Cars, Computers, and Curriculum

The computer may be today's darling, but its value for tomorrow has yet to be tested.

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In 1900 an enthusiastic futurist might have made some predictions about society and education as follows:

By 1950 the automobile will influence every aspect of our lives. Those who have no knowledge of the automobile will be at a serious disadvantage in their personal, social, and vocational lives. Every household will have one (or even two!) cars. Vast industries of auto production, sales, and maintenance will grow. The automobile will enable individuals to live at even greater distances from their places of employment, as "commuters" simply jump into their cars each morning, drive at speeds up to 40 miles an hour, and return by the same routes on an expanded network of macadamized roads.

Moreover, new vistas of recreation will be open to families. Advanced technology and mass production will make cars affordable to the average American family. We can look forward to driver-friendly devices (no-crank ignitions, automatic chokes and transmissions) that will breakdown resistance to car use in our society.

But pity the poor midcentury citizen who lacks fundamental knowledge of the automobile. Such a person will be stymied by the overheating of a radiator, the deflation of a tire, or the simplest unplugging of a wire in the car's complex electronic circuitry. People who are knowledgeable about the basic workings of the automobile will have incalculable advantages over "auto-illiterates." The car-wise individual will arise on time, make more professional contacts, and engage in sparkling conversation about radiators and batteries. The non-driver and non-car owner will be ill-suited to successful 20th century living.

The implications of the automobile for education are mindboggling. And yet it is clear that our schools are not...
preparing students for the world in which they will live. This is especially ironic, because young people seem to have a natural affinity toward cars, far outstripping their parents in open-mindedness and eagerness to learn. The curriculum must be drastically overhauled to serve the new, car-rich environment.

Here are some moves that must be implemented immediately: mandatory courses in car maintenance and repair, beginning in the seventh grade or earlier; driving and safety courses as prerequisites to high school graduation; in reading programs, emphasis on rapid decoding of street signs, traffic markers, and a variety of direction-giving devices; in mathematics, emphasis on auto economics—calculation of miles between communities, miles per gallon, and cost of auto upkeep; in the sciences, on the complex principles of physical and chemical processes involved in the workings of automobiles.

Beyond general education, our professional and vocational programs must be developed to furnish a virtual army of lawyers, engineers, insurance specialists, police officers, mechanics, salespeople, and others with the intensive knowledge required in an automobile-dominated society. In short, schools will either immerse themselves in car consciousness to meet the demands of the new society, or they will lapse into irrelevance.

Yes, I've tossed in some obvious anachronisms and exploited hindsight with considerable license. But a 1900 Nostradamus would have been very reasonable in advancing such ideas about schools, automobiles, and social change.

Reasonable, but only partly right. Schools might have been pushed in those directions, but somehow they took a different perspective on the automobile, dealing with its revolutionary social effects without recasting the K-12 curriculum. I suspect that a similar situation will evolve with regard to computation and the expense of developing high quality materials (Bell, 1980; Fech, 1982) are immediate arguments against prematurely placing our faith (and our money) in advanced technologies.

The very concept of computers as advanced educational technology is called to question by Weizenbaum's (1976) observation that the algorithmic, binary nature of computer generation invites (but does not compel) development of mastery-based, drill-and-practice materials drawn from Skinnerian models of learning processes. The bias towards a linear model of thinking discourages development of more complex and challenging materials that deal with higher cognitive abilities.

This technical quirk hides a deeper question about human values and professional priorities: should the development of higher thinking skills be sought primarily through computers? In recent years we have learned much about cognitive processes embedded in and developed through oral and written language (Kroll and Vann, 1981; Staton, in press; Thiiss, in press). With such exciting resources for direct, eye-to-eye development of human potential, we should wonder mightily about a medium that is fundamentally asocial, tending to isolate learners from peers and teachers.

The computer has other limitations that are seldom taken into account. The computer as a medium for what Brown (1979) calls "deep reading." True, a user can gain quick access to various parts of a lengthy text, but the fact is that complex texts—those requiring concentrated attention and high-level synthetic reasoning—are rarely found either in commercial software packages or in other database resources. The computer as a medium is well-suited to information aggregates—stock market reports, recipe collections, short news items, and the like—not to extended prose fiction or analytical essays.

3. Bandwagons break down: student fads are mortal. You'd think we would have learned this lesson, having survived every manner of hustle, and faced with new hat tricks with names like the "Paideia Proposal." It is not reactionary to point out that the current computer rage has the familiar earmarks of an overpublicized educational hype: claims of efficacy that exceed research data, endorsement by the federal government, coverage ad nauseam by mass media, a new focus for big spending, and feverish attempts to "get with it" in the educational community.

As for students taking to computers rapturously and in large numbers, I recall the same rationale for TV in the classroom in the 1960s. Moreover, evidence of children's "natural" enchantment with computer programming is largely anecdotal and certainly hyperbolic. I have heard such stories mainly about children of MIT professors, and from parents who recently sank several thousand dollars into personal computers and a truckload of peripherals and software. By and large, computer interest among youth is centered on the neighborhood arcade—and even there, the thrill is on the wane (Wanner, 1982).

4. "Computer literacy" is not an extension of general literacy. Have you ever noticed that people who want to champion a cause often link onto the word "literacy"—as in visual literacy, global literacy, scientific literacy, computer literacy, and what-have-you literacy? The device is raw propaganda, and does no service to reading and writing (which must now, it seems, be redundantly called "print literacy"). Greenlaw (1976) and Morrow and Suid (1974) have asked hard questions about slippery verbalizations like "visual literacy." Similarly, we must ask, What do computers really have to do with literacy?

Computers have a great deal to do with general mathematics, and LOGO (Papert, 1980) shows promise for teaching geometry and physics in new ways. But outside of word processing, certain
In the Alexandria, Virginia, schools, computer literacy has become as basic as reading, writing, and arithmetic.

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Recognizing that the explosion of computers in society has made computer literacy as essential as the basic skills of reading, writing, and arithmetic, the Alexandria City Public Schools in Virginia are going all-out to make their students and teachers computer literate. During the 1981-82 school year, Alexandria was one of three school systems in the country to pilot a K-8 computer literacy program developed by the HumRRO Corporation. The program calls for use of computers in language arts, mathematics, science, and social studies so that students are ultimately able to use the computer (1) as a tool in the instructional process, (2) to solve problems, and (3) in writing through word processing.

Problem solving and logical thinking are key components of the Alexandria program, which has four strands: history, concepts, process, and applications. Figure 1 shows activities covered at each grade level. Students in the fourth grade, for example, receive hands-on experiences in the "concepts" strand. Even kindergarten students are taught basic computer parts.

The district meets the equipment needs of this program through two laboratories, each containing 24 microcom-