of entertainment, and they are going to look to us to provide that. What that means, basically, is that we are going to serve a client-

tele which is adult, which wants to participate in education for a variety of reasons such as professional—either retooling in their field or learning a new field—or personal—for entertainment or cultural value or learning for learning's sake. This new clientele will probably be on a part-time basis, rather than necessarily wanting to be in residence on our campuses.

## NEW SERVICES

The character of our clientele is linked to my second point: the way in which we deliver our services is already undergoing rapid change and will be radically altered within the next two decades. The combination of television, microwave transmission, satellites, cable, fiber optics, and computers means that we are already capable of delivering educational services to people where they work and live by the use of electronic communications. The biggest curse of that technology to date, namely, the fact that it is difficult or expensive to make it interactive, is about to disappear. It is now absolutely necessary to be aware that probably before the end of the 1980s, or certainly by the 1990s, it will be perfectly feasible and economical (if you can charge a fee) to have a communications link between a teaching agency and a client location which is wholly interactive in terms of sight and sound and which can be individualized according to the needs of the client. It will be possible, for example, at any hour of the day, through microwave, cable, satellite, telephone wire, or whatever, to have a video and audio link so that there can be discussion with an instructor in one place, and the audience someplace else.

We will be able to reach people in their homes and all they need for reception will be a cathode ray tube. They already have those, and they probably will have more of them or a more sophisticated form on which all of these things take place. Our institutions of higher education will also have them. Because that technology exists, its use will be demanded of us, and we will use it. The only question that remains is how some of us will adapt to those uses.

How are we going to carve up that new audience and where are we going to deliver these services? Are those of us in metropolitan areas going to serve primarily clients in our own metropolitan area? Will major universities with large and scattered alumni bodies serve their alumni as a primary audience being indifferent if they are located in the Northeast and their alumni are in the Southwest or Far West? It probably does not make any difference because these media of communication are distance- and space-independent.

To what extent will this be internationalized? To the extent that English is the telecommunications *lingua*

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*franca* of today, will transmission in English be satisfactory to reach audiences at least in English-speaking countries? How far are we from getting past about the only other major global obstacle we have left, which is computerized instantaneous translation of language? Probably not very far.

It is highly likely that, before the end of the century, it will be possible to make input into these electronic media in English, and by computerized translation have an audio output at the other end in Russian or Chinese or Japanese or German or Italian, and vice versa. This means that in serving a different audience, our delivery systems are going to change, because it is inconvenient, expensive, and unnecessary for people to come to campuses when they can be far more effectively served where they live or work. In many cases, one has to ask oneself what the campus offers that is indispensable.

We need to examine to what degree audio/video contact is *manqué* in terms of human communication. Is it better if, at the beginning and at the end, one actually can feel the person? How necessary are the feelies and smellies if you can see and hear? If it turns out that, to a large extent, this technique works as a substitute for being in the same room within smell and touch of each other, then what about the fact that you need laboratories to teach science?

If you are reaching people where they work, and if there are laboratory facilities where they work, it may be cheaper for the company interested in continuing instruction for its employees to let them use corporate labs (if the facilities are roughly the same) which are tied into university labs with audio/video equipment. Then, the employee can see a university laboratory with a professor doing something and replicate that process in their own laboratory. What, if any, difference is there going to be between working side by side at exactly the same installation and working side by side at different installations but linked by video and audio? If there is no need to bring students into laboratories, then why is there any need to bring them to campuses at all? Examinations? Well, multiple choice, of course, can be done anywhere, but even oral examinations could presumably be conducted this way and probably will be.

#### NEW CONTENT

The third point is that the content of what we do is going to change. We are all going to have to jolt ourselves out of our habits or perception and rethink, individually and collectively, what we believe learning is. To a very large extent, we have all become habituated to equating learning with at least two things:

memorization and reading. Both are undoubtedly part of learning, but they may have to be rethought in terms of their actual role in the learning process because of the new technology that is now available.

Everyone knows about computers. Computers, among other things, are extraordinary tools for enhancing memory. Properly programmed, a computer can produce with accuracy and great speed an enormous amount of data. If you want to know, for example, all the kings of Britain from Alfred the Great or William the Conqueror onward, you can laboriously memorize them and their dates, or you can punch them in the computer and there the screen is, full of them. And every name presumably will be spelled right and every date will be correct. The interesting question is why, in heaven's name, would you want that information? Even more interesting, though, is the question that if it is already true that the new technology provides memory enhancement—a quantum leap in terms of what human beings have been able to dispose of before—then what is the point of putting such a stress on memorization?

Shouldn't we really be educating people to the point where they know what kind of data they want to use and why they want that data, and then have the mental capacity to deal with that data to address a problem when they have it? We have said that we teach people to think. To some degree we do that, because some of the things that we ask students to read presumably prompt them to think. Most of our examinations, however, really ask for what they can recall.

It is interesting that there are arguments in faculties with which I am acquainted about the degree to which you allow the students to bring some of these memory enhancers into the classroom when they take examinations. Are we going to insist that students recall data in their own minds when in real life later they are going to use the computer for that data? We may have to rethink what an examination is, which leads one to rethink what we really are asking people to do. What are we trying to educate them to do? If we are serious about educating people to solve problems, is there anything left that enables people to integrate what they know, because we have compartmentalized knowledge so much? Are we in danger of having people who can manipulate data and hide it in compartmentalized ways? Should we teach them how to integrate what they know into some meaningful framework? That has not been accented in our educational processes lately.

We are going to have to teach people how to screen out data. It used to be that the mind could not remember enough. Now the mind is going to have enough

data at its disposal to drown any sane person. We are either going to have to teach people how to live insanely—we are doing a good job of that so far—or we are going to have to simplify the data for them, which means an educational process that tells you: This is what you need to look for and other stuff is not relevant.

We are also going to have to re-examine the role of the word—the spoken and printed word—as the primary vehicle of communication. One may immediately assume that numbers are relevant here, and that it is legitimate to communicate in numbers. But it has not been legitimate in Western civilization for several centuries to give serious weight to communication and learning by images. Yet, of course, it is true, if we go back to what little we know of the origins of our society, that images have always played a powerful role in the transmission of culture and in the transmission of concepts. We are living now with a technology that enables us, whether we want to or not, to be exposed to the most powerful imagery that humankind has been exposed to, that is, living color and sound on a giant scale.

As long ago as the early 1960s, I had an experience teaching comparative government at Cornell University where students did not respond particularly well to reading what was then considered contemporary European political science or history. But when they were given the opportunity to see old newsreels, they packed the hall, and all of a sudden the whole thing took on new meaning. In those days we were trying to remind them of people like Hitler and Mussolini, who were not yet history in the textbooks. But they had existed before the living memory of those students. Those personalities as living presences on the screen became powerful. We are going to be able to recreate everything to a large extent. The commercial industry has already done that: we have seen Charlton Heston as God and Moses and Ronald Reagan as President of the United States!

We are also going to have to teach people by the use of images, and we are going to have to legitimize that process. And that again raises questions about the learning process, the teaching process, and the examination process. In addition, it means that the content of what we do is going to have to change, and in doing so, it will solve some awful problems.

As a result of the society we live in, our attention span has shrunk. The ability of the average person to absorb anything for any length of time has been truncated a great deal. There is solid evidence for that: speeches are shorter, jokes are oneliners. We know the attention span is shorter and also know that much of what we have done traditionally in teaching is boring, particularly in comparison to the entertainment media. It is probably heresy for the president of a traditional university to suggest that we should compete with the media and be entertaining, but if we do not compete we will go down the tubes and our campuses are going to be roughly like the old nunneries that have been abandoned by the order. The technology is there,

and it is made to be used. In fact, it may be necessary to achieve integration by the use of images. The marriage of the picture to the word is not unrespectable; it is traditional.

In computer imaging, we can design our own images as we go along. We are going to have to teach that way if we want to teach at all. And our teaching will have to be more effective than it is now. It is not a question of whether you like it or whether you find it startling. Either you will be doing it, or you will be a client—as an unemployed person—and somebody else will be doing it.

Furthermore, our old ambition to turn out a finished product is nonsense. The fact is that the best service we can now render, especially for those young people who are aggregated for social reasons on our campuses, is to give them a good fundamental education. To train them in the state-of-the-art is terrific, except that the state-of-the-art is gone three to five years later, and they will have to catch up with it again. More importantly, we ought to be training them to be lifelong learners, not as a hobby, or simply to escape boredom, but because they will need it professionally. That means we have to rethink our content in those terms, too. We need to rediscover what the fundamentals really are and to give our students some context into which they will orient their learning process for the rest of their lives.

## NEW WAYS OF OPERATING

The fourth point is that the style in which we do business is going to change. A great many people are now worrying about how to support full-time students for the indefinite future, when they really ought to be worrying about where to solicit the part-time clientele that they are going to be serving, how to serve them best, and how to pay for that service.

At a place such as The Johns Hopkins University, it is becoming almost a matter of indifference what we pay people in the sciences, because the payroll is only a small part of the cost. To hire a full professor of chemistry or microbiology, we need to be prepared to spend between two and four million dollars in laboratory equipment. For example, if we have a great graduate program in medicine, we may need to have two or three imaging magnetic resonance spectrometers. But is a Hollins or a Haverford going to have that? What is going to happen just to the teaching of science?

There may be an answer to that, and that is that 3,000 disparate institutions in the United States, each of which is marked by an unquenchable desire to survive and a parochialism to match, may actually have to become serious about sharing. Sharing may just be one of the ways in which we apply the new technology, by reaching out to students where they live and work, and by offering certain kinds of science instruction that can only be given by institutions which have sophisticated resources for that purpose, and which need to be shared with institutions that, either because

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they are different or because they have concentrated on something else, simply do not have these resources.

We may also find that we are sharing globally. I have talked on my own campus about the emergence of world class universities which are in touch with each other because they have more in common with each other across national frontiers, oceans, and so on, than they do with colleagues who are working at different levels in domestic institutions only 20 miles away.

An obstacle to international cooperation has been travel; the new communications may make that travel less relevant, less necessary. Instead, we will have interconnections, networking, and sharing. For example, we may save on library resources because we will no longer maintain all those books which are chemically decaying anyway. The publishing industry is going to have to face the fact that if we can transmit text electronically, we can also print it out on a printer. The question is, who do we pay to have that done? It is technologically possible and it may be cheaper than buying a book. And the paper may become biodegradable, so that after reading it, you can eat it, or it will self-destruct!

The potential hazards of a post-Gutenberg university can be frightening. At worst, it could be that we are talking about a post-Gutenberg university which will become mechanistic, impersonal, alienated, and superficial and whose dealings with its students or clients will be rootless on both sides. Because of the heavy reliance on these impersonal mechanisms of communication that are susceptible to control, in the very worst case, this marvelous technology could be adapted to an authoritarian system. There is some fundamental truth certainly to fear in George Orwell's *1984*.

On the other hand, the rewards of doing this well are beyond the wildest dreams of anyone who has ever really cared about education at all, particularly for an American audience committed to American notions of individualism, democracy, and freedom. Consider that we now have the means to make our services accessible to everyone. Consider that instead of leveling a democratic system of higher education down to the lowest common denominator, we can gear it up so that everyone has the opportunity to be exposed to the highest manageable or obtainable levels of comprehension.

It is exciting to realize that this technology can be individualized so that people can participate in a com-

mon program and learn at their own speed. One of the nice things about computerized instruction (which is not my favorite medium of education) is that if certain students are lagging behind, they have a sensational way to catch up. You can also tape presentations, and because there is sight and sound, students do not just have to take notes. They can see it and hear it again.

The process can also be a universal, global mechanism. There could be something in that old saw about understanding breeding understanding.

The most important thing is that the power of the human mind, the human understanding, and the human energy, individually is so enhanced by this, it will make human beings much more intellectually powerful. If we can manage that well and turn it loose, just think of what services we could render, of what audience we are serving and what that can do to breed a post-Gutenberg civilization that could at its best be marvelous and at its worst, authoritarian and repulsive.

#### ACCEPTING AND PREPARING FOR CHANGE

Thirty or forty years ago, almost everything with which we are now familiar was new. Think about the world in which we are living. We may laugh at the notion of a computer printout where the paper self-destructs. But would we have thought that we would watch the space shuttle? It is blasting off again. It is normal. It is real. The jet is in our lifetime. Refrigeration is in the lifetimes of some of us. Frozen food is new. All of the electronic media are new. And so on.

In the ten years that I was president of the Johns Hopkins Hospital I saw a whole era come and go. Ten years ago we did not have any scanners and now we are getting rid of our scanners to put in MRI. Who knows? The whole business of invasive exploratory surgery may be ending.

That is the real world. That is not space science. That is not fiction. It is possible to do all these things, and everybody knows it. Some of us are worried about whether we should buy computers for our students. Don't worry. Within five years they will all come with computers and they may understand them better than the faculty does. That is a serious problem that must be dealt with immediately. Because the most serious problem is the post-Gutenberg university with a pre-Gutenberg faculty.