Effective Practices (Part 5): The Future


Q. I am planning to make a presentation to our school board. What are some really good arguments that computers can make a difference in education?

I am currently involved in a research project designed to investigate this issue and provide some answers to this frequently asked question. This column is the fifth in a five-part series of columns summarizing some of what my research group is finding, as well as explaining my own current thinking on this question.

Forecasts for Computer Technology

Computer technology continues to change at a rapid pace. However, it is possible to anticipate much of this change and to make forecasts that are useful to planners and decision makers. The following forecasts describe the computer systems that will be used routinely a decade from now.

- **Hardware.** Processor speed will continue to increase. A decade from now, mid-priced microcomputers will be 10-20 times faster than today's mid-priced machines.
- **Primary and secondary memory.** A decade from now, mid-priced microcomputers will have 10 times as much primary memory and 25 times as much secondary storage as today's mid-priced machines.
- **Software.** The strong trend toward seamlessness among the various software tools will continue. Software will increasingly have built-in help features, and the human-machine interface will continue to be improved.
- **Connectivity.** There will continue to be a very rapid increase in connectivity. A decade from now it will be routine for teams of people located throughout the world to be connected by computer-based, two-way video as they work together on solving complex problems.
- **Digitization of information.** Increasingly, everything that can be digitized into computer-readable form is being digitized. A decade from now, resources in online libraries will far surpass the resources available in any individual physical library, such as the Library of Congress.
- **Artificial intelligence.** There will continue to be slow but steady progress in this area. Progress is already occurring in many everyday uses and products. Voice input is improving, and a decade from now it will be commonplace. Intelligent agents and expert systems are improving in their capabilities and will also be commonplace.
- **Merger of media.** The capabilities of telecommunications, television, and the computer are rapidly being integrated. We are already seeing a strong movement toward a product that is a combination of a computer, a television set, and an interactive communications device.
These forecasts paint a picture of increasingly powerful computer systems becoming available at reasonable prices. Such changes suggest that students and teachers need to learn to use a wide range of generic computer tools (word processors, databases, spreadsheets, telecommunications, and others) as an aid to representing and solving problems in the various disciplines. Such tools need to be thoroughly integrated throughout the curriculum and should be readily available to students and teachers throughout the school day and for use at home.

In addition, technology-enhanced learning (TEL), which includes computer-assisted instruction, computer-managed instruction, and distance education, needs to become a standard component of the educational system. One part of learning involves learning to be an independent, self-sufficient, lifelong learner.

**What Will It Cost?**

At the current time, schools in the United States spend about 1.3% of their budgets on computer hardware, software, networks, infrastructure, and support systems. Already, however, some schools spend 5% of their budgets in these areas. Over the long run, even this 5% figure will prove inadequate.

To understand why this is so, imagine a school of the future in which every student has a combination computer-television-telecommunications system networked to people and information sources throughout the world. TEL resources are available to the student at school and at home. These resources are further strengthened by a well-maintained infrastructure and support system. The support system provides teachers with the inservice education and technical support they need to continue to grow on the job.

The average cost of public education in the United States is currently about $6,000 per student per year. Ten percent of this amount is about $600 per student per year. Now, imagine how far $600 per student per year would go in terms of providing:

- Every student and teacher with a powerful portable computer and a full range of applications software.
- Every classroom with a technology infrastructure that includes scanners, printers, camcorders, desktop presentation software, and network connections.
- Every student and teacher with good access to the full range of TEL facilities both in and outside of school,
- Maintenance and repair staff, as well as other technical support.
- Continuing inservice education and support for teachers.
- Ongoing curriculum revision and curriculum development to keep pace with the continued change in technology.

Even 10% of the school budget is not enough to provide all these facilities and services. Thus, over the next decade we will see a steady rise in the average percentage of the K-12 educational budget going toward technology. A decade from now we will see a number of schools spending more than 10% of their budgets for such technology.

Dave Moursund: moursund@oregon.uoregon.edu

Note: The National Foundation for the Improvement of Education (NFIE) has received funding from Microsoft founder and CEO William Gates III to carry out a project titled "The Road Ahead." NFIE is a non-profit educational foundation created by the National Educational
Association in 1969. NFIE has subcontracted with the International Society for Technology in Education (ISTE) to do research and evaluation on this project. Some of the ideas in this series of columns on computers and effective practices are based on this research.