Contemporary Issues

# Educating Citizens and Leaders for an Information-Based Society

If schools are to help students process knowledge in a rapidly changing world, they must teach for breadth, values, and a global perspective.

Education is the drivewheel of an informed society. Information, processed into knowledge and wisdom, has become our dominant resource in the United States. Consequently, the quality of our leadership both at home and abroad depends more than ever on our educational systems—on how demanding and relevant and continuous and broad and wise our learning is. The people and nations that don't learn to participate in an information-based society will be its peasants.

Yet, our formal systems of education haven't assimilated the new fact that more than half of all work is information work and that, as a consequence, the nature of the work for which we educate students is changing faster than ever. Such information work requires integrative thinking and a global perspective, precisely the kind of brainwork-in-breadth that most of our schools and colleges aren't yet set up to encourage.

## A Skeptic's Predictions

The content of many, perhaps most, jobs a generation hence is unknowable today, as were the job descriptions for astronauts, nuclear physicists, ecologists, computer programmers, and data base managers a generation ago. But even a decade ago, the U.S. Department of Labor projected that two-thirds of 1974's kindergarten students would eventually fill jobs that did not then exist.

In earlier writings I have expressed skepticism of our ability to forecast the market for work. Do not, then, suspend your own skepticism as I try, with an impressionist's broad brush, to picture the kinds of work that are bound to be especially valued in a future knowledge-rich society.

There will be more information and service and less production work. Farming, mining, and manufacturing already account for a good deal less than a quarter of the U.S. economy, and a lot of what is still counted as working with things is actually work on symbols, which is to say information work. The mechanized application of more and better and faster information, so greatly accelerated by the explosive marriage of computers and telecommunications, will keep on eating up routine and repetitive tasks. The jobs left for people to do will require more brainwork and skill in people-to-people relations, the uniquely human functions that machines can't handle. Work, and therefore education for work, will have to become less competitive and more organized around cooperation.

The market for education as a nonpolluting leisure-time "consumer good" will grow. Already some union contracts grant workers time off for education; Italian metal workers, for example, are entitled by contract to 150 hours of education a year.

"Recurring education," the 1980's in-word for adult or continuing education, will create a growing proportion of the demand for higher education. Education for leadership in varying forms will be a growth industry, because the proportion of people who perform some leadership functions will continue to grow. Despite tenure systems and retirement benefits, people will move around even more than they do now—from place to place, function to function, and career to career.

More and more people will work at managing forms of international interdependence. International travel for work and leisure, along with the expansion of global telecommunications, will continue to spread, swelling the demand for people with training in crosscultural communication.

## First at Thinking Up New Things to Do

Will there be enough jobs to go around? No one knows with certainty, but there is no reason to doubt a continuation of the cheerful precedent Howard Bowen reported in the 1970s. "Two centuries of history have revealed no secular trend toward greater unemployment as technology advances." There is no finite amount of work that must be parceled out to a given number of workers. Work, along with capital, expands with our capacity to use new devices in new ways for new purposes. The United States did not get to be a great nation merely by improving the previous generation's practices. We got there, and can only stay there, by being the first to think up new things to do, such as linking

computers to telecommunications. The numbers and quality of jobs will continue to be a function of men's and women's imaginative capacity to solve problems.

## Real Problems are Interdisciplinary

Liberating human imagination for creative solutions to human problems has hardly been the strong suit of the U.S. educational system. Both students and school critics can sense that the vertical academic disciplines, built around clusters of related research methods, are not very helpful in solving most problems. Few, if any, real-world problems fit into the jurisdiction of any single academic department. As every urban resident knows, we have a great deal of specialized information about the city, but we seldom get it all together to make the city livable, efficient, safe, and clean. In agriculture, by contrast, university-based science combined with its delivery to the farms in every county created the miracle of U.S. food production.

Many of the university's interdisciplinary approaches in the past have been disappointing. A course on environmental issues may be taught by an evangelist less eager to train analysts than to recruit zealots. A workshop on a "problem" may mask a research contract for a government or corporate client who knows the answer and is looking for an academic rubber stamp. Even so, many students prefer courses that promise to cut across the vertical structures of method and help them construct homemade ways of thinking about the situation as a whole.

The students' intuition may not be wrong. Yet they face a phalanx of opposition to their instinct that the vertical disciplines should be stirred together in problem-solving, purpose-related combinations. Access to authorship in academic journals, professional repute, and promotion and tenure are not achieved by having lunch with colleagues from other departments. For once, education's external critics and the academics agree: if the division of knowledge into manageable compartments enabled graduates to develop self-esteem and a decent living, why does the curriculum have to be changing, complicated, and controversial?

Doesn't the *new* knowledge environment place a higher premium on integrative thought? Won't we have to take a new look at systems that award higher credentials for wisdom than for mastering the narrowest slices of knowledge?

## A Heavy Bias against Breadth

I suspect that a newborn baby knows from the start, by instinct, that everything is related to everything else. We are born with naturally integrative minds. Before a child is exposed to formal education, its curiosity is all-embracing. The child hasn't yet been told about the parts, so it is interested in the whole.

Ironically, the more the child learns, the less her or his learning is tied together. Most holistic learning comes in grades K-4 when the teacher often has to be able to answer the question "Why?" Farther up the ladder of formal schooling, we manage to persuade most children that the really important questions start with "When?" and "Where?" and "How?" and especially "How much?" Fortunately for the nation and the world, some young citizens persist in asking "Why?"

Jasimina Wellinghoff, a Twin Cities scientist and writer, writes about her 1st grader.

> When my six-year-old learns that we heat the house with forced air, she immediately wants to know who is forcing the air, where natural gas comes from, and how it got stuck underground. After I have done my best to explain all this, comes the next question: "If we didn't have natural gas, would we die in the winter?" There you have it. Geology, engineering, physics and biology, all together in a hierarchy of concepts and facts. However, a few years from now my daughter will be studying the structure of the earth's crust, combustion, hydraulics and the classification of living beings—all in different years and quarters, neatly separated, tested and graded.

Everyone seems to know that in the real world, all the major problems are interdisciplinary and all the solutions are interdepartmental, interprofessional, interdependent, and international. Yet our institutions cling to a heavy bias against breadth, for at times they have found the bias useful: the secret of success in the scientific revolution was not breadth but specialized depth. Chopping up the study of physical reality into vertically sliced puzzles, each to be deciphered separately by a different analytical chain of reasoning (a discipline), made possible the division of specialization and of labor.

These simplifications have led to complexity, just as E. B. White thought they would when he asked, "Have you ever considered how complicated things can get, what with one thing leading to another?" The resulting complexity now makes it imperative that these differing analytical systems be cross-related in interdisciplinary thinking and coordinated action, and to do that, leaders must get used to thinking integratively.

The trouble is that our whole educational system is geared more to categorizing and analyzing patches of knowledge than to threading them together. It would be nice if, having noticed this problem, we could discover a simple solution. The clashes between training and education, between vocational and general, between honing the mind and nourishing the soul that divide outside critics also divide professional educators; they even divide students.

Just now, our favorite way to avoid having to make difficult choices is to delegate them to individual students. We "maximize the student's options" by creating a bewildering proliferation of courses and programs of study, a cafeteria of the intellect using what the food service people call the "scramble system." For the limited numbers of students who know just what they want and why, the freedom doesn't work badly, but most students expect some guidance in creating an intellectually complete array of reading, discussion, writing, computing, and work experience.

My guess is that if U.S. schools and colleges continue to proliferate courses, external pressure groups and state and federal governments will sooner or later impose social and economic, even political, criteria for curriculum-building. If our ultimate curricular principle is abdication-by-providing-maximum-options, the outsiders will, in the end, tell the

academics what to teach and the students what they can learn at the public's expense.

### Neither Horn, Thank You

The curriculum debate, as usual, will not be settled by choosing one or the other of a dilemma's horns. Honing the mind and nourishing the soul are equally important. What we need now is a theory of general education that is relevant to life and to work based on the new information resource. Perhaps, in the alternating current of general and job-oriented education, it is time for a new synthesis, a new "core curriculum," a central idea about what every educated person should know, and have, and try to be.

Such a core is not going to have much to do with learning facts. Most of the facts that children learn in schools are unlikely to be true for as long as they can remember them. (The last time I took physics, I was told the atom couldn't be split—a fact that has not served me well in the nuclear era.) What students need above all is general theory with which they can process the shifting facts they will encounter over a lifetime.

If we think hard about what the new knowledge environment requires, and consult the instincts and perceptions of our own future-oriented students, I think we could construct a new core curriculum for American citizenship from goals such as these.

- Integrative brainwork—the capacity to synthesize the analytical methods and insights of conventional academic disciplines so as to solve real-world problems. Exposure to basic science and mathematics, to elementary systems analysis, and to what a computer can and cannot do are part, but only a part, of this education.
- Social knowledge—education about public purposes, the costs and benefits of openness, and the ethics of citizenship. Such knowledge should enable the educated person to answer two questions: "Apart from the fact that I am expected to do this, is this an action I would choose?" and "Does the validity of this action depend on its secrecy?"
- A capacity for self-analysis—the achievement of some fluency in answering the question "Who am I?" through the study of ethnic heritage, religion and philosophy, art, and literature.
- Practice in real-world negotiation, in the psychology of consultation, and the nature of leadership.
- A global perspective—an attitude of personal responsibility for general outcomes, in an interdependent world.

I would like to conclude with a few words about the last of these new imperatives for American citizenship. In the mid-1970s "global perspectives in education" was novel enough to sound radical, but change has become so rapid in our society that by the mid-1980s, the idea has flowed into the mainstream of a powerful public school reform movement.

I do not mean that the elementary school teacher, that very model of a modern generalist, should teach about everything at once. I am not neurotic about global perspectives, merely insistent. I do believe that young children can learn to think in systems. They live with interdependence every day—in families, home rooms, and in the local public park. The ambience of mutual dependence, the ambiguities of personal relations, the conflicting ambitions of groups, are the stuff of socialization from their earliest years.

Once they know how to think about value questions in their everyday life, they are more than halfway to coping with complex planetary puzzles, such as food production, climate change, energy use, population planning, development strategy, environmental protection, ocean law, trade, investment, and money.

In short, once the child can follow cause and effect around the corner, the child-grown-up should be able to follow cause and effect around the world. And with that kind of education for wisdom, the child-become-adult-leader can tackle with less diffidence the Cheshire cat's first question: "Where do you want to get to?"□

Editor's note: This article is based on Harland Cleveland's new book, *The Knowledge Executive: Leadership in an Information Society* (New York: E. P. Dutton, 1985).



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# Common Sense About Information and Information Technology

Before we become slaves of the Information Age and its complex technology, we need to ask ourselves not how much information we can generate and absorb, but what information is of most worth and for what purposes.

ALEX MOLNAR

In his book, *The Knowledge Executive*, Harlan Cleveland (1985) quotes Gertrude Stein: "Everybody gets so much information all day long that they lose their common sense." Stein has put her finger on the heart of an increasingly difficult problem for educators: how to make sense of and respond to the increasing vol-