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# The Impact of Technology On Public Education

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Public education is in a period of great stress throughout the industrialized world. It has reached that stage in its evolution as an institution when its technology has matured, and it is facing a future of diminishing returns.

Since education is embedded in society, policy makers should look to the social, economic, and cultural environments for insight on appropriate action. The direction for change will be found more by intuition than by rational analysis. It is a mistake to look too deeply at details. These are so numerous that they can cloud the issues. A broad outline of conditions and a general sense of which direction to steer are what count. If we use this perspective to view the context of education, some amazing shifts become evident.

The most significant change is in the creation and manipulation of information. The industrialized world is literally awash with it. From the detailed specifications of work-related information to the blow-by-blow description of current events from all over the world, people in every part of their lives are assailed by facts, opinions, rumors, and lies. To survive, people must know how to process that information in ways that lead to personal satisfaction rather than to psychological disorientation. Students growing up and learning in this turbulent ocean of information require ways and means of learning which are compatible with the environment.

A single phenomenon is responsible for the exponential increase in information: electronic communication, including unprecedented power of computation. Information is now electronically transmitted, manipulated, and stored in huge quantities and at incredible speed, all of this being in addition to a voluminous supply of print materials. This has been referred to by some as the "information revolution," an event equal in significance to the industrial revolution. What brought it about was the invention and steady refinement and improvement of some truly remarkable electronic communication devices: telephone, radio, and television. Added to that now is the computer, which not only transmits and presents information but manipulates it in accordance with instructions given by the user. So subtle has this power of computation now become that man and machine are virtually interacting at a cognitive level. The development of the microprocessor is making this computing power more readily accessible to the individual, so that we are now moving rapidly not only into a world of information, but also into a world in which the individual, even with

minimal computer literacy, will have steadily increasing access to more and more personalized information services. This will constitute a fundamental shift from a society of consumers who were accustomed to receiving the bulk of their information *en masse*, in broadcast mode, to a more individualized society in which people will look for and create more personalized information exchanges.

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## Educational Implications

The above development has far-reaching implications for public education, particularly at secondary and post-secondary levels. The most significant point to grasp is that enormous pressure is building up to shift the focus of the educational process from the teacher to the student. A learner-centred system is fast becoming a reality and a necessity on several counts:

- 1) Greater individual access to data bases and sources of information.
- 2) The development of accessible, interactive instructional devices.
- 3) A shortage of skilled human resources enabling the individual to command more attention in order for his services to be acquired and retained and for his productivity to be increased.
- 4) Rapid obsolescence of technology thereby requiring highly flexible on-site upgrading of individuals in cost-effective formats.

The creaking machinery of an educational system based on an industrial model of a mass production of graduates by a process of time-specific "learning" events will satisfy no one. The students will not be satisfied because they will intuitively know that they are wasting time in school. The teachers and professors will not be satisfied because they will get little pleasure out of working with bored and reluctant students. The employers will not be satisfied because they will not get competent recruits out of the educational institutions. The government will not be satisfied because it will wonder why it is spending so much money for so little economic and social return. Finally, the public will not be satisfied because it will imperfectly sense all of the above frustrations and complain that something should be done about them.

Even more potentially serious than all of the above, however, is the danger that there will be an almost total preoccupation in society with "maintenance" learning: individuals and industries trying to extract from the hodge-podge of learning environments, skills, and manpower to keep them viable as economic units; and educational institutions so preoccupied with their own economic survival that they cannot get any clear-sighted policy together that addresses the larger educational issue of improvement in the human condition world-wide. This is the issue of "innovative" learning being overwhelmed by "maintenance" learning. To neglect this issue in a world as dangerous and volatile as today's world would be most unwise.

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## Policy Issues

In the face of such pressures, educational policy must be concerned with two paramount issues: changing the technological base of education in a direction consistent with the changing technological base in the larger society; and



restructuring responsibilities for maintenance learning and innovative learning.

It is not the intent here to elaborate in detail on specific policy direction with respect to these two issues, but rather to indicate a general direction which can guide strategy.

Concerning the former issue, government should take the initiative in providing incentives and controls for institutions to shift instructional content and delivery to a more learner-centred approach, capitalizing on interactive communication technologies. This entails promoting greater cooperation among institutions, establishing direction for the acquisition of hardware, encouraging greater standardization in the production and acquisition of software, and generally showing leadership and demanding change.

Concerning the latter issue, government should recognize the limitations of institutional-based training for vocational purposes at all levels of skill requirements. The new technologies are making industry-based training and part-time study a much more viable approach for maintenance learning. In the area of innovative learning the rich resources of the existing educational institutions need to be integrated with the capabilities of other social institutions, particularly the media, to awaken the need for greater public understanding of human problems and the public's participation in finding the solutions to these problems.

In making these comments to senior officials in the Department of Advanced Education and Manpower, what I was essentially arguing was a need for government to provide policy direction and flesh it out with consistent strategies. By doing so, government would be taking positive action to assist public education to develop a new, more viable relationship with the society it serves.

We are not playing around here with electronic toys. We are going to be facing some hard decisions on such highly volatile issues as: control and allocation of resources; changing roles for teachers and the emergence of new roles; retraining of personnel; revamping of teacher-preparation programs; shift of the control of education from the teacher to the learner; reformulation of curriculum materials with tremendous pressure to shift from a print basis to an electronic basis; and rethinking of concepts such as compulsory education and life-long learning.

The significant issue is not going to be the hardware. By the mid 1980s our culture will be flooded with it. The issue will be what software to put on the hardware and how to arrange delivery. We have not figured out these issues for television yet, and it has been around for more than 20 years. Now we are talking about a new technology and, indeed, the marriage of this new technology with the technology of television for the purpose of stimulating learning in human beings.

This is a remarkable challenge. Let us not underestimate the enormity of it and let us not dissipate our energies by engaging in recriminations which emerge because, of necessity, any one of us views these matters from a limited perspective. Let us aim at widening those perspectives and undertaking to work together at what needs to be done.