

Technological Literacy: What and Why? Summary

**Prepared for the NAE/CSMEE
Committee on Technological Literacy**

**Washington, DC
September 10, 1999
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There is a great deal of confusion, both semantic and substantive, about what is meant by technological literacy. The word technology is relatively new, mainly of this century. The word literacy has been around somewhat longer. But there is confusion about what the combination of the two words means.

Many think of technology as computers and of technological literacy as the ability to use them. Others think of technological literacy as understanding how things work, or knowing how to build things, to be learned, for example, through skill courses in the schools. Still others think of a technologically literate person as one who has an understanding of the technological process and its impacts, historically and today.

In a pervasively technological society like ours is, technological literacy needs to encompass all these views. There is little agreement, however, as to the necessity for every citizen to be technologically literate in this broader sense. That everyone should be able to use computers or to know how to drive a car is generally obvious and uncontested. Also, the very nature of our lives forces us to know something about the devices that we use at home and at work, from microwaves to copying machines, as well as to have some manual dexterity with tools so as not to be completely helpless in our everyday life. But the crucial importance of the broader dimension of technological literacy for the health of our democracy is only dimly perceived. The consequences range from unrealistic expectations about technology to excessive fear of technology, and inability to participate intelligently in the discussion and resolution of a myriad of issues in which technology plays an every more determinant role and affects deeply our lives, from jobs to education, from defense to health care, from privacy to the environment, from sustainability to international relations.

Socrates marveled why Athenians were able to do many clever things technologically and yet there was something seriously missing in the political process. He

was talking about the artisans of Athens, and marveling at how poor was their ability or will to operate in the political arena. Not much has changed in twenty-four centuries. Today we have very impressive technologies, but we find more and more that technology *per se* is not sufficient without a broad societal understanding of its potential and limitations. Much attention has been paid to the need for better *science* literacy among the general public and in the schools, but we barely talk about the parallel need for *technological* literacy. We are concerned that people should understand the solar system, chemistry, or biology, but we are doing virtually nothing in our schools—the schools that bring up the people who will make the decisions, who will be electors, who will be elected—about technological literacy. We do not prepare the students to appreciate the factors that must be taken into account in making a decision about technology, that is, about what one can expect from the interaction of technology with society, or with the environment, or from the interactions between technologies, such as aviation and electronics, or telecommunications and transportation systems. To develop such an appreciation and such an understanding is important and urgent for us all.

The list of areas and issues which require any educated person to be technologically literate in order to deal knowledgeably with concerns about equity, the impact of rapid change, job shifts, side effects, investment of national resources, is growing every day. The direct impact of computers on jobs, education, and everyday life is by now beginning to be widely appreciated. But there are many other issues, often shrouded in the fog of ignorance of basic facts, that are bound to have on the aggregate an even greater impact which will inevitably affect the lives of everybody, and which citizens will be called to decide with their votes or their pocketbooks or their feet.

Just to make a few examples:

- the ever more rapid development of biotechnology, with its potential to revolutionize many industrial processes;
- the impact of alternate engine technologies on the auto industry, and hence on millions of U.S. jobs, as well as on the transportation infrastructure;
- the impact of new transportation systems, from high speed trains to vertical take-off airplanes, on the air transportation industry, from airlines to airports;
- the transformation of retail commerce through wireless communications and the Internet, with the potential to eliminate intermediaries such as the retail store;
- the transformation brought by the Internet of many other facets of our lives;
- the degree to which the shift of manufacturing to other countries is desirable, and its implications for U.S. communities that seek to avoid the fate of some ghost towns abandoned by massive industrial operations;
- our leadership responsibilities in international efforts to reduce environmental impacts, *versus* our immediate self-interest because of the impacts on mining, utilities, manufacturing and all sorts of other activities and enterprises;
- the technological transformation of our infrastructure, our housing, and our places of work, to accommodate the needs of an increasingly aging population—and by the same token the new training needs for that population

- that now can contemplate many years of useful work beyond traditional retirement age;
- the role that technology could play in reorienting the health care system from remedial to preventive.

Because of these trends, millions of jobs have already vanished, and millions of jobs requiring new skills are being created—but not always for the same citizens. All this has occurred without a deep consciousness in the citizen of the implications of these trends. The most important implications transcend individual citizens and affect the vitally important ability of our nation to continue to change, to continue to innovate. Technological literacy helps a citizen understand the enormous dimensions and implications of these trends, what directions may emerge, what new technologies may be relevant, whether our educational system is effective in preparing students at all levels for the new face of work, whether adequate provisions are being made to retrain the current work force (these shifts occurring too rapidly to consider only changes in formal education), what are the promising strategies, what are the costs and side effects, and what will be done for those in our society who cannot keep up.

The issue is not whether a citizen should have a fixed set of opinions on these matters, but whether a citizen should be able to ask appropriate questions and learn the pertinent facts—and only then make up his or her mind. Technological literacy is the best guarantee to avoid technological determinism and to preserve freedom of choice. This is what the broader and ultimately most crucial dimension of technology literacy for our democracy is about.

General literacy is more than just being able to read and write the alphabet of letters. Similarly, technological literacy is more than just being able to master the alphabet of technology—the computers, the tools, the procedures. The ability to read became a powerful instrument of freedom and societal advancement after Gutenberg's invention. A widespread ability to understand technology is now needed to advance our modern technological society and to safeguard its liberty.