Computers in Education

The Resource Center

By MARGARET MORABITO

Computer networking is quickly becoming a valuable tool—and even a necessity—for increased productivity in both small businesses and schools. Although networking is usually associated with big business and big budgets, it does not have to be expensive. In fact, networking is catching on in budget-conscious school systems as an inexpensive way to share peripherals, thereby putting more students on computers more often.

Multi-User Computer Networking

The term multi-user networking has various meanings. In a broad sense, networking refers to the linking together of stand-alone personal computers or dumb terminals so they can communicate or share centralized information or peripherals.

Large companies and institutions often use dumb terminals. These are connected to a central mainframe computer that is usually housed somewhere on the premises, but that can be located in a separate building and be remotely controlled. The terminals can be connected by phone lines or directly by cables. All files and programs are held in the mainframe, ready to be called into individual terminals by the user.

In this setup, information can be shared, and communication between terminals is possible. When the mainframe is off, the terminals cannot function.

School systems that use computers for classroom instruction and administrative purposes often have personal computers (rather than dumb terminals) linked together in a network, primarily for sharing peripherals. The computers in this multi-user system are independent from a

How do you solve the problem of giving students access time with a limited amount of equipment? Read how one small school system makes a little go a long way with networking. And the solution is not as expensive as you might think.

central mainframe, and the user has more direct control of the applications that he or she runs. Eight or more personal computers can be linked to a single disk drive and a printer by direct connection to a multi-user switch housed near the group of computers.

More Computers for the Money

For a school system with a limited budget, this second type of multi-user networking is the solution. It is cost-effective because, instead of having to invest in a disk drive for each computer, a school can buy just one drive to be shared by a group of eight computers. Furthermore, each group can also share a printer, thereby saving even more money. With the savings, a school can purchase more computers, multi-user switches or software.

Commodore personal computers are a good choice for school systems because they are so inexpensive—

currently, the C-64 is selling for close to $100 and the C-128 for about $275. These low prices allow a school to buy five to ten times as many Commodores as it could the more expensive computers, such as Apple IIs and Tandy computers.

Considering the availability of Commodore multi-user networking links (many of which cost only about $150), the consistently low prices of peripherals and the large amount of software available, any school system would be wise to look into Commodore computers.

One School System's Experience

The Winchester Elementary School, in Winchester, New Hampshire, has been using computers for five years, according to the principal, Curt Cardine, who is the moving force behind this program.

Winchester now has 32 C-64s and VIC-20s in the classrooms and one C-64 for administrative purposes. The classroom computers are linked together with multi-user switches. They use a combination of 1702 monitors, black-and-white television sets and monochrome monitors.

Two fourth-grade classes use seven VICs and one C-64. Two fifth-grade classes are sharing six VICs and two C-64s, and two sixth-grade classes share 16 C-64s. Only four 1541 disk drives and four Commodore printers are needed to provide peripheral access for these 32 workstations.

When asked why he chose Commodores, Cardine replied, "Money. We are one of the poorest school systems in the entire state." Commodore computers were the obvious choice. Cardine decided that it makes more sense to let your money pay

for a group of C-64s than to buy just one Apple II.

The problem in many school systems is that they are trying to teach computer applications to a class of 20 to 30 students with just one expensive computer. Even a poor school district, however, can get computers into its schools if it takes the time to select cost-effective equipment.

When asked if he would prefer Apple IIs if his budget were bigger, Cardine said emphatically, "No."

The Commodore's easy-to-use screen-editing features, cursor controls and keyboard graphics are some of the reasons for his preference.

"My time on an Apple is double my time on a C-64 because of the Apple's crude screen editing," he said. Also, he finds that the VIC-20s are well-suited to younger elementary grade students because of the large, colorful, easy-to-read letters.

Another benefit of using Commodores in the school system is that students' parents can often afford to buy a C-64 for use at home. This provides an excellent means for doing homework and follow-up study of school training.

The Winchester school has been able to give most students an opportunity to work on a VIC-20 or a C-64 on a weekly, and in some cases, daily, basis. Although Cardine currently provides only one class session of formal instruction per week for the fourth through sixth grades, students work on the computers at recess time, during free time and after school. Without networking, this just would not be possible; there would be too many students waiting around to use the computers.

The VIC Switch

Cardine started off five years ago with two VIC-20s (then priced at $300 each), two monitors and two cassette recorders. He quickly saw that the school needed more computer stations. It was obvious, however, that it would be too expensive to buy the complete system for each station.

The following year, as a result of a federal grant (Title 4C), the school was able to buy a C-64, five more VIC-20s, one disk drive, a 1525 printer and, most important, a VIC Switch ($150) by Handic Software.

The VIC Switch is typical of the multi-user links on the market today for Commodore computers. It is a small unit, with nine serial ports— eight input ports for connecting directly to eight computers and one

output port. The output port is for connecting a peripheral, such as a disk drive, that will be shared by all eight computers. A printer can then be daisy-chained from the disk drive and shared by the entire network of computers.

The VIC Switch has worked well over the years and has brought computer training to many students in this school. There has been one problem, however. When two computers would try to access a peripheral simultaneously, the VIC Switch would often lock up.

This condition can occur when one student forgets to close his or her channel to the disk drive or printer. When the next student tries to access the peripheral, the lockup occurs. You can avoid this problem by having the student make sure that the channel to a peripheral is properly closed and that the other students know when the peripheral is free for access.

The Microshare
Multi-User Disk System

Although the Winchester school system does not regularly use the Microshare system (from Comspec Communications), Cardine has tested this networking device in his classrooms. Its price is $900, which is a prohibitive factor for this school's tight budget.

Despite the price, the Microshare system has strengths. Unlike the VIC system, it is designed to allow all users to load the same software simultaneously. But when Cardine tested this unit on various commercial software products, he discovered that the unit would not perform group loads of software that had automatic load routines built into them.

Some other features of this system include a built-in print buffer with a software-selectable device number, individual disk error status reports for each user, individually controllable channel switching delay and the ability to link eight IEEE or seven serial devices. An internal hardware change is required to accept eight computers, whereas both the VIC Switch and the CSI-64 Switch are initially set up to accommodate eight computers.

The CSI-64 Switch

Recently, the Winchester Elementary School purchased two CSI-64 Switches, which have proven to be most valuable. The price, performance and availability of the CSI-64

Switch, from Computer Specialties, Inc., are the features that make it particularly attractive to the Winchester school.

With the CSI-64, which costs about $130, you can connect up to eight C-64s, VIC-20s, Plus/4s, C-16s or C-128s to a single disk drive and a printer. All Commodore serial printers will work with this, and you can use certain interfaces to allow the use of non-Commodore printers.

Cardine discovered that the CSI-64 Switch rarely locks up. It handles simultaneous requests for access by queuing up the computers. The system works on a first-come, first-serve basis and puts subsequent requesters on hold until the present user has finished. There is a light on the front of the unit that lets the users see which of the eight computers is accessing the drive or printer.

The Winchester school is planning to buy more CSI-64 switches to link together several more classrooms of C-64s and new 128s. The ultimate goal is to provide a computer for every student.

CSI has recently come out with an Instructor Monitor Prompter (IMP) device that lets a teacher monitor any of 16 computers. The IMP allows the master computer station to observe what each computer on-line is doing, communicate with any of the users and perform group loading of software at an incredibly fast speed. (This is a fairly new product and has yet to be tried at the Winchester school.)

Does It Work?

I asked Curt Cardine if he had been able to measure an improvement in learning in those students who had been using computers. He said, "Yes. Their thinking skills went way up." Cardine studied one group in his school and was excited about the trends that he saw. Twenty-four students, after spending one year learning about computers and actually working on them, increased an average of two years on their achievement tests.

"Children can actually push themselves through developmental stages. They definitely advance in their ability to reason things out," said Cardine.

The Winchester school is a prime example of how a non-affluent system is able to bring to its students computer training that is often available only in wealthier schools. Multi-user networking has proven to be the only way that this school has been able to provide computer education for its students.

I welcome comments about computer networking from those of you who are using this application. I also encourage you to contact me if you are using Commodore computers for any type of educational purpose, whether in a school, community activity or at home.   R
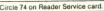
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