

THE 21st CENTURY AND ITS IMPLICATIONS FOR HIGHER EDUCATION

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In viewing higher education at the end of this century, just a few short years away, it is very clear that tertiary education in the United States, and the rest of the world as well, will be undergoing dramatic change. Intensive forces generated from within higher education institutions and from society will bring about change. By the 21st century, the higher education systems of most, if not all countries, will be more diverse, more flexible, more innovative, users of high technology, and serving greater numbers of the post-secondary school population of all ages. The higher education system will be expected to be a primary instrument for successfully addressing the many and varied societal problems that exist even today. Institutions of higher education will be viewed by the public as either an integral part of the solution or will be seen as one of the major problems. Traditional institutions will undergo the transformation dictated by internal and external forces or watch new institutions being established to meet societal needs. There is evidence that this is already happening in many countries where new institutions are being established or existing institutions are being overhauled to better serve the needs of the population.

Before proceeding further, it would probably be useful to explain my view of the goals and purpose of higher education, thereby providing a frame of reference for the audience. These are:

- being research institutions involved in both theoretical and applied research as well as being the centers of scholarship;
- being teaching institutions where the students will not only develop a command of the discipline but also such cognitive skills as thinking critically, applying concepts across disciplines, analyzing problems, and making decisions;
- developing an understanding of both national and world culture;
- enabling students to communicate effectively in written, oral, and symbolic modes;
- preparing students for productive and fruitful roles in society after gradu-

ation, including preparation for the world of work, the use of leisure time, and taking responsible roles as citizens in democratic societies.

-serving as an instrument promoting social and economic mobility.

It should be emphasized that these are how I perceive the goals for the higher education system. This may well be an essentially American perspective. That is not to suggest that each and every institution should address each and every one of the goals. That may be asking too much. Not every institution can be or perhaps should even try to be in the forefront of research. However, I would suggest that the competencies for students is valid for all institutions.

I am proposing that the forces for change will emanate from two sources: from within the university and from outside the university. Examining the first set of forces, universities will be a prime user of high technology, specifically computers and information technology. Even today, several universities in the United States, including Carnegie Mellon University, have mandated that all students must have their own personal computer. In the not too distant future, this same requirement will exist in virtually all colleges and universities, where, if the student for economic reasons cannot purchase his own computer, then he will have access to one either in his department of study or in centralized areas. Faculty will of course have their own computers either in their homes, their offices, or both. Moreover, it is almost certain that library resource centers will have most if not all of their holdings computerized. All of these computers will be intranetted through laser technology, specifically fiber-optics. This technology will allow for the simultaneous transmission of enormous amounts of data, graphics, voice, and video. Even at the present time such communication networks are being established at such institutions as Massachusetts Institute of Technology, Carnegie Mellon University, and the University of Pittsburgh. Finally, research is being undertaken to develop the software necessary to have a totally integrated information system within a university, and likely for the future, to have these unit systems interconnected so that individuals would have access to the information base at other universities.

The possibilities from such a system are staggering. Consider, for example, research. Rather than having to go to the library and laboriously wade through reference materials, search journals and books (many of which may be out on loan), and seek out technical papers and other holdings of the library, the work can be carried out by the student in the convenience of his or her own room. She or he will be able to access the materials at the same time as scores of other students. Materials can be quickly scanned and copies made by the printer connected to the personal computer.

Other technological possibilities include students and faculty participating in televised lectures and seminars, video conferences, using sophisticated program instructional materials — particularly in the areas of science and technology to augment and reinforce learning, electronic mail and messages, homework assignments sent electronically, and on and on. Can there be any doubt that the infusion of information technology and the advent of the personal computer will not dramatically change the learning process, the teaching process, and the role of faculty?

Even if society were to allow the university system to remain an «ivory tower» aloof and distant, the forces generated by high technology must of necessity bring about change. But, the problems being faced by all societies will, in my view, generate additional pressure for change thereby helping to mold the future shape of the university and its curricula.

Many countries including those who are advanced developed, such as the United States, and even lesser developing countries are experiencing serious difficulties in harnessing the new, high technologies. One basic reason is that although we live in a rapidly accelerating technology world, the vast majority of persons graduating from the educational system are technologically ignorant. Both decision-makers and the average citizen will be expected to have a basic understanding of technology as fundamental to a society making the most appropriate, cost-effective, and ecologically appropriate decisions. On the other hand, scientists and technicians will be expected to have a broader, interdisciplinary perspective on the impact of technology on the society as a fundamental part of their education.

The harnessing of evolving high technology is but one factor. Others include:

- the likelihood that high technology can intensify inequitable income distributions that currently exist within a country and among countries. Experience to date suggests that the high technology production unit will tend to have a two-tiered workforce: the high level decision-makers and lower level, relatively unskilled production workers, plus small numbers of technicians carrying on development and maintenance functions;

- the increasing likelihood of career and work obsolescence thereby increasing the probability of several career changes occurring during an individual's lifetime;

- changes in the nature of work itself, with much of it becoming more routine;

- a likely dramatic decrease in the length of the work-week, thereby increasing the amount of leisure time available. The educational system will be expected to better prepare its students to make full usage of leisure time once they enter the workforce and provide instruction to adults as interests change over the course of a lifetime;

- a tendency to expand basic and applied research to develop the products that will keep a region and a country economically competitive. The university may also be called upon to provide the concomitant training to workers at all levels in order that they may be able to function productively.

What are some of the specific changes that I see resulting from these pressures?

- 1) A drastic change in the role of faculty within the learning/teaching process. As students will have enormous amounts of information at their disposal, faculty will take on the role of mentor or guide in the learning process. The faculty will use its knowledge, expertise, and experience to assist students in developing conceptual skills such as application, analyses, and decision-making. The thrust of the educational process will then be a movement away from accumulation of information towards the ability to effectively use the information at one's disposal.

- 2) Software will become available for using the computer as an important teaching tool. At Carnegie Mellon today, assignments, especially in the area of

mathematics and sciences, are made for use with the student's personal computer. At CMU painting is taught with students using electronic pallets; drama students design scenery and engineering students do application designs using computers. At my own institution, La Guardia Community College, we are using personal computers to teach basic writing skills to adult learners who have previously not done well in traditional classroom settings. The English faculty are very enthusiastic about the outcomes being achieved. In several experimental classes, students who have failed previous courses in English at least 3 times have mastered the subject area as evidenced by their performance on standardized departmental examinations. It is very likely that very shortly a huge array of software from virtually all disciplines will become available to augment the teaching process.

3) Significant changes will occur in the structure of curricula. Students, of course, will still be expected to master their discipline. The process today, however, points the student towards increased mastery of more and more specialized areas within the discipline so that the end point of doctoral studies is enormous expertise in a narrowly limited area. This results in over-specialization which has been criticized in the literature in recent years. Researchers within a single discipline often times have difficulty communicating with each other let alone being able to effectively communicate with colleagues across disciplines. This argues for the reestablishment of a neo-renaissance tradition where the students will be expected to develop a basic familiarity with concepts outside of and perhaps far removed from their own disciplines. Students majoring in liberal arts and humanities disciplines will be expected to develop basic technical competencies while the science and technology students need to master liberal arts and humanities disciplines.

Much thought will be given to what is meant by «mastering disciplines», particularly those outside of one's own major area of study. A series of courses, which is the primary approach being used today, will give way to interdisciplinary approaches that are more directed to the student's major area of study. For example, science and technology major would study and learn the various social science disciplines through interdisciplinary examination of the impact of technology: for example, the psychological, sociological, anthropological, etc., implications of technology. The non-science or technical major, such as education, foreign language, social sciences, etc., will develop a perspective about scientific process, philosophy of science, the language of technology and an understanding of certain basic concepts as a basis for understanding the nature of technological change.

4) New courses and perhaps new disciplines will emerge which will better prepare students for understanding and coping with a rapidly changing world. Perhaps stimulated by Toffler's work, «The Third Wave», many colleges and universities in the United States have been offering courses in what might be called «futuristics». Much more will be done in this direction, thereby using historical and current perspectives to project into the future with all its risks and uncertainty that entails.

5) It is very likely that non-classroom learning experiences (e.g. internships and cooperative education type workplaces, alternance in Francophone countries,

sandwich in the U.K. and Commonwealth countries, will be included in the curriculum. These out-of-classroom settings will be viewed as field laboratories which enable the students to develop the skill of applying classroom-based concepts to «real world» situations. Techniques which link classroom education to learning in a field setting, such as participant observation, are well known in such fields as sociology and anthropology. These are likely to be extended as basic learning skills that all students will develop.

6) Students in all disciplines will be expected to develop an international or world perspective through studying the social/historical/political and economic aspects of the various regions of the world. The purpose would be to develop a foundation for understanding the dynamics of a world that is rapidly growing more interdependent.

7) Students would be prepared for the world of work after graduation. This could be one of the objectives for the use of non-classroom experiences within the curriculum. Tied to this would be to have students begin to reality-test career options in their fields of interest and begin to develop the career and life-planning skills that they will need in the future. In the teaching of cultural disciplines much more emphasis will be placed on not merely learning about the discipline, but on developing the skills to be an amateur practitioner. Students will learn to paint, write music, sculpt, write poetry, etc. both for their own enjoyment and as a way of productively filling leisure time in a personally satisfying time. Much greater emphasis on adult and recurring education both in terms of credit programs and, short-term, non-credit programs. The need to update one's knowledge and skills in order to sustain a position in the workforce will be one primary factor. In a knowledge-based society, opportunities will be expected to be made available to those adults who for various reasons are not able to take advantage of the opportunity for higher education during their youth. Also, the desire on the part of individuals to make better use of leisure time will open new directions for the university. These diverse interests will be a challenge for educators to develop learning processes more appropriate for adults, no doubt making effective use of technology.

8) Much greater emphasis will be directed towards the continuing professional development of faculty. Higher education institutions will be expected to provide opportunities both within the institution as well as taking greater interest in establishing experiences outside the institution that would help ensure a faculty current in their field.

9) Educational administration will be seen as a profession that will shift away from the notion of scholar to that of professional manager. The educational administrator will be responsible and will be held responsible for the management of the human resources of the institution, the ever scarce fiscal resources, and for the effective management of change.

10) Universities will be expected to increase their research capabilities perhaps becoming centers of high technology within the region they serve. These efforts will probably involve expanding ties between the private business sector in terms of developing the products of new technology and the subsequent training

necessary for individuals. This revised role for the university will raise questions such as how to protect an institution from becoming merely an extension of a private corporation's own research facility. Safeguards against any restrictions on the free-flow of information from such activities must be established. Also, the issue of distributing income stemming from research at the university will need to be addressed.

While complex, the experience in the United States to date, indicates that all of these basic questions can be appropriately resolved. The questions that I briefly raised with regard to the last change that I envision is but one of many questions and issues that come to mind. Change under the best of circumstances is never easy and, if I am at least in part correct regarding the changes that the university will be experiencing, the impact will be dramatic and the problems that will be generated will be significant. However, it is my hope and belief that educators will accept the challenge, thereby bringing higher education into the 21st century. The next few decades promise to be exciting, challenging, and very likely frustrating. However, the end result will be an enormously strengthened education process that will better achieve the fundamental goals and purposes of the university and, I would hope, will make significant contributions towards having all of us, in all countries of the world, lead long, satisfying, productive, and peaceful lives.

