The Information Era: What Does It Mean to Education?


The history of the human race can be considered a sequence of eras. The hunter-gather era was followed by the agricultural era, the industrial era, and now the information era. Each era has its unique characteristics and educational requirements.

I was born and raised in an industrial era, so I believe I understand an industrial era society. The food needed by the society is produced by a small percentage of the work force; food production, storage, and distribution methods are quite efficient. Factories make use of increasingly sophisticated machines powered by electricity to increase the productivity of workers. Mass production techniques decrease the cost of manufactured goods. Mass distribution techniques are important. Cities grow larger and an increasing population can enjoy an increasing standard of living.

Education for an industrial society is best illustrated by our current educational system. Most young people spend many years in school, acquiring basic skills and foundations for more advanced formal education or training. The major emphasis is on learning content, as opposed to learning process. Much of the education and training is of little immediate use to students, the same curriculum may be followed by students throughout an entire country, and there is considerable emphasis on rote learning. A much higher percentage of the high school aged population is in school than in an agrarian society. High schools offer vocational training, since many students do not have much opportunity to gain such skills through summer or part-time employment.

But the United States has now moved out of the industrial era and into an information era. The past decades have seen substantial progress in manufacturing more and more goods using fewer and fewer workers. Our storage, transportation and distribution systems for manufactured goods have steadily improved. Such progress, along with rapid improvements in telecommunications, have made the world "smaller."

Computers have contributed to automation and to other manufacturing and distribution efficiencies. Computers have helped improve our information collection, storage, processing and dissemination systems. Progress in the latter areas have greatly increased the productivity of people such as accountants, lawyers, secretaries and clerks who process information.

It is only recently that I have begun to think carefully about what constitutes an appropriate educational system for an information era society. My progress so far tells me I (and our educational system) have a long way to go!

Part of the difficulty lies in the title "information era." This title suggests that more and more people work with information, instead of raising food or manufacturing factory products. But that seems inconsistent with the widely reported fact that the greatest sources of new jobs are in categories such as clerk in a fast food store or janitor! Many of these jobs tend to be relatively
low-skilled and low paying. It is true that there is an increasing number of high-tech jobs, but the total number of such jobs is modest.

I think the major difficulty is that while "information" is a useful term in describing our current era, capital-intensive, service-oriented, high tech/high touch and shrinking world are also appropriate. The latter term is of particular significance. We live in a world that is steadily shrinking due to improvements in transportation and communication. Radio and television audiences for a major event may amount to 20 percent of the entire earth's population or more. It is estimated that by the year 1990 there will be about one billion telephones interconnected by our telecommunications system. That is about one for every five people on earth! The cost of communication between two places via telecommunications satellite is essentially independent of the distance between them. There are telecommunication satellites currently in production or on the drawing board that will add hundreds of thousands of additional long distance telephone circuits.

At the same time, high tech is shrinking the world, populations continue to increase and the people of this planet are becoming more interdependent. To me this suggests our educational system needs to combine high tech with high touch. The high-tech aspect of our current era indicates that we need a number of highly trained, technically oriented workers. Computers and other technology will continue to rapidly increase the total productivity of these workers. Over the short run, there will be an increasing number of these types of jobs. But eventually the demand will peak, and may then even decrease as the high-tech workers become still more productive.

The high-touch aspects of our society have considerably different characteristics. High touch refers to people skills such as knowledge of self, knowledge of others and good abilities to use this knowledge. High touch relates to getting along with others—which is essential since high tech has led to weapons of mass destruction.

Certainly high touch is affected by technology. One need only watch a professional performer reaching an audience of tens or hundreds of millions via television or radio to see this. But technology does little to change the one on-one or small-group interaction that characterizes much of what we call high touch. Abilities to gain and improve knowledge of self and knowledge of others are distinctly human characteristics and essential parts of our current era.

One conclusion I draw is that our school system needs to place increased emphasis on both high tech and high touch. Students need good opportunities and encouragement to simultaneously develop both types of orientation. They will spend their adult lives in a society which requires both high-tech and high-touch skills. Those with particularly strong talents in either orientation need good opportunities to develop these talents and to build careers based on them. People who are highly skilled in a combination of high-tech and high-touch skills will be particularly in demand.

Increased emphasis on both high tech and high touch can be done through modification of the current curriculum. An excellent example is provided by the teaching of process writing in a word processing environment. Process writing has a strong high-touch orientation. Conferencing with teacher or peers and sharing through publication are both high touch; revision and working to communicate clearly are high touch. The use of a word processor with spelling and grammar checkers is high tech.
We need to find equally good examples in math, the natural sciences, the social sciences and other disciplines. Perhaps the microworlds and sophisticated simulations created by use of computers give clues as to what is needed. Perhaps "process math" will eventually emerge as a new way to engage students in the learning and doing of mathematics. Such examples may form the foundation of a high tech/high touch curriculum.

But we have skipped over one essential and far-reaching point. In our information era, people who work with information are being provided with tools to increase their productivity. One need only look at a modern business office to see how rapidly such changes have occurred. A modern office worker is supported by tens of thousands of dollars worth of equipment. A recent report indicated that about two-thirds of the secretaries in the United States now make daily use of an electronic word processor.

But there is one very large information-oriented occupation where there has yet to be an infusion of capital and technology to increase productivity:

Education! Our educational system is still in an industrial era mode, following a mass production, factory-like model. Neither teachers nor students have been provided with adequate productivity aids.

There are many reasons for this. Perhaps the key reason is that there is relatively little competition in education and it tends to be a local enterprise. A second reason is the difficulty of translating educational research results into productivity gains. Here computer-assisted instruction seems an obvious solution.

In any event, continued improvements in transportation, communication and the packaging and distribution of instructional materials are slowly but surely changing instructional delivery systems. Excellent examples are available in the training and retraining of people employed by some of our large high-tech companies. The challenge to our current educational system is clear.

The following brief article appeared in the same issue of The Computing Teacher as the above article, and started on the second page of the above article.

Effective Inservice for Use of Computers As Tools


I was recently awarded a three-year National Science Foundation grant to conduct research on effective inservice for school use of computers as tools. The aim of the NSF project is to gain information on how to help regular classroom teachers and school administrators learn to integrate the tool use of computers into the everyday curriculum.

The project focuses on uses such as word processors, spreadsheets, data bases, graphics programs and other tools. Such tools are characterized by their interdisciplinary and multi-grade level applicability. The project will develop, test and disseminate a method for effective inservice of teachers and school administrators. Materials will be developed to support the
training of upper elementary school teachers and secondary school teachers of math, science and social science.

During the first year the project will work with elementary school teachers in grades three to five and with math teachers in middle school and high school. The second year of the project will replicate the inservice models and instructional materials designed for these two groups of teachers, as well as develop models and materials for middle school and high school science and social science teachers. The third year of the project will replicate the work done with science and social science teachers.

Key aspects of the inservice procedure include:

1. "Ownership" by participants. Participant needs will be assessed and addressed. Participants will be involved in materials development and testing.
2. Strong involvement of school administrators.
3. Formal instruction based on a model of demonstration and practice.
4. Peer support, with an emphasis on collegiality.
5. Use of the school as a unit of change, and having a number of participants from each school involved in the project.
6. Coaching, as participants practice new ideas in the classroom.
7. Ongoing formative evaluation.

The project will produce periodic reports and a substantial amount of material to be used by teachers, computer coordinators, and teachers of teachers. The intent is to use the SIG Bulletin as a dissemination vehicle for the periodic reports. The first major report will appear in the January/February/March 1986 issue of the SIG Bulletin. It includes the project proposal and should be useful to people developing similar proposals for inservice in their school districts. People interested in following the progress of this project and obtaining early access to some of its materials should subscribe to the SIG Bulletin.

[A one-year subscription (1985-86) to the SIG Bulletin is $10 for ICCE members and $15 for non-members and includes all four issues in that volume. Please specify whether you are a computer coordinator/administrator, teacher educator or special educator. To order or for more information, contact ICCE, 1787 Agate St., Eugene, OR 97403-1923; ph. 503/6864414.]