Effective Practices (Part 1): Computers in Schools


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

This is a frequently asked question. I am currently involved in a research project that is designed to summarize some of the answers. This column and my columns in the subsequent four issues of Learning and Leading With Technology' provide a five-part answer summarizing some of what my research group is finding as well as my own current thinking on this question,

Handle-Assisted Hammering

Listen in on a hypothetical conversation from several hundred thousand years ago:

J: Hi, Tarz, I heard you working. I see you are using a hand ax to break up the mastodon bones.

T: Right, Jane. The marrow will go great in the stew.

J: Say, Tarz, let me try out my new ax.

T: Interesting—you have used a leather thong to tie a stick to a stone ax. Why would you want to do that?

J: I call the stick a "handle." With a handle, I can get a harder hit and it doesn't take as much strength. Also, I am less apt to mash my fingers when I hammer on a bone. You know, that happens pretty often when you use a hand ax.

T: True, but I don't like your idea. I can't imagine how you can hammer where you want to hammer. It looks awkward. And it is dangerous. The stone ax could fly off the handle. Furthermore, what if you are out in a desert and there are no branches or thongs available? I don't like your idea. I don't want you teaching that idea to our children!

Of course. Jane had invented the better tool. She eventually overcame Tarz's objections, and the new tool came into common use.

The Better Tool

A short answer to the question given at the beginning of this month's column is that computers are "better tools." Contemporary standards for solving problems and accomplishing tasks are steadily becoming more demanding. People need better tools in order to meet these higher standards.

A longer answer is that there has been a great deal of research on computers and their uses in education, and this research strongly supports the contention that computers are a better tool and that students benefit substantially by the thorough integration of computers into their educational system.
This first column in this series focuses on some general issues about research on computer technology in education. The next three columns will discuss effective practices in three different areas of computer technology use in education. The final column will discuss the future of educational technology.

**Effective Practices**

The history of computer use in K-12 classrooms goes back to before 1960. Time-shared computer systems made instructional computing available to many students well before the invention of the microcomputer. Microcomputers began to come into the classrooms in the late 1970s and are now the dominant computer technology being used in K-12 classrooms.

The past 35 years of computer use in schools have given us a vast amount of accumulated knowledge about computers in education. Figure 1 shows how information from the research literature, from practitioners, and from experts in the field contribute to effective practices in the use of computer technology in education.

![Figure 1. Inputs to information on effective practices.](image)

**A Research Question**

You might wonder why it is necessary to draw on such diverse sources of information in order to identify effective practices. Why not just design and conduct high-quality research that will provide the needed answers? This section illustrates some of the difficulties of a pure research approach.

Consider the following research question: "Do students who receive at least half of their writing instruction and practice in a computer-based writing environment learn to write better than students who receive all their writing instruction and practice in a pencil-and-paper environment?"

Superficially this seems like a good research question. Of course, it would be difficult to actually carry out such research. Presumably, such a project would need to be carried out for
many years. Two groups of students would be required, with all students closely matched in all characteristics except the writing "treatment" they received. The teachers of the computer-based writing components would need to be as well qualified at the teachers of the pencil-and-paper writing component. Assessment instruments would need to be developed that could compare somewhat unlike activities—writing in a pencil-and-paper environment versus writing in a computer environment.

Actually, this is not a good research question. There are certain types of writing that are new to the computer field—they do not exist in a pencil-and-paper writing mode. What weight should be given to a method in which student learn to communicate in an e-mail environment, perhaps one in which students from widely dispersed locations work collaboratively on a project? (To maintain the integrity of the study we presumably would not allow the students writing with pencil and paper to use e-mail.) What weight should be given to a process in which students learn to create hypermedia documents? What role does a spell checker play in this experiment? What weight should we give to the development of desktop publishing skills?

Some students have physical handicaps that prohibit them from learning to write with pencil and paper. Other students may be developmentally delayed in the fine muscle controls needed to write with a pencil. How could one justify prohibiting these students from gaining any exposure to these new modes of computer-assisted communication throughout the many years that this research would be carried out?

Although the amount of space that I have available in this short column prohibits me from thoroughly discussing research issues, you can begin to see the difficulties. In terms of this specific example, it is becoming increasingly valuable for a person to know how to communicate effectively in both a pencil-and-paper mode and in a computer-assisted mode. These two modes of communication are not the same. In certain communication situations, pencil and paper is the better tool. In others, a computer is the better tool. Our educational system should not frame this as an either-or question. Rather, we should look for effective ways to use both tools.

[Send your questions/or this column to Learning and Leading With Technology, International Society for Technology in Education, 1787 Agate Street, Eugene, OR 97403-1923; fax 503/346-5890; e-mail iste@oregon.uoregon.edu. You can e-mail Dr. Moursund directly at moursund@oregon.uoregon.edu]

Note: The National Foundation for the Improvement of Education (NFIE) has received funding from Microsoft founder and CEO Bill Gates to carry out a project titled "The Road Ahead." NFIE is a nonprofit educational foundation created by the National Educational Association in 1969. NFIE has subcontracted with ISTE to conduct 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.