The End of Exponential Growth


The past half dozen years have been a period of exponential growth of computer availability in schools. The number of computers doubled and redoubled. It was estimated that a doubling was occurring every 14 months. Futurists pointed to the time, not too many years away, when there would be a computer for every student.

In the spring and summer of 1986, people were predicting that there would be about two million microcomputers in precollege schools by the full of 1986 or early 1987. This would be about one computer for every 23 students. But here it is a year later, and we probably haven't reached that figure yet. The period of rapid growth has ended (though perhaps only temporarily). We must adjust our thinking to this situation.

A recent article in Business Week contained an estimate that the precollege computer hardware market had about $350 million to spend this past year. That is enough money to buy perhaps 350,000 to 450,000 computer systems, depending on how much is spent on printers, second disk drives, hard disk drives, etc. More systems can be acquired if we buy the bottom of the line systems, and fewer if we go for the more modern, more sophisticated systems. We can use figures such as these to make guesses about the short-range future of computer availability.

For planning purposes, suppose that in the fall of 1988 there will be two million computers in schools and that funds are available to acquire 400,000 to 500,000 new systems per year. If the computer systems had a life expectancy of four to five years, we would be very close to a steady-state, no growth situation! We might eventually end up with about 2.5 million systems in service. Of course, these figures change if we use a life expectancy of longer than five years.

Business Week carried the estimate that four million microcomputers were sold in the United States during the first half of 1987, and it estimated that total sales for all of 1987 will be in excess of eight million microcomputers. This represents substantial growth over 1986 and indicates that the overall microcomputer market is quite healthy. It suggests that computers, which play a major role in the Information Age, are rapidly becoming readily available to people at work and at home.

Thus, schools are faced by the perplexing problem of how to prepare students for life in a highly computerized society where resources devoted to computers in schools are quite limited. Schools have always faced a similar problem in terms of other types of equipment and facilities, so the general nature of this problem is not new. For example, most industrial arts programs suffer from this difficulty.

It is worth noting that many students who go on to college tend to take care of this problem for themselves. A recent article in the Chronicle of Higher Education contained an estimate that one-fourth of the students now entering college are buying computers while in college. Some colleges require all of their students to own computers.

Also, many parents have solved the problem for their own school-aged children. In many of the more affluent school districts, more than half of the students have access to computers at home.
There are many ways to attack the problem of adequately preparing students for adulthood in the Information Age. While some of these require much more hardware than is currently available, others require relatively little hardware. For example, the ideas of bibliographic information retrieval and using and creating databases are fundamental to social studies education whether or not computers are available. A social studies curriculum that places increased emphasis on the analysis, synthesis, and evaluation of information that one retrieves (no matter how one retrieves it) is consistent with preparing students for the Information Age.

A word processor is certainly a useful tool in writing. But writing—the organization and communication of ideas—does not depend on having a word processor. And while we know that a word processor is useful in process writing, process writing does not depend on having access to a word processor. A school can have an excellent writing program without access to computers.

Mathematics education can focus on developing good skills at paper and pencil computation and manipulation, or it can focus on higher-order problem-solving skills. The curriculum can assume all students have access to calculators or it can attempt to ignore this tool. The fact that computers can readily solve equations, graph functions, etc., is sufficient to allow major changes in curricular emphasis, even if computers are not readily available to students.

Scientific instrumentation has changed markedly in recent years, with more and more equipment containing built-in microcomputers. This can be demonstrated in a science class, using a modest microcomputer system and inexpensive probeware. Other aspects of computer-as-tool, such as number crunching and graphing data, can lead to modifications of the science curriculum even if computers are not readily available. Sometimes when money is not available for computer hardware, one can find funds for large screen monitors or projection systems. Such equipment facilitates whole class, computer-based interactions. There is an increasing variety of high quality software to support this exciting type of computer use.

The list of such examples and ideas can easily be extended. The point is that we have quite a few computers in schools, and many times as many computers in homes and places of work. As computer education leaders we must continue to push hard for more and better hardware and software for school use. But at the same time we can be facilitating major changes in the current curriculum so that it more appropriately prepares students for adult life in the Information Age. These changes should occur even if the number of computers in schools stabilizes at a number far lower than we would like.

**Retrospective Comment 8/26/08**

This 20-year old editorial that contains quite a bit of data about the school computer situation 20 years ago. A lot has changed since then. In essence, the personal computer has indeed become a personal computer. It is now understood that many people need and/or want to have their own computer for use whenever it suits their convenience. Quite a few schools have at least experimented with the idea of having one computer per student.

Cell telephones have come onto the scene is a big way, and these devices are far more powerful computers than the microcomputers of 20 years ago. It is now clear that it is feasible to provide a significant percentage of the world’s school age children with some sort of connected laptop computer or handheld combination of phone and computer. This connectivity among people, and between people and the Web, is a major change agent. Few futurists of 20 years ago saw such possibilities or their impact on the people and societies of the world.