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ABSTRACT

In examining microcomputer uses in education, consideration must be given to hardware, software, and most importantly, the people who will use them. The educational software market is being affected by hardware manufacturers, educational publishers, independent software houses, user groups, and classroom teachers. Each of these groups has clearly defined (and not necessarily compatible) objectives for producing software. Problems in software evaluation include the need for a software classification system for educational purposes. One possible classification system could begin by categorizing educational software as administrative software, computer assisted instruction (CAI) software, or programming languages, and subdividing these categories. Hardware aspects include the use of dedicated processors, as in video games and interactive video peripherals. Articles on educational media have increasingly focused on microcomputers because of their decreased costs and size, and their increased capabilities. As computers have become essential to modern communications systems, so communications systems have become essential to provide access to databases of information throughout the country. We must be reasonable in our approach to the media and be aware of the mania that can lead to intellectual irresponsibility. (LMM)

MICROCOMPUTERS: MEDIA OR MANIA

by

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Microcomputers: Media or Mania

As we approach the seventh birthday of microcomputer systems, the age of reason for humans, it is appropriate to consider these systems as a medium, a channel of communication. In looking at the use of microcomputers in education or in any other area of application there are three major points that should be considered. These are hardware, software and people. Although the first is somewhat obvious, it is not as important as some might lead us to believe. In fact it is probably the least important area of consideration today. The most important area of consideration is the people. In every application of a microcomputer system, the success of the hardware and software will depend on the people that are using it. Thus in selecting a medium like a microcomputer system, we must first look at the task to be performed and that includes looking at the people who will be performing the computerized task. Second, we must find the software that will perform the task to our specificiations

and those of the people who will actually be using it. In many cases, the availability of the appropriate software will dictate the hardware. However, if we should be one of those lucky few whose software package exists on a number of different micro-computers systems, then we finally have a decision to make.

Today people, all sorts of people, are becoming more computer literate with each passing day. We are beginning to understand that the educational software market is being effected by five major forces. They are the hardware manufacturers, educational publishers, independent software houses, user groups, and classroom teachers. Each has clearly defined objectives for producing educational software. The hardware manufacturer wants to support the hardware and insure future sales to schools. A classroom teacher, on the other hand, might develop a piece of educational software on a particular brand of hardware because that is what is available, and in the teacher's opinion there is no software that adequately addresses the needs of the classroom in that subject. Consequently, the process of evaluating and classifying software becomes both difficult and important.

The National Council of Teachers of Mathematics and MicroSIFT have each developed a set of guidelines for courseware evaluation. However, no one requires as yet any pre- and post-testing, or detailed observation of student activity while using an educational software package. Also, reviewers sometimes forget their audience and a typical lament among classroom

teachers is, "It seems that the review was written by someone without enough sense to know that nineth grade vocabulary is a great deal different from twelfth grade vocabulary --it certainly wasn't written by anyone who teaches English to high school students." Something that might assist in the evaluation effort is a new database available through DIALOG Information Retrieval Systems called Microcomputer Index. Although the index is primarily a subject and abstract guide to microcomputer articles from some thirty-two periodical sources, the information contained includes software reviews, as well as, reviews on hardware and books.

Still the other problem is classification of the software that schools might use. As a "first cut", we might consider the classifications of administrative software, computer assisted instruction software, and programming languages.

Much of the software being used by school administrators is available commercially as business software. Using general-purpose file management software, administrators are storing and retrieving information concerning permanent teachers, staff, substitute teachers, and job applicants. These programs are commonly called database management systems. At the college level they help track students by their major, year in school, and advisor. Computerized spreadsheet programs like VISICALC are being used by the fiscally minded administrator to calculate budgets and project future enrollment trends in various classes.

This same software is used by classroom teachers as an electronic gradebook that presents updated averages per student and per class test each time an entry is made in a table where student grades are the rows and test grades are columns. Word processing software is also getting to be a must among administrators. This product by itself has sold more microcomputers to school systems than any other. In fact, it will eventually replace the traditional typewriter as the gift to the son or daughter that is about to go to college. To supplement the word processing package, administrators are also selecting mailing list software. This helps them keep in contact with the band boosters, the parents of school atheletes, and those volunteers that are always needed by schools on so many occassions. Finally, some schools have also invested in general ledger, accounts receivable and accounts payable packages. However, since such activities are usually centralized, this is not a common occurrence.

Of course, not all administrative software is being adopted from business software. There is specially designed microcomputer software that is being used to help librarians manage their libraries. There is attendance software that is available to help principals monitor truancy in their schools. There is also educational programs known as authorship software which allows the classroom teacher to develop tests or other computer assisted instruction lectures that will be used by students. As we become more sophisticated and define our needs,

we will be demanding even more specialized educational administrative software.

Computer assisted instruction (CAI) software can be divided into drill and practice, tutorial, testing, simulation and dialog. The objective of each category is substantially different and merits this discrimination. Administrative software like the authorship programs can be used to construct a CAI module but it is the CAI module that the student uses that we are interested in here and not the authorship program. Also, some administrative software translates directly into CAI because of the subject that is being taught. For example, using a word processor in a class where we are teaching word processing, or using VISICALC in a business math class where we want to teach VISICALC because of its forecasting properties. The former is being used as drill and practice while the latter would be classified as simulation.

Drill and practice software presents exercises to reinforce learning gained from another source. It is strictly a supplemental approach to learning. In fact, its purpose is to sharpen known skills. A teacher might introduce and explain a concept in class, then the microcomputer in the study hall or at home presents exercises on that concept. Furthermore, the microcomputer can provide immediate feedback to every problem, as well as, provide positive reinforcement for correct solutions and hints for those problems that are giving the student difficulty.

Tutorial software is similar to the old programmed text booklet except that with a microcomputer each frame is a video screen and you can not cheat by turning the booklet page and peeking at the answers on the bottom of the next page. There is certainly some drill and practice involved in every tutorial but the main emphasis is on instruction and explanation. Although drill and practice software does give the correct answer to a missed question, it does not explain why the student's answer was wrong. Tutorial software must not only give the correct answer but the program must also explain how the correct answer was obtained. Furthermore, quality tutorial software should recognize patterns of mistakes and concentrate on helping the student understand the misconception that is causing the mistakes.

Testing software presents problems just like drill and practice software except that in this case the student's answers are recorded for later evaluation by the teacher. Tests are usually the multiple choice, true/false, and fill in the blank varieties. A number of testing software packages select their questions for each test at random from a large stored database of questions on a particular subject. This gives the added advantage that each student gets a different test and since the test is being scored by the microcomputer this does not work any additional hardships on the teacher. With testing software the student is not told his or her score until after the test grade

has been recorded. Also during the test, there is no indication that a question has been missed or answered correctly. Some programs do review with the students the problems that were missed after the test is completed. In the eyes of the student using testing software, the role of the teacher has changed to more of an "educational consultant" since it is the computer that is asking all the hard questions.

Simulation programs allow the microcomputer to imitate real situations in physical or social systems so that students may observe how changing different variables will affect the overall operation of the system. This software may appear to be a game but it is a serious model of some type of dangerous event. For example, there are ecological models of preditor/prey relationships and the student is asked to help Nature maintain the balance. There are simulation programs which allow the student to be an air traffic controller or an engineer at a nuclear reactor plant. Simulation software has yet to be fully developed in education. Both the government and industry have noted the importance of simulation software and have already spent millions on its development for such activities as flying the space shuttle and being a gunner on a tank.

Dialog software differs from the other types of CAI software in that it allows the student to teach the microcomputer rather than the microcomputer drilling, tutoring, or testing the student. Probably the most famous endeavor in this area is LOGO

the brain child of Dr. Seymour Papert of M.I.T. LOGO can be used in preliminary grades to introduce young children to the microcomputer. LOGO basically draws pictures for the student. When simple instructions are entered from the keyboard, a shape on the screen called a turtle moves about leaving a trail. In this way, the student is invited to explore computing with LOGO. In order to make the turtle produce a square, for example, the student must plan an action and then describe it to the turtle through commands like "FORWARD" and "RIGHT" which may be simply abbreviated as "F" and "R" for the kindergarten youngster that can not read or write. LOGO involves the students in thinking logically about distance, directions, and angles; it gives them a great opportunity to be creative.

The last major category of educational software is that of programming languages. There are more than sixty computer languages in existence today. Each has a particular reason for being; furthermore, languages come and languages go and by themselves they are not really that important. An analogy can be drawn between different human languages and problem solving. Speaking both English and Spanish does not automatically make one a better problem solver. However, speaking both these languages can help one express ones thoughts on a particular problem to an audience that only understands one of the languages. If our microcomputer has only a BASIC interpreter then indepth knowledge of PASCAL will not allow us to communicate with that machine.

Evaluating programming languages is much like evaluating human languages. It is just as ridiculous to say that PASCAL is better than BASIC as it would be to say that English is better than Spanish.

Finally, we must consider the hardware aspect of the medium. Without doubt, one type of hardware that has significantly impacted our society has been the video game. These microcomputers are what we in the computer industry called dedicated processors. They do one thing and they do it extremely well. Such microcomputers, when mass produced, are cost effective and very efficient. Now the issue of video games in society is certainly a hotbed of contention, but dedicated processors definitely have a place in schools and should be recognized along with the general-purpose microcomputer system. Most people are aware of the success that Texas Instruments has had with its Little Professor, and Speak and Spell. Dedicated processors such as these can be used effectively when many of the more elaborate capabilities of a general-purpose microcomputers are not needed. In the primary grades, the limited entry keyboard that is usually associated with a dedicated processor is a distinct advantage. There is also the story about the little girl at the ripe old age of five being introduced to the keyboard of the family's general-purpose microcomputer. She had received a Speak and Spell for her third birthday and had already enjoyed using it for two years. After a few moments of looking at the

general-purpose microcomputer keyboard she said, "Daddy, why don't they use the ABC's?"

In expanding our horizons with microcomputers, we are attaching more and more peripheral equipment to the basic machine. Students are now requesting plotters on their microcomputers so that they may draw graphs or make blue prints. Art students are using graphic tablets to design company logos and softball teams ensignias. Music students are attaching piano-like keyboards to assist in the delivery of new sounds. Educators too are trying to enhance their computer assisted instruction software by attaching videotape recorders to their microcomputers thus eliminating the passive quality of television. Interactive video is the term most often encountered when one discusses the marriage of the microcomputer and television. Videodisc players seem to be the future for interactive video. The goal of interactive video is the development of a complete instructional delivery system. This can be very important to small rural schools that are having great difficulties in finding science and math teachers. It may also help urban schools that are faced with the same problem. Interactive Video can assist schools in offering subject that would not otherwise be available such as astronomy, computer literacy, or even Latin. Certainly, a lot more is to be expected in the future as we dream of better ways in which to communicate our knowledge to our young.

But are we creating a mania about the media? We probably are. We have done it before. For example, in the summer 1977 issue of School Media Quarterly, there were three articles and none concerned the use of microcomputers in education. (It was only that year that microcomputers began entering the classrooms.) In fact in all of 1977, School Media Quarterly published twenty-three articles and none were on microcomputers. The big topic that year was television. Now in the summer 1982 issue of School Library Media Quarterly, there were 6 articles and 5 were about some use of microcomputer systems in education. What has caused the shift?

First of all, since 1977 microcomputers have become less and less expensive so that now more of us can afford having one in our homes (just like the television set). Second, microcomputers are shrinking in size and increasing in speed and capabilities with each new year. They require less energy to operate and environmental controls such as air conditioning and dehumidifiers are no longer crucial. Finally, we have realized that microcomputers like their bigger brothers the minicomputers and the mainframes, are terrific machines for gathering and storing data and retreiving that data for analysis and manipulation thus giving us information. We are, after all, the Information Society!

In August 1981, IBM entered the microcomputer market with its personal computer. Great expectatons were voiced then and

for the most part these expectations were well founded. To quote Mr. James Finke, past president of Commodore Business Machines (Mini-Micro Systems Sept. 1982), "The cliches are right about IBM's legitimizing the market. It makes everybody's business more solid because the public sees the personal computer as part of a real trend and not another Hula Hoop." Since August 1981, there have been on the average the introduction of two new microcomputer systems every month. Digital Equipment Coropration unveiled five new microcomputer systems in May 1982 alone. However, not everything introduced can be applied to the educational market. In the June 1982 issue of Datamation an attempt is made to list the top microcomputer manufacturers. Although IBM is not on this list, the mass assets of this company will soon be brought to bear in education unless, of course, there is another demand for its resources. That demand may come in its head to head confrontation with American Telephone and Telegraph another corporate giant. This collision will certainly have an effect on our schools and in particular our libraries.

Just as computers have become essential to modern communication systems, communication systems have become essential to information processing. Communication software turns a microcomputer in a classroom or library into a window to databases of information throughout the country. Students and teachers are no longer limited to the databanks that are personal or even local. There are roughly 500 databases across the United

States that are now available by subscription. According to an article in the June 7, 1982 issue of Business Week several of our libraries have already installed pay microcomputer systems for their patrons. By paying $2 to $6 for an hour of computer time, library customers can use the equipment for word processing, computer assisted instruction, or database searches. The patrons are all too willing to pay such fees.

People cause mania by expecting too much too fast. Surely, the microcomputer industry has feed our enthusiasm by its rapid growth since 1977, but there is certainly a long way to go. We must be reasonable in our approach to the medium. Unfortunately, there are "experts" today that have become experts because they have bought their own microcomputer system and have worked on it for a few months. This is like saying that as a library user, one is qualified to be a librarian. We must be aware of the mania that can lead to intellectual irresponsibility. For example, some knowledgeable person raises some valid criticisms about microcomputer systems X or software product Y which may or may not be correctable. Pretty soon it becomes fashionable to "bad mouth" X or Y. People who know nothing about the subject except that some "famous" person has criticized it begin to voice those and other, these imagined, criticisms. As another example, a knowledgeable person might say that Z is quite possible with microcomputer system X. Again, in time, people who know nothing more than what has been said will

in fact say that Z is <u>only</u> possible with microcomputer system X. As educators, we are responsible for seeking truth. If we criticize something, then we have the responsibility to know it well. If it turns out that we do not know something related to what we have done, then we should admit that we do not know.