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ABSTRACT

This brief publication provides general background on issues related to using microcomputers for instruction and suggests ways in which computer technologies can be included in state education improvement plans. Specific computer assisted instruction (CAI) uses mentioned are individual drill and practice and developing higher order skills. Three primary problems which emerge when school districts acquire new technology are identified and discussed: (1) postponing any action with the rationale that hardware can be purchased at lower cost in the future; (2) purchasing hardware without goals or plans for expansion; and (3) lack of knowledge about the full range of costs. In addition, the following five state concerns are outlined: integrating computer technology into state plans for improving and restructuring education; acquiring enough hardware to do the job; buying or developing quality computer software; training education personnel in computer instruction; and making computer technology accessible to all. Specific suggestions are made for action by state leaders in each of these five areas. A four-item reading list and contact information for two software evaluation centers are provided. (LMM)

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38. State Strategic Planning For Technology

The Issue

Public pressure for schools to use microcomputers and related technologies has strengthened considerably in recent months. Although computers are not new for schools, societal factors are pushing them toward greater use:

- Computers are rapidly gaining acceptance in homes, small businesses and other sectors of society.
- The public is increasingly aware that computer technologies are important in our new information age and that computer literacy is essential for our youth if they are to participate fully in society.
- Computers offer the potential to improve education programs and increase educational productivity.

This Issuegram provides general background on the issues related to using microcomputers for instruction and suggests ways computer technologies can be included in state education

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improvement plans.

General Background

Those planning to use computers in instruction should first analyze the educational purposes and needs to which computer applications may be applied, and inventory the equipment or hardware available for instruction. Many forms of computer-related technologies are available and each may be used for many purposes. Microcomputers have received primary attention because they are relatively inexpensive, convenient and familiar to students. The effective installation of microcomputers in a school requires a plan for purchase of an adequate number of computers and necessary hardware; purchase/acquisition of effective software or programs that "teach" the desired information and skills; training for teachers and administrators; and continued funding for software acquisition/replacement, hardware repair/replacement, and staff training. Potential uses of microcomputers for instructional management by teachers and a variety of administrative tasks should also be considered.

Computer-assisted instruction may be used for:

- Individual drill and practice. Students must master basic skills in mathematics, word recognition, spelling and the like. Computer-aided instruction (CAI) enables them to work at their own speeds and provides them with immediate feedback about the "rightness" of their answers. Studies generally show CAI to be a more efficient approach to drill and practice than structured classroom approaches. CAI allows students to control their own learning, and results in significant gains in learning achievement.

- Developing higher order skills. CAI also may be used for difficult learning tasks such as analysis, synthesis, application of information and problem solving. Designing appropriate software for these uses is difficult, however, and the supply of good software is limited.

Some of the problems which emerge when school districts acquire new technology are:

1. Postponing any action with the rationale that hardware can be purchased at a lower cost in the future.

   It is true that the cost of computer hardware will decrease in the future and large-scale "crash" investments should be avoided. However, postponing

purchase of microcomputers penalizes current students and slows staff training and development.

2. Purchasing hardware without goals or plans for expansion.

A plan for effectively using hardware requires specific goals and a strategy for increasing computer use. If a primary goal is to use microcomputers for remediation of basic skills, for instance, it may be essential to provide labs where each child has regular access to a microcomputer. For other goals, such as teaching simulations and word processing, students may be able to share a microcomputer.

3. Lack of knowledge about the full range of costs.

Many have worked to acquire funds for purchasing microcomputers and have overlooked the costs of software and training personnel. It is estimated that funds equal to one-third to one-half the cost of hardware should be available for software, training and maintenance.

State Concerns

An estimated 400,000 microcomputers will be used in public schools by the end of the 1982-83 school year. While districts move ahead with efforts to use existing technology, though, states are just beginning to identify the policy and program implications created by a somewhat chaotic, unplanned use of microcomputers for instruction. Five state concerns are:

- Integrating computer technology into state plans for improving and restructuring education. Plans for microcomputer technology should range across the basic skills, higher order skills, information processing and occupational goals.

- Acquiring enough hardware to do the job. In local districts today, microcomputers are available to only one out of every 400 students. Further, these microcomputers are often poorly or under-used. Some federal money is available for purchasing computers (about 15% of Chapter I funds, about 35% of Chapter II funds, and other allocations for handicapped and bilingual education). Local parent organizations donate 15% - 20% of computer costs. Business and industry sometimes contribute equipment and funds. Thus, some states may not need to provide general funds for hardware. But states should monitor computer acquisition to ensure access to technology for poor, rural, and inner city districts.

State aid may be necessary at some point to equalize access.

- Buying or developing quality computer software (courseware). While the available courseware is expanding, it does not fill the needs for more comprehensive or more specific instruction programs. But developing quality courseware is expensive, the profit is low, and there are not enough skilled software developers. Further, much existing software cannot be used on different brands of computers. States can play a key role in providing resources for developing quality software.

- Training education personnel in computer instruction. The crucial element in using computer instruction effectively is the capability of the teaching staff. States can play a key role by providing inservice training, technical assistance, and other incentives for increasing educational staff capability.

- Making computer technology accessible to all. Employment patterns in high technology industries, enrollments in postsecondary and vocational programs, computer buying patterns and observations of classrooms suggest that minorities and women are underrepresented in computer technology. State monitoring of participation, special programs, and incentives can do much to remedy this.

What State Leaders Can Do

- Integrate computer technology into instructional goals and programs for improvement.

  - Establish a broadly representative state task force, including government, education, business and industry and lay citizens to develop plans to improve education which includes the use of microcomputer technology.

  - Develop curriculum guidelines and examples of the use of microcomputers in various subject matter areas.

  - Identify computer literacy goals and minimum requirements to encourage district efforts.

  - Provide resources for computer laboratories at teacher and administrator training institutions.

  - Require computer competency for certification of teachers and administrators.

- Encourage conferences, workshops and fairs for inservice training and exchanging information, programs and experiences.

- Set up a "student assistantship" teacher corps, or loan forgiveness program to encourage technologically skilled youth to work in the public schools.

- Support efforts to acquire hardware.

  - Offer tax incentives to parents, business, industry and others for donations of funds, equipment, services or personnel to install and maintain computers.

  - Train, assist and inform school boards, administrators and teachers as they develop strategic plans and acquire hardware.

  - Fund state programs to purchase hardware when needed.

- Buy and/or develop quality computer software.

  - Specify state priorities and provide "up-front" money for courseware developers.

  - Join other states in consortiums to sponsor the development of quality courseware, or set up institutional consortiums within the state.

  - Establish awards, recognition and other incentives for educators to design computer courseware and programs.

  - Provide tax incentives to industries that donate staff or resources for developing educational courseware.

  - Develop courseware adoption procedures for quality courseware.

  - Teach education personnel how to evaluate courseware and help local education agencies identify quality courseware.

- Train education personnel.

  In addition to the training suggestions under some of the headings above, states can:

  - Provide inservice training, either during the school year or at summer workshops, that offers opportunities

to gain or expand computer use and skills.

- Invite outstanding students and teachers to participate in state-sponsored computer camps or workshops.

- Equalize access to technology.

  - Monitor the acquisition of hardware and the development of computer programs across districts.

  - Encourage computer literacy program requirements for all students.

  - Help school personnel to counsel interested minority and female students toward careers in mathematics, science, engineering and computer sciences.

What to Read

Electronic Learning. New York, New York: Scholastic, Inc.

THE Journal (Technological Horizons in Education). Acton, Massachusetts: Information Synergy, Inc.

Seymour Papert. Mindstorms: Children, Computers and Powerful Ideas. New York, New York: Basic Books, 1980.

Robert P. Taylor, editor. The Computer in the School: Tutor, Tool and Tutee. New York: Teachers College Press, Columbia University. 1980.

Software Evaluation Centers:

Education Products Information Exchange, P.O. Box 839, Water Mill, New York 11976

Northwest Regional Education Laboratory, MicroSIFT, 300 S.W. Sixth Avenue, Portland, Oregon 97204