Education for the 21st Century

The nature of society and education is rapidly being transformed by technology, the information era, and demographic shifts.

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By looking at today's trends, we can get a glimpse of the future and obtain a more accurate image on which to base our education programs. Three trends that seem especially pertinent concern the rapid development of technology, our entrance into the information age, and recent demographic shifts.

Rapid technological development. This is a time of exponential growth, as evidenced by the world's population and our national debt. Technological development is also growing exponentially.[1] The speed of development in computer technology, for instance, was graphically illustrated recently in *Scientific American*: "If the aircraft industry had evolved as spectacularly as the computer industry, a Boeing 767 would cost $500 today, and it would circle this globe in 20 minutes on five gallons of fuel."[2] From the *New York Times* comes this description of the communications network between Washington, D.C., and New York City: "A pair of glass fibers as thin as a hair can carry 1300 simultaneous conversations. . . . With the laser pulsing 90 million times a second, the entire content of Webster's unabridged dictionary could be transmitted through a single fiber in six seconds."[3]

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Thus, our image of the future is not merely one of accelerated technological development, but of acceleration itself.

The information era. [illegible]rance into the information era is pro[illegible]ndly influencing our image of the future. Already

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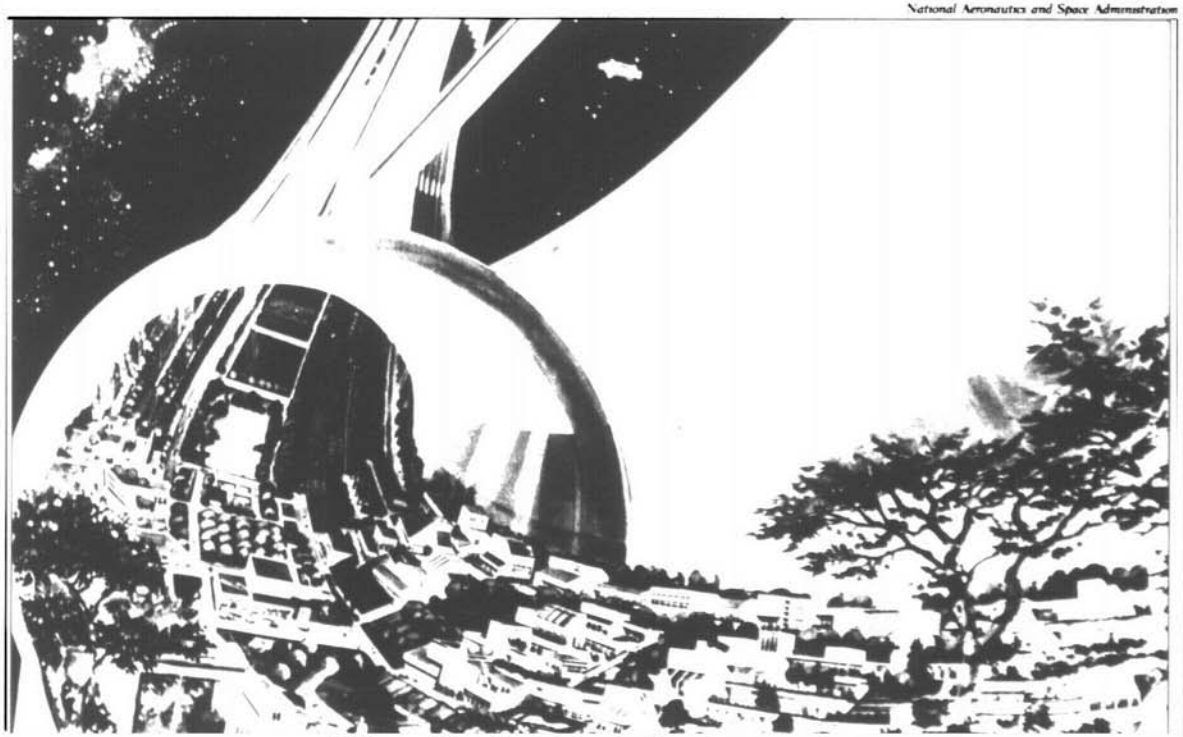

Artist's conception of the interior of a 21st century space colony

it is producing changes in human values, in trends in thought, and in political and economic structures in society. The information era differs from the industrial era in several significant ways:

- The core of the industrial age is powered machinery; the core of the information era is the computer.
- The industrial age replaced manual work and magnified physical strength; the information era enables us to replace mental work and magnify mental capabilities.
- Goods produced in the industrial age are expended; information, the product of the information era, cannot be depleted.
- Energy—oil, coal, nuclear power—is the driving force in the industrial age; education is the driving force in the information era.

Note that education, a handmaiden in the industrial age, is the foundation of the information era. Although production will not cease after the industrial revolution—the output of industry will increasingly be produced by computer-controlled robots.

Demographic Shifts. Demographics are another facet of the future with implications for education. The 1957 baby boom (4.3 million) was followed by a baby bust as the fertility rate dropped. Thus, when the 1957 babies begin to retire in 2010, there will be only two active workers paying for the benefits of each retired person. In 1950, that ratio was 16 to 1; today it is approximately 3 to 1.

Another consequence of this shift is that seven million fewer young people will reach working age in the 1990s than in the 1970s. This fact, according to Pifer, "places a much higher premium on making the most of the much smaller number of Americans now being born. . . . Human capital formation, always important, has become many times more so because casualties resulting from poor nutrition, poor health care, inferior education, low maturation, and so on, simply can no longer be afforded."[4] Clearly, education programs that waste human talent will undermine our society.

Education Trends

An effort to improve the quality of education is emerging as a national priority. Definitions of "quality" vary from achieving high scores on standardized tests to adding more required courses to the curriculum. More and more careers will require backgrounds in science, mathematics, and computer science. Fewer careers will be open to the undereducated. Just increasing course requirements, however, will not produce the high quality of education we need. Skills that today are considered higher level, such as problem solving, creativity, analysis, synthesis, critical thinking, and communication, will become essential for many workers in the future.

Unfortunately, the 1982 National Assessment of Educational Progress appears to confirm another trend: younger students are doing better on basic skills but older students are not doing as well on higher-level skills. In both reading and mathematics, we focus on the skills that are easiest to teach and learn and neglect the higher-level skills—the very skills necessary for our survival.

We must avoid the trap of raising standards just for the more able students, however. The findings of a study by the New York Stock Exchange are illuminating. Their commission visited Japan to find out why productivity is higher there than in the United States. Their conclusion: "The single most important factor in Japan's extraordinarily high productivity—more important than quality circles, techniques of management, or the partnership between businesses and government—is the high quality of Japanese primary and secondary education."[5] "The great accomplishment of Japanese primary and secondary education lies not in its creation of a brilliant elite," they observe, "but in producing a high average level of capability in its graduates."

Over 20 years ago John Gardner asked whether we should strive for equality or quality in education. His conclusion that our society must have both is as important today as it was then. Our expectations for all students need to be higher—but still realistic enough to avoid the problems in Japan.

Education to Fulfill Tomorrow's Needs

Our present image of the future is complex—too complex to forecast the problems of the 21st century. We can, however, anticipate their nature. They will surely be global, for instance, and require the integration of knowledge from different fields for their solutions. Increasingly, the first decisions that are made will have to be correct; the harm that may result from a wrong decision could be irreversible. Finally, it will be increasingly important to apply value judgments when weighing solutions to problems. Because new technologies, such as genetic engineering, can have a greater impact on human welfare than did earlier technologies, value considerations in guiding technological developments are more important than ever.

Above all, when we consider the problems that lie before us, we must not expect technology to solve our social problems in the same say it has solved, and created, so many scientific problems. That particular trap represents an abdication of our personal responsibility for improving society.

We cannot teach children all they will need to know to solve the problems of the next century, but there are two things of paramount importance that we can do:

1. We can help students develop skills of reading, writing, and computing. While they will need skills in accessing information, information alone is not enough to solve problems. The ability to comprehend that information—to analyze it, synthesize it, and apply it in a value-oriented way—is also necessary.

2. We can encourage students to assume responsibility for their own learning—to become self-directed, lifelong learners. The ultimate goal of education is to shift to the individual the burden of pursuing his or her own education. We assign, grade, and evaluate students at all levels; then we wonder why students do not take more initiative for their own learning. To cope with emerging global problems, people will need to continue learning throughout their lives. Their survival will depend on it.□

[1]John Platt, "The Acceleration of Evolution," *The Futurist* XV (February 1981): 14–23.

[2]Hoo-min D. Toong and Amar Gupta, "Personal Computers," *Scientific American* 247 (December 1982): 87.

[3]Andrew Pollack, "Lightwave Era Is Ushered In," *The New York Times*, February 11, 1983, p. 29.

[4]Alan Pifer, "The Report of the President," *Annual Report 1982* (New York: Carnegie Corporation of New York, 1982), p. 6.

[5]Leonard Silk, "A Lesson From Japan," *New York Times*, November 17, 1982, p. 30.

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