The Information Revolution Will Transform Education

The Information Revolution Will Transform Education. National Academy of Sciences.
Opposing Viewpoints: The Information Revolution. Ed. Paul A. Winters. San Diego: Greenhaven Press, 1998.

Table of Contents:

Reprinted from *Reinventing Schools: The Technology Is Now*!, an on-line book by the National Academy of Sciences, 1995, at www.nap.edu/readingroom/books/techgap/welcome.html, by permission of the National Academy Press.

The National Academy of Sciences is a private organization founded by the U.S. Congress to advise the federal government on scientific and technical matters. In the following viewpoint, the academy argues that schools must change in order to prepare students for the workplace of the future. The information revolution is transforming the work world and will require future workers to be flexible and to have updated skills and knowledge, the academy contends. Therefore, they conclude, schools must use technological innovations to teach students how to work cooperatively in gathering, analyzing, and utilizing information.

As you read, consider the following questions:

1. How do the authors describe the "factory school model"?
2. According to the authors, in what ways can computers be used as effective learning machines?
3. What is the role for teachers under the new model of education, in the authors' view?

Schools tend to reflect the societies in which they are embedded. In America before the Civil War, little book learning was needed to manage what was for most people still an agrarian life. School started relatively late in the day and ended early to leave time for chores. In summer, school let out entirely so children could help their parents in the fields. Education was narrow in scope, controlled largely by the teacher, and focused predominantly on basic skills.

In that world, the model of education embodied in the one-room schoolhouse was sufficient. Teachers taught reading, writing, and elementary mathematics to complement the skills students learned outside school. Since relatively few students progressed even as far as high school, the need for higher levels of education was minimal.

Outdated Models of Education

By the end of the 19th century, more and more of the population was settling in cities and going to work in factories. To teach students the basic skills and simple facts they needed for industrial jobs, the first great revolution in schooling took place: the factory school model appeared. Large buildings enclosed labyrinths of classrooms where students sat in neat rows with the teacher in front. Schools sought to be an efficient social institution that could turn out identical products. Students learned enough to work at jobs that they would probably keep for much of their lives.

Today many students still attend factory-model schools. Much of the day is spent passively listening to lectures. Many classes reach skills for jobs that either no longer exist or will not exist in their present form when students grow up.

The Information Revolution Will Transform Education

It is clear that yesterday's innovation has become today's obstacle to change. Only about 20 percent of the employed population now works in factories or on farms. People graduating from high school or college will average six to eight jobs over the course of a career, many of them requiring skills that are unforeseen today. About half of all employed Americans work with information—analyzing information that already exists, generating new information, storing and retrieving information. Soon a major portion of this group will not even work in an office, much less a factory, but at home.

This postindustrial form of society calls for a new, postindustrial form of education. Teachers, parents, school administrators, and policymakers have begun to realize that an entirely new model of education is needed. In this new kind of school, all students will be held to far higher standards of learning because everyone will have to be prepared to think for a living and everyone will have to be capable of learning many new skills over the course of a lifetime. This model of education will increase the links between students and their communities, bringing the resources of school to bear on the complex ethical, civic, and technical decisions that all citizens will have to make. The timing and location of education will be more flexible, to reflect and take advantage of changes in the workplace. The distinction between learning inside of school and outside of school will blur.

Technology is a key transforming element in creating this new model of school. Just as technology is reshaping other institutions, it has the potential to reshape education, ending the disjunction between school and the broader society. Technology offers unlimited new ways of learning, of teaching, and of running schools. It provides new ways for everyone involved in education to be openly accountable to parents, to communities, and to students.

Technology and the New Model of Learning and Teaching

Yet technology by itself is clearly not enough. As applied in factory-model schools, technology can be as uninspiring as traditional mimeographed worksheets. Computers in schools have too often been used for drills, for word processing, and for remedial work. These applications fail to take advantage of the rich, interactive capabilities of today's information technologies.

Compare the use of computers for drill and practice to their use as effective learning machines. With imaginative, inspiring software, students are not forced to come up with the one right answer; rather, they learn to ask many questions and to devise multiple approaches to a problem. They learn at their own pace and in their own style, so that skilled students advance without restraint while other students have the various resources they need to meet high standards.

Traditional schools have emphasized individual performance and competition and have discouraged students from working or even talking together. In the new model of school, classroom experiences emphasize critical thinking, teamwork, compromise, and communication—the skills valued in today's workplace.

This model of education calls for changing the roles of students, teachers, and schools. In the new model of school, students assume many of the functions previously reserved for teachers. In small groups, individual students act as peer-tutors for others. Because they are often the ones most familiar with new technologies, students lead by example, helping their classmates work through problems. In this way, students begin learning from an early age how to communicate and how to assume greater responsibility for their own education.

The Information Revolution Will Transform Education

Teachers, in contrast, change from being the repository of all knowledge to being guides or mentors who help students navigate through the information made available by technology and interactive communications. They help students gather and organize information, judge its value, and decide how to present it to others. Moving from group to group and from student to student, teachers help students stay focused and working at the limits of their abilities. When the class meets as a whole, teachers share the responsibility for teaching with the students—each of whom has been forging ahead at his or her own pace.

A New Model of Education

In this new model of school, education looks different than it does in most schools today. Schools might be open all day and all year, with groups of students rotating in and out of session. Classrooms might include students of different ages. Traditional 50-minute classes will stretch or disappear to accommodate activities made possible by technology. Longer-term projects will cut across disciplines, combining the subject matter of previously separate classes. Multiple choice tests will be replaced by new kinds of assessments that measure the acquisition of higher-order skills.

Schools may emerge in unlikely places—such as office buildings—or more conventional schools may have branch campuses integrated into businesses, hospitals, or homes. Secondary schools may forge new links with two-year colleges and community institutions to ease the transition from school to work. Individual classes will be integrated into workplaces, providing a vocational education far richer and more useful than what is offered today. Technologies used at home will convey lesson plans, homework, and assessments both to students and to their parents.

The ultimate goal of this new model of education is to foster communities of lifelong learners, where intellect and cooperation are highly valued. Within these communities, decisions will be made by those in the best position to make them—by students, teachers, and educational administrators.

The elements of this new model of education are starting to appear in scattered communities across the United States. Schools are experimenting with new organizational structures, new forms of governance, and new uses of technology that are designed to reflect the constant flux of modern society. This trend is about to accelerate dramatically. As technology becomes more powerful and plentiful, and as the needs of society more urgently call for a new model of education, American schools will be caught up by irresistible forces of change.

The Information Revolution Will Transform Education

FURTHER READINGS

Books

- John Brockman. *Digerati: Encounters with the Cyber Elite*. Emeryville, CA: Publishers Group, 1996.
- Tal Brooke, ed. *Virtual Gods*. Eugene, OR: Harvest House, 1997.
- Martin Campbell-Kelly and William Aspray. *Computer: A History of the Information Machine*. New York: BasicBooks, 1996.
- Jim Cummins and Dennis Sayers. *Brave New Schools: Challenging Cultural Illiteracy Through Global Learning Networks*. New York: St. Martin's, 1995.
- Peter J. Denning and Robert M. Metcalfe. *Beyond Calculation: The Next Fifty Years of Computing*. New York: Copernicus Books, 1997.
- Michael L. Dertouzos. *What Will Be: How the New World of Information Will Change Our Lives*. San Francisco: HarperSanFrancisco, 1997.
- David G. Garson and G. David Garson. *Computer Technology and Social Issues*. Wilmington, DE: Idea Group, 1995.
- Bill Gates. *The Road Ahead*. New York: Viking, 1995.
- Paul Gilster. *Digital Literacy*. New York: Wiley, 1997.
- Steven Johnson. *Interface Culture: How New Technology Transforms the Way We Create and Communicate*. San Francisco: HarperSanFrancisco, 1997.
- Rob Kling, ed. *Computerization and Controversy: Value Conflicts and Social Choices*. San Diego, CA: Academic Press, 1996.
- Pierre Levy and Robert Bononno. *Collective Intelligence: Mankind's Emerging World in Cyberspace*. New York: Plenum Press, 1997.
- John Naisbitt. *Megatrends* 2000. New York: Avon, 1996.
- Nicholas Negroponte. *Being Digital*. New York: Knopf, 1995.
- O'eilly & Associates, eds. *Internet and Society*. Cambridge, MA: Harvard University Press, 1997.
- Charles Platt. *Anarchy Online*. New York: HarperCollins, 1997.
- David Porter, ed. *Internet Culture*. New York: Routledge, 1997.
- Gregory J.E. Rawlins. *Slaves of the Machine: The Quickening of Computer Technology*. Cambridge, MA: MIT Press, 1997.
- Gene I. Rochlin. *Trapped in the Net: The Unanticipated Consequences of Computerization*. Princeton, NJ: Princeton University Press, 1997.
- Richard S. Rosenberg. *The Social Impact of Computers*. San Diego, CA: Academic Press, 1997.
- Theodore Roszak. *The Cult of Information: A New-Luddite Treatise on High Tech, Artificial Intelligence, and the True Art of Thinking*. Berkeley and Los Angeles: University of California Press, 1994.
- Herbert I. Schiller. *Information Inequality: The Deepening Social Crisis in America*. New York: Routledge, 1996.
- David Shenk. *Data Smog: Surviving the Information Glut*. San Francisco: HarperSanFrancisco, 1997.
- Richard A. Spinello. *Case Studies in Information and Computer Ethics*. Scarborough, ON: Prentice Hall, 1997.

The Information Revolution Will Transform Education

- Clifford Stoll. *Silicon Snake Oil: Second Thoughts on the Information Highway*. New York: Doubleday, 1995.
- Don Tapscott. *Growing Up Digital: The Rise of the Net Generation*. New York: McGraw-Hill, 1997.
- Don Tapscott and Ann Cavoukian. *Who Knows: Safeguarding Your Privacy in a Networked World*. New York: McGraw-Hill, 1997.
- Alvin Toffler and Heidi Toffler. *Creating a New Civilization: The Politics of the Third Wave*. Atlanta: Turner, 1995.
- Ellen Ullman. *Close to the Machine: Technophilia and Its Discontents*. San Francisco: City Lights Books, 1997.
- Jonathan Wallace and Mark Mangan. *Sex, Laws, and Cyber-Space: Freedom and Censorship on the Frontiers of the Online Revolution*. New York: Henry Holt, 1996.
- David B. Whittle. *Cyberspace: The Human Dimension*. New York: W.H. Freeman, 1997.
- William Wresch. *Disconnected: Haves and Have-Nots in the Information Age*. New Brunswick, NJ: Rutgers University Press, 1996.

Periodicals

- Nicholas C. Burbules. "Technology: What We *Haven't* Worried About," *Education Digest*, May 1997.
- Paul Gruchow. "Ransacking Our Libraries," *Utne Reader*, May/June 1995.
- Lisa Gubernick and Ashlea Ebeling. "I Got My Degree Through E-mail," *Forbes*, June 16, 1997.
- Marilyn Gell Mason. "The Yin and Yang of Knowing," *Daedalus*, Fall 1996.
- Richard L. Measelle. "Reinventing Education," *Vital Speeches of the Day*, June 1, 1996.
- Kathryn C. Montgomery. "Children in the Digital Age," *American Prospect*, July/August 1996.
- Eli M. Noam. "Electronics and the Dim Future of the University," *Science*, October 13, 1995.
- Joseph N. Pelton. "Cyberlearning vs. the University," *Futurist*, November/December 1996.
- Neil Postman. "Virtual Students, Digital Classroom," *Nation*, October 9, 1995.
- Laura Shapiro. "What About Books?" *Newsweek*, July 7, 1997.
- Nathaniel Sheppard Jr. "Another Lane on the Superhighway," *Emerge*, July/August 1997. Available from 2425 W. Olympic Blvd., Suite 4050W, Santa Monica, CA 90404.
- David Skinner. "Computers: Good for Education?" *Public Interest*, Summer 1997.
- James H. Snider. "Education Wars: The Battle over Information-Age Technology," *Futurist*, May/June 1996.
- Paul Starr. "Computing Our Way to Educational Reform," *American Prospect*, July/August 1996.
- Sallie Tisdale. "Silence, Please: The Public Library as Entertainment Center," *Harper's*, March 1997.
- Sherry Turkle. "Seeing Through Computers," *American Prospect*, March/April 1997.
- Velma A. Walker. "The Great Technology Divide: How Urban Schools Lose," *Education Digest*, February 1997.

Source Citation:

National Academy of Sciences. "The Information Revolution Will Transform Education." *Opposing Viewpoints: The Information Revolution*. Ed. Paul A. Winters. San Diego: Greenhaven Press, 1998. *Opposing Viewpoints Resource Center*. Gale. Apollo Library. 7 Dec. 2008

The Information Revolution Will Transform Education

<http://find.galegroup.com/ovrc/infomark.do?&contentSet=GSRC&type=retrieve&tabID=T010&prodId=OVRC&docId=EJ3010147215&source=gale&srcprod=OVRC&userGroupName=apollo&version=1.0>.

- [How to Cite](#)

Gale Document Number:

EJ3010147215