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Computers in the School: Too Much Too Soon?

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Computers have long since left the isolation of the laboratories and big companies and entered the mainstream of American life. They are at the grocer's checkout stand and in the mechanic's corner garage. Already school administrators use them routinely and classroom use is increasing. In a shorter period of time than most would imagine, a classroom without a computer will be as rare—and as underequipped—as a classroom without a blackboard.

The principal factor controlling the onrush of computer usage is the unit cost of computing. These costs have been dropping at an incredible rate and will continue to drop for the foreseeable future as micro-miniaturation continues unabated. The recently introduced IBM 4300 systems have a memory cost one-fifth that of the IBM 370/138 system which was introduced a few years ago. Small computer systems are available for less than \$600 on an individual basis and the prices continue to drop as the sophistication increases. With these realities, it is inevitable that computers will be standard budget items for classroom use in the next few years. With the introduction of computers into schools will come new problems and new dangers as well as new educational possibilities.¹ Now is the time to think about these problems and dangers so that solutions can be found and implemented. We are in the beginning stages of a third industrial revolution² which cannot be stopped but for the protection of the schools, teachers, students and society as a whole. It is imperative that we control its direction and pace.

The use of computers within the schools is and will be as varied as the educational process itself. Already many administrative functions are handled by computers. Functions such as roll-taking and accounting provide no greater or lesser problems for a school system than they do for business enterprises in general. Special benefits are available to schools when they use computers for such routine functions as schedule planning, routing of busses and record keeping of diverse items such as SAT scores

and daily attendance. Computers not only perform record keeping functions efficiently but as a result of their use the information is easily manipulated to generate reports and statistics which are so important in future planning.

Teachers no less than administrators are finding the computer useful for many of their administrative functions. We have long been familiar with using computers to score tests. Now computers can even create tests.³ By entering many questions, assigning each a type—multiple choice, true-false, fill-in-the-blank—and scaling their degree of difficulty, a teacher can ask the computer to select questions randomly to create a test with a particular composition, such as half true-false, half multiple choice, and with a given degree of difficulty. The creation of new tests each semester thus becomes easy. Indeed, once the initial questions are entered, the creation of a different test for each class becomes simple.

For many years computers have been used for rote instruction, by first providing information and then following up with a multiple choice quiz. With the more sophisticated "programmed instruction," computers can follow a path controlled by the correctness or incorrectness of student responses to the questions. Thus, a student can speed quickly over the areas he knows well and concentrate in areas that are less familiar.

Ever more sophisticated programming for interactive instruction means that the computer is not just a static machine waiting for a student answer but can act as a dynamic force in the educational process. Just as the use of laboratories was an important innovation in American education in the times of John Dewey, the use of the computer in schools will be the laboratory innovation of the future—if not of the present. A student of calculus who is able to see the plot of a curve change by feeding in different coefficients will have a much greater understanding of the subject. The difficult problems of economics will be clearer when a computer

can quickly show a child what happens to the rate of return on an investment as the interest rate goes up or as the principle goes down or as the time of the loan is changed.

One of the most important teaching functions of computers in the schools will be the actual teaching about computers. As computers become more prevalent in society, it is important that members of society learn to work with computers. Exposure to computers of various sorts from an early age in the school system will not only cause people to use them routinely but will mold their thinking to the logic of computer functions. In a very real sense, the illiterates of the next generation will not be those who cannot read but those who cannot program computers and use their capabilities.

It is certain that the present state of the art in the use of computers as teaching devices is in its infancy despite the fact that computer hardware is highly developed.⁴ It is as difficult now to recognize the effect of our computer revolution on education as it would have been for Orville Wright to discourse on the advantages of a 747 jet or for Gutenberg when he first printed the Bible to have been aware of the technological and social revolution he was launching.

Of course, there are no gains without pains. The problems and threats to the schools are not far behind. The rote work that computers do so well is in most cases the worst kind of teaching. What makes a great teacher is hard to build into the computer. They have neither a teacher's flexibility nor humanity. Therefore, one of the greatest dangers of computer use is the overuse of computers. They must be limited in what they do. We must not be fooled into believing they can or should do all the teaching. A computer does not have the ability to control a classroom of students nor help an individual student who merely sits and stares at the screen of a terminal. One of the primary functions of education is the socialization of the children both through the teaching of acceptance of regulation and the interaction with fellow

students and teachers. This interactive function is greatly diminished by the overuse of computers.

Another major area of concern with the increased use of computers is in the area of privacy. In essence, a computer is a storehouse of information which can be manipulated in a variety of ways. Prior to the advent of the computer, even the smallest number of records were expensive to collect and when collected would eventually become so burdensome to retain that it became economically necessary to throw them away. With the passage of time, therefore, much information became inaccessible simply through destruction of the records or obfuscation of the classification function. Not so with a computer data bank. With a computer, it often becomes easier to store a great deal of information on a person and to retain that information no matter how obsolete it has become than to remove it. Moreover, since computers are increasingly interconnected, it is feasible to develop a dossier on each citizen which comprehends his education, family relationships, health records, criminal data, political associations and other sensitive and essentially private information.⁵

The records maintained are not just the student's records but records of the teacher and of the school. With the ease of record keeping and the storage capability of discs, tapes and chips, more kinds of records will be kept in more detail and computer-to-computer exchanges will be commonplace.

Already it has become essential to control the access to these records. A proliferation of privacy regulations running the gauntlet from student records to health and arrest records have been the result. Americans' passion for more information about all sorts of subjects creates part of the problem. If a college wants to be able to consider prospective students based on their records from the first through twelfth grade, it will be possible to do so at the mere push of a terminal button. Yet, even if proper for col-

lege admission, should we provide the same information to a prospective employer or should guardians be allowed free access to all school information or only some of it.

Once we develop detailed information on a person, the problem of rights of access to it and the right of persons to see or even to change their records becomes important. Should the schools be encumbered with the troublesome kind of laws that banks and credit bureaus face?⁶ Already schools and universities are involved in the privacy problem and the right of access problem. The computer has both created and sensitized us to these dangers to our privacy.

With more records comes the threat of more litigation and a new form of crime. Records become a source of proof for discrimination of many sorts, for negligence in education or for damage caused by faulty records. Of course, the converse problem is created if records are not kept or preserved. Establishing the nonexistence of discrimination, negligence or damage is also difficult, if not impossible. As was shown in the Equity Funding scandal, computer records have a way of not just replacing other records but of becoming a reality in their own right. If there is no check, what the computer says the score was is what the score is. Hence computer fraud is a problem that has reached major proportions on many fronts.⁷

It will soon be apparent to many bright students—as it has already occurred to some—that it is easier to learn how to overcome computer security than it is to learn the test material. It may also prove to be more enjoyable unless we improve the education process. If over ten million dollars can be removed from a California bank without immediate detection by the use of a computer, a replacement of a few "C's" with "A's" is unlikely to be detected. The student who once worked hard to steal an advance copy of the test will now need only to "correct" the record after the grades are in.

Since suits have already been brought by students who feel they have received an inadequate education for one or more reasons,⁸ the use of computers to replace a teacher or to perform part of the teacher's functions might well be an invitation for similar suits. The opposite side of the coin, of course, is that a student whose instruction is not aided by a computer may feel disadvantaged. The courts may be called on to decide if school boards must provide equal computer facilities to insure equal educational opportunity which has been mandated by Federal courts. Of course, some students will have extra advantages. What is now a \$600 home computer will soon be a much more powerful \$100 home computer. The affluent child will be able to buy extra educational instruction at home just as Patty Hearst could afford a better lawyer than some young person from the south side of Chicago. Perhaps the affluent child will be no more likely to take advantage of it than are children likely to take advantage of piano lessons, but it would seem likely that he would. If so, can others claim discrimination?

In the far future of 1984—which is datewise and otherwise not far off—the ultimate threat to schools will be that as computers replace the teaching functions in the schools, it will become apparent that those functions can be performed much cheaper elsewhere. If school instruction is parcelled out to the homes, the rout would be complete. Of course, we all know this cannot happen here!

But no society has ever correctly judged, until well after the fact, the total changes to be wrought by technological breakthroughs. Already we have seen the electronic calculator change from a very expensive personal item to a Christmas stocking stuffer. The effect of the infusion of calculators in grade schools will be impossible to quantify but it is likely to have some unexpected effects. Does the justification for teaching math to the vast majority who will never use it professionally disappear when simple arithmetic can be performed by calculators

without the user needing any comprehension of the mechanisms of arithmetic?

Audio visual aids have found their place within the school system but the impact of electronic reproduction mechanisms are still not fully appreciated. When modern reprography is coupled with the computer, we are introducing a much more complex marvel into the school system. The question is not whether or not to use computers in schools but only when they will be there in force and how we will attempt to direct their use. It is necessary to begin now formulating policies to insure privacy, to delineate the extent to which we will allow computers to be used as teaching tools and to find ways to maximize the beneficial effects of the use of computers. Though the day when the classroom consists of 30 children dutifully responding to a robot is far in the future, the day when every elementary school child will spend part of his school day programming at a computer terminal and using it as an education tool is just around the corner.

References

¹ The problems and social issues raised by the computer in society at large have been the subject of much comment and not an insignificant amount of hand wringing. See McCracken, "A Problem List of Issues Concerning Computers and Public Policy," and other materials collected in Wessel, *Materials and Cases on Computers, Society and Law* (2nd Ed. 1976).

² The harnessing of electrical power is considered the first and the development of electronics the second.

³ See "Final Exams—Let the Computer Write Them" by Bernard Eisenberg, *Creative Computing*, Nov.-Dec. 1977, p. 103.

⁴ Quite a bit of research has been carried out on the use of computers to assist in teaching some aspects of law. In addition, McGraw-Edison Company was heavily involved in developing an interactive teaching typewriter nearly twenty years ago—a development that is totally obsolete now in view of the state of the art.

⁵ Much has been written about the threat to privacy posed by the national data bank despite the legitimate uses to which such information can be put. See "Data Banks in a Free Society" Alan Westin, (Nov. 1972 Quadrangle Books).

⁶ Electronic Funds Transfer or the "Checkless/Cashless Society raises staggering social implications as to privacy, competition and liability. See the speech of Joe Sims, "Evolving Competition Among Financial Institutions" to a Department of Justice Executive Seminar, February 28, 1975.

⁷ "Waiting for the Great Computer Ripoff", Caroline Parker Young, *Fortune*, July 1974, p. 143.

⁸ One of the more humorous examples arose in a case where a student charged that Columbia University had promised to teach him wisdom—and had apparently failed! See *Trustees of Columbia University v. Jacobsen*, 148 Atl. 2d 63 (Sup. Ct. App. Div. N.J. 1959), *appeal dismissed per curiam*, 156 Atl. 2d 251 (1959).

