

Real Costs:

Computers Distract Us From Children's Needs

"I've probably spearheaded giving away more computer equipment to schools than anybody on the planet. But I've come to the conclusion that the problem is not one that technology can hope to solve. What's wrong with education cannot be fixed with technology. No amount of technology will make a dent."

—Steve Jobs, co-founder of Apple Computer, in *Wired Magazine*, Feb., 1996.

OUR NATIONAL INFATUATION WITH COMPUTERS in early childhood and elementary education is diverting scarce resources from children's real unmet needs. To what extent is the push to computerize childhood driven by the profit imperative — and political power — of high-tech industries? How much of it is fueled by adults' fears about their own ability to keep up with the pace of technological and cultural change? Is it reasonable to expect that training young children to operate powerful machines — machines doomed to obsolescence long before they apply for their first job — will somehow inoculate them against tomorrow's economic uncertainties? Can we afford to ignore what we know about the health and welfare of growing children to pursue educational policies that are fear-based and profit-driven?

The Real Costs of Educational Technology

U.S. public schools have spent more than \$27 billion on computer technology and related expenses in the last five years, based on one

estimate. Yearly spending has more than doubled since the 1994-1995 school year, rising from about \$3.6-billion that year to an estimated \$7.8-billion for 1999-2000. Those numbers are primarily based on reports by Quality Education Data (QED), a company that conducts a detailed yearly survey.¹ It does not separate out figures for elementary schools. Other companies also collect and sell similar information. But no official government estimate of trends in technology spending exists, let alone specific data on elementary schools, according to the National Center on Education Statistics.²

The high costs of computerizing early childhood and elementary education are likely to grow much higher — both in dollars spent and in opportunities lost to meet children's far more pressing needs. The Clinton administration has been urging schools to adopt its goal of one multimedia computer for every five children, Internet access in every classroom from kindergarten on up, and the software, training, and support services necessary to realize its vision of training all teachers to use computers

to teach every academic subject.³

How close are schools to meeting these federal goals? The Department of Education has estimated that 100 percent of schools are likely to be connected to the Internet by the end of 2000.⁴ By the fall of 1999, 94 percent of elementary schools had access to the Internet, according to the Education Department. But only about 62 percent of elementary classrooms did. And the ratio of students to computers with Internet access was 11 to 1 in elementary schools.

Schools that serve high proportions of low-income students are lagging behind. Those in which at least 71 percent of the students qualified for free or reduced-price lunches had one computer with Internet access for every 16 students in the fall of 1999. Only 39 percent of their classrooms had computers with Internet access. Schools with no more than 11 percent of students qualifying for free or reduced-price lunches had one computer with Internet access computer for every 7 students. And 74 percent of their classrooms had at least one such computer.⁵

Between 1990 and 1998 the ratio of computers in K-12 schools went from one for every 20 students to one for every 6 students.⁶ Many classroom computers are older models that can't run the latest multimedia software, however. Multimedia computers represented only about 57 percent of schools' instructional hardware base in 1998-1999.⁷

And schools are still spending far less on teacher training than most experts say is necessary — at least 30 percent of total technology spending — if schools expect the new machines to do more than gather dust.⁸ In 1998-1999, for example, they spent less than 8

percent on technology-related training and professional development.⁹

Estimates of the total cost, over time, for schools to fully realize the administration's goals start at about \$47 billion.¹⁰ Almost none of these estimates, however, include money to protect children from eye strain and repetitive stress injuries. This health issue — the ergonomic design of computer workstations so that they properly fit the growing children who use them — has been largely ignored by schools, the federal government, and other proponents of school computers. Few data are available on this issue. But it seems likely to add billions or even tens of billions of dollars to school computing costs.¹¹

The initial costs of computerizing classrooms are just the beginning.

The initial costs of computerizing classrooms are just the beginning. Maintaining the machines and networks is a huge continuing expense: the repair and maintenance of equipment, retraining, and the frequent replacement of hardware and software, given how quickly they become obsolete or simply boring. Schools are training students and teachers to be avid educational “consumers,” demanding the excitement of one new product after another. A 1995 report from SRI International refers to this effect as a powerful “technology appetite.”

“As soon as more powerful computers are introduced, no one wants to use the older, slower machines,” SRI notes. “Even if the school does not get new hardware, teachers' and students' technology activities will lead them to read about newer technologies available elsewhere, with an attendant frustration if they cannot have the same technology in their own school.”¹²

A panel of President Clinton's advisers in science and technology policy urged K-12 public schools in 1997 to earmark at least 5 percent of their total budget — roughly \$15 billion for the academic year 1999-2000¹³ — every year, from now on, for technology-related expenses. That would be nearly twice what schools are now spending.¹⁴

Flawed Assumptions

A close reading of the president's advisory panel report provides compelling reasons to reject the panel's own advice. The report notes all of the following:

- The quality of research to date on the impact of computers on academic achievement has been low, relying partly on anecdotes. (The report cites approvingly one such anecdote about the Christopher Columbus Middle School in Union City, New Jersey, as “the most widely publicized example of the successful application of educational technology.”¹⁵ That particular story, however, has since been discredited. The celebrated rise in test scores at the school happened before the introduction of computers, not because of them.¹⁶)
- No one has established how to use technology in ways that actually improve education — let alone how to do so in a cost-effective way, compared to alternative reforms. For this reason, the report adds, a huge new federal research effort would be critical to try to help schools figure out how to use computers wisely in the classroom.¹⁷
- Not only is there no consensus on how to use technology to support the best pedagogy, but there is also no agreement on an even more basic question: Which peda-

gogical approaches actually are best for children?¹⁸

- Schools will have to make significant cuts in other programs to come up with billions more for technology.¹⁹
- There is both “a relative dearth” of high-quality software and digital content designed for K-12 schools, and an “absence of a demonstrably effective base of educational software.”²⁰
- Teachers need three to six years to learn how to fully integrate technology into their teaching. But technology should be updated every three to five years. So “a teacher's learning curve is thus unlikely to ever level off entirely.”²¹

Despite these sobering facts, the panel urged the nation to forge ahead and “deploy”²² as much technology in schools as possible. No money should be “wasted,” it added, to research the still unanswered question of “whether computers can be effectively used within schools.”²³ After all, the White House report declares, “the probability that elementary and secondary education will prove to be the one *information-based industry* [emphasis added] in which computer technology does not have a natural role” is far too low to spend money on investigating the matter.²⁴

In ruling out this critical research question, the panel here disregards its own warning about how dangerous such assumptions can be in educational research:

It is well to remember that the history of science (and more specifically, of educational research and practice) is replete with examples of compelling application-specific hypotheses that seem to arise ‘naturally’ from well-founded theory, but which are ultimately refuted by

either rigorous empirical testing or manifest practical failure.²⁵

We cite this report at length for three reasons: First, its recommendations have exerted a powerful influence on current educational policies. Second, the report is typical of government documents on the subject, in representing a narrow range of perspectives. The White House panel included two top executives of high-tech companies, including the group's chair, and other strong proponents of educational technology. Missing from the panel were classroom teachers from elementary or secondary schools, child-development experts, or critics of educational technology. Third, the report urges schools to spend much more on educational software — despite the current dearth of high-quality products — to provide software companies with financial incentives to develop better products.²⁶

The same flawed thinking can be seen frequently at the state level. In 1996, for example, the California Education Technology Task Force issued an influential report urging the state to spend nearly \$11 billion on technology for schools over the next several years as the single most important measure to “right what’s wrong with our public schools.” Executives from companies like Apple Computer, Hewlett Packard, IBM, and Sun Microsystems dominated the advisory group, according to the *Los Angeles Times*.²⁷

The Politics of Technomania

The Clinton administration has taken the lead, but the high-tech-for-tots agenda has been very much bipartisan. Democrats and Republicans alike have enthusiastically campaigned for generous federal, state, and local school technology budgets. The

Republican-controlled Congress, for example, has established the bipartisan Web-based Education Commission, which will recommend policy changes to promote the use of the World Wide Web in educating students of all ages.

This 16-member group includes no current elementary-school teachers, no critics of educational technology, no child-development experts, and only one high-school teacher. It does include several members of Congress and three executives from high-tech companies, including the founder of OnlineLearning.net, a company that sells continuing education courses through distance learning, and the senior vice president of bigchalk.com, a new company that provides educational resources via the Internet.

The commission plans to issue final recommendations by November 2000. The group's mission is to “help ensure that all learners have full and equal access to the World Wide Web.” And it intends to conduct “a thorough study of the critical pedagogical and policy issues affecting the development and use of Web-based content and learning strategies to improve achievement at the K-12 and post-secondary levels.” But its Website shows no sensitivity to the different developmental needs of a child in kindergarten, for example, compared to a college undergraduate. Instead, the assumption seems to be that even five-year-olds need “full and equal access” to the Web.²⁸

Of the five public hearings the commission has planned, one was held at the National Education Computing Conference in Atlanta — hardly neutral territory — and a second at the headquarters of Sun Microsystems in Silicon Valley. One or two critics of educational technology have surfaced at the four hearings held so far. At the Sun-hosted hearing, for example, the majority of witnesses represented

companies with a financial interest in promoting Web-based education, including Sun's own director for the "global K-12 market" and Sun's vice-president of "global education and research." Kim Jones, the Sun vice-president, urged Congress to spend more money to help schools purchase the products and services of companies like her own.

Jones described Sun's vision of the future of grade-school math. "There may be only a handful of, say, third-grade math courses that are the best in the world," she said. "A robust network that links schools and students to those courses ensures that any third-grader anywhere can benefit from the best course, no matter where it originates. This is why Congress must invest not only in such a network, but also in the best educational content."²⁹

The commission's presumption that Web-based instruction will improve education at all levels reflects a long history of wishful thinking. Few leaders from either party have taken note of the 30 years of disappointing research findings about the likelihood that technology will improve academic achievement.

Even fewer seem to have considered whether such an agenda might harm young children. The U.S. Department of Education plans to issue a revised national plan for educational technology in September 2000. Based on preliminary documents the agency posted on its Website in May 2000, it appears that the administration is preparing to adopt an even more aggressive computer agenda, calling for "universal access to effective information technology" at home, school and in the community, for all students and all teachers, and declaring that "all teachers will effectively use technology."³⁰

These documents make no mention of how

to protect young children from repetitive stress injuries if their lives truly involved "universal" computing at home and school. In fact, the Education Department has never conducted any studies to investigate whether children using computers are at increased risk of repetitive stress injuries, or how to prevent such injuries, according to Carol Wacey, deputy director of the agency's Office of Educational Technology.³¹

Both major presidential candidates, Vice President Al Gore and Texas Governor George W. Bush, have endorsed the continued expenditure of billions of federal dollars every year to computerize schools. Much of this federal money is spent on the products or services of high-tech companies. And both candidates have conspicuously sought political and financial support from high-tech industries. Gore, who has made computerizing schools a key plank in his campaign, helped raise about \$2.6 million for the Democratic Party at a Silicon Valley fundraiser in April 2000. And Bush announced his own plan to spend \$3.4 billion a year on school technology and research on school technology just hours before attending the first of three Republican fundraisers in Silicon Valley in June 2000. Republicans expected to raise a total of about \$5.9 million at those events.³²

The Commercial Blitz: A Mega-Scam

Hardware, software, networking, and telecommunication companies don't leave the promotion of their sales agenda to politicians alone. Many have gotten directly involved in financing and/or taking leadership roles in groups like the Consortium for School Networking, TECH CORPS, and the CEO

Forum on Education and Technology. The press frequently quotes such organizations without mentioning their close links to companies with a financial interest in high-tech schools.

These groups talk about the complete technological makeover of K-12 education as a kind of national emergency. The CEO Forum, for example, organized a public challenge to every college of education in the country to sign a pledge to President Clinton that they will train all future teachers — presumably including all early childhood teachers — to use and integrate technology effectively in their teaching. The forum, joining with the secretary of education and two national associations related to teacher education, also challenged them to pledge to make technology a priority on their own campuses in every way — including funding. (About 20 percent had done so by the forum's deadline, after having received a letter that was signed by, among others, John S. Hendricks, the chief executive of Discovery Communications, Inc.³³)

In June 2000, the forum released a report declaring that “we need to apply technology's powerful tools to change the way our students, of every age, learn.” It urged schools and districts to commit to that vision and to “increase investment in digital content.”³⁴

Of the CEO Forum's 25 members, 23 are from industry, including high-ranking executives of Apple Computer, BellSouth Business, Compaq Computer, Computer Curriculum Corporation, Discovery Communications, IBM, Lucent Technologies, NetSchools Corporation, Quality Education Data, ZapMe Corporation, America Online, Bell Atlantic, Classroom Connect, Inc., CompassLearning, Dell Computer, and the

Washington Post Company. The National Education Association and the National School Board Association are the only two noncorporate members. Nearly all of the 23 corporate members either sell high-tech services and products or represent clients who do.

TECH CORPS is a nonprofit group that encourages volunteers to share their technical skills with schools. Its Website has declared that TECH CORPS is “passionate about giving America's students a chance to have the most technologically advanced education possible.”³⁵ But it's primarily financed by corporate sponsors with profits, as well as passion, at stake in emphasizing that goal. Its four national sponsors are all high-tech powerhouses: Cisco Systems, Compaq Computer, Intel, and the Cellular Telecommunications Industry Association. So are most of its patrons and partners, including America Online, Bell Atlantic, Hewlett-Packard, MCI WorldCom, Microsoft, and the National Cable Television Association. TECH CORPS's Website includes direct links to all of those companies' sites.

TECH CORPS's guide for parents, “Child Safety on the Information Highway,” encourages parents to “get online yourself.” While noting the dangers to children of adult predators and adult material, the brochure also adds: “To tell children to stop using these services would be like telling them to forego attending college because students are sometimes victimized on campus.” Children, it adds, without specifying any age in particular, can learn to be “street smart,” to safeguard themselves. The TECH CORPS brochure was sponsored by several Internet-related businesses, including America Online and Prodigy Service.³⁶

Other authorities strongly recommend that parents closely monitor who and what their

children are exposed to online. The American Academy of Child and Adolescent Psychiatry, for example, advises:

Most parents teach their children not to talk with strangers, not to open the door if they are home alone, and not to give out information on the telephone to unknown callers. Most parents also monitor where their children go, who they play with, and what TV shows, books, or magazines they are exposed to. However, many parents don't realize that *the same level of guidance and supervision must be provided for a child's online experience.* [emphasis in original]³⁷

Even the International Society for Technology in Education, in the past an organization for educators, has just created a new corporate program — “ISTE 100” — for “industry leaders in the educational technology field” who are committed to the group’s goal of “improving education through the appropriate use of technology.” This new corporate arm of the group is interested in promoting technology from preschool through high school. At the request of the founding corporate members, ISTE has invited all of its teacher members interested in “advocating for the effective use of technology in schools” to join its new Advocate Network. The companies will then be able to directly e-mail them to conduct marketing research for the design of new products.³⁸

In a draft report on the high-tech future of education, the society proposes an ambitious set of technological goals for the nation’s schools. The goals “are designed to support the overall goals of education.” They also appear to be closely aligned with the business goals of the

man who is funding the report — Bill Gates of Microsoft, author of *The Road Ahead*. The draft is titled: “Foundations for The Road Ahead: An Overview of Information Technologies in Education.”³⁹ (About 76 per cent of all K-12 public schools and about 84 per cent of all the nation’s school districts used instructional software produced by Microsoft in 1998-1999, according to one major survey.)⁴⁰

The Consortium for School Networking is another nonprofit group that includes school districts and other institutions. It also includes many companies — each with a “hot link” from the consortium’s Web page directly to their own. The companies involved almost without exception are high-tech players in the school market. One of the consortium’s major initiatives is “building a grassroots network of advocates for investment in education technology,” especially for lobbying the federal government. The New York Times Electronic Media Company is one of these corporate members, which puts *Times* reporters in an awkward position in covering the politics of such spending.⁴¹

Given the keen interest of so many companies in promoting childhood computing, it is surprising how little the private sector is actually donating to cover the high costs of this agenda. School districts report that donations and fundraising accounted, on average, for only 2.1 percent of the costs of technology in 1998-1999.⁴²

The school market is not the only corporate incentive for promoting the use of computers by children. Parents frequently cite their children’s education as the reason for buying home computers. The belief that young

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children's futures hinge on early and ubiquitous access to computers, then, creates an opportunity for companies to sell parents the entire array of high-tech equipment, Internet services, and software. It also benefits major media companies that are increasingly eager to generate more traffic and more revenue through their dot.com sites. In this way, children's "need" for computers opens the spigot for high-tech products and services to flow into households.

The resulting hard sell to parents and schools, says Alex Molnar, professor of education at the University of Wisconsin at Milwaukee, is "a mega-scam."⁴³

The Dog That Didn't Bark

It seems likely that the top executives of these high-tech companies sincerely believe that their products really will revolutionize education in positive ways. After all, to paraphrase an old saw, to a man with a hammer to sell, everything looks like a nail.

But why are so many Americans buying the pitch? Parents, policymakers, and educators should take note, as Sherlock Holmes suggested, of "the dog that didn't bark." If it is truly a matter of competitive survival for the United States that young children be trained to operate the most sophisticated tools ever devised, as high-tech companies and politicians keep telling us, why is it almost exclusively the companies with high-tech products or services to sell that are so exercised about this issue? Why is the rest of corporate America not clamoring for such an expensive and unproved educational fix?

The answer is obvious. Wiring and computerizing America's schools is an urgent priority — not for children, but for high-tech

companies that need to constantly expand their market. The competitive pressure in these industries is famously intense. Schools and families with children represent a huge market. Many companies aim to establish brand loyalty with children at ever younger ages, at home and school. And others count on "the whine factor" to turn online advertising on children's sites into parents' purchases.

Quality Education Data, which provides research and marketing advice to companies that sell instructional technology, publishes "tipsheets" pointing out that the federal Title I program has become a major source of money for schools' purchases of technology.

Companies can "capitalize on this funding source" by "following the money" and targeting schools with higher percentages of Title I students. One tipsheet is actually titled: "Title I Funding: Are You Getting Your Share?"⁴⁴

Title I was designed to improve the academic achievement of disadvantaged children, especially those attending school in high-poverty areas. By 1997-1998, schools were spending nearly \$300 million of the program's total cost of about \$7.1 billion to purchase computers and other instructional technology.⁴⁵ Schools can also use the money to improve curricula, provide professional teacher development, and pay teacher salaries. The last helps schools reduce class sizes — an educational reform, unlike technology, that is strongly backed by research.

It is time for educators, policymakers, parents, and advocates for children to resist these pressures and to refocus on children's needs — not industry's hunger for an ever bigger market.

Children's Real Unmet Needs

The White House panel has urged the nation to spend on the order of about \$15-billion a year on educational technology, and all the related services and training, for K-12 schools. Again, that's about twice the level of current spending. (On a pro-rated basis, it would be about \$8-billion for students from kindergarten through sixth grade.) Presumably a large portion of this extra money would come from new tax expenditures.

But what makes educational technology such a high priority? What about other, far more significant and underfunded priorities, in terms of children's unmet needs — especially the unmet needs of our most disadvantaged children? How else might we spend the billions now directed to technology, as well as the billions more that proponents are calling for? Perhaps we could focus on some real childhood emergencies:

Eliminating lead poisoning

First, we might finally make a long overdue commitment to eliminate childhood lead poisoning. This serious, preventable injury affects an estimated 4.4 percent of all children between the ages of one and five — or about 890,000 preschoolers.⁴⁶ At these ages, children's developing brains and nervous systems are especially vulnerable to damage from lead exposure. Lead-based paint in houses and residential apartments is the major source of lead poisoning in this country. The problem is most severe in deteriorating housing, where children may eat paint chips, breathe lead dust, or ingest the dust by putting their hands in their mouths after touching toys, food, or other items the dust has settled on.

For that reason, the prevalence of lead

poisoning among children living in poverty is eight times that of children from the wealthiest families. And children of color, who are more likely to live in crumbling urban neighborhoods, are also disproportionately harmed. African-American children suffer lead poisoning five times as frequently as white children. And Mexican-American children are twice as likely as non-Hispanic white children to show toxic levels of lead in their blood. An estimated 11.2 percent of all African-American children have suffered toxic exposure; 4 percent of all Mexican-American children have, and 2.3 percent of all white children.⁴⁷

This is one of America's most serious educational crises. "Even when exposed to small amounts of lead levels," reports the American Academy of Child and Adolescent Psychiatry, "children may appear inattentive, hyperactive and irritable. Children with greater lead levels may also have problems with learning and reading, delayed growth and hearing loss. At high levels, lead can cause permanent brain damage and even death."⁴⁸

According to the Alliance to End Childhood Lead Poisoning, half of all the preschool children in some of the nation's most blighted neighborhoods are lead-poisoned.⁴⁹ Teachers and health care professionals testify that the educational fallout is as tragic as it is preventable.

"Over and over again, we see kids coming out of the same houses lead-poisoned," says Dr. Charles I. Shubin, director of children's health and family care at Mercy Medical Center in Baltimore, which monitors and cares for about 8,000 lead-exposed children. "One generation after another, we see the same addresses, the same blocks, the same neighborhoods, the same landlords. Our kids are being poisoned while

we watch.”⁵⁰

In Baltimore, according to a recent report by the *Baltimore Sun*, nearly seven out of every ten children tested each year in the slum enclaves of Park Heights, Sandtown, and Middle East show elevated lead levels in their blood. These same neighborhoods, the *Sun* added, “are home to some of the city’s poorest performing schools, its highest violent crime rates and its largest blocs of substandard rental housing.” Dr. Herbert L. Needleman of the University of Pittsburgh Medical School, perhaps the nation’s top expert on the effects of lead on children, doesn’t think that convergence of social problems is coincidental.

“In some populations,” says Needleman, “[lead exposure] may be the most important factor in determining a broad range of neuromotor, psychosocial and behavioral pathologies — poor cognitive performance, hyperactivity and aggression being particularly well-established traits... It’s a very potent metabolic poison.”

The classroom impact alone is dramatic. Danette Murrill, instruction coordinator for an elementary school in one of Baltimore’s most severely affected communities, estimated that one in five of the students at her school had suffered lead poisoning.

“They don’t stay on task, they’re very fidgety, they’re uncooperative in class and they have great difficulty retaining information,” Murrill told the *Sun*. “As a teacher, it’s very frustrating because you always have at least 5 or 6 of them in a class — but you don’t always know who they are.”

Why pour billions into computers — at best an unproven intervention and at worst actually harmful — before first eliminating this toxic barrier to the academic success of so many poor children?

Poor children, the *Sun* noted, are also more likely to be poisoned repeatedly and less likely to have access to good health care and a healthy diet, both of which can counter the harmful effects of high lead levels.

Lead poisoning, Needleman added, “can put [children in troubled neighborhoods] so far behind at the beginning of the race of life that they never make up the lost ground, particularly as they deal with all the other pathologies in their environment — crime, drugs, malnutrition, neglect, alcoholism — and particularly if the exposure is persistent. Lead sets them up to fail across the board.”⁵¹

Here is an educational emergency that could truly benefit from the political clout of high-tech industries. Between 5 million and 15 million residential properties pose lead hazards because of deteriorating paint, and the cost per unit of lead abatement averages about \$5,000, according to the Alliance to End Childhood Lead Poisoning. That means the total cost to erase the major cause of this problem would be between \$25 billion — less than the amount schools have spent on computer technology in the last five years — and \$75 billion.

The Clinton administration has proposed a ten-year plan to address the problem. The federal government would provide an average \$230 million a year over current federal spending, now about \$60 million a year. The administration has suggested that other non-federal sources of funding that are already in place will take care of the rest of the problem. Child advocates, however, are not hopeful that Congress will adopt even this modest proposal.⁵²

Why wait ten years? Why pour billions into computers — at best an unproven intervention and at worst actually harmful — before first eliminating this toxic barrier to the academic success of so many poor children?

Other Pressing Needs of Our Most At-Risk Children

There are many other challenges to the academic success of our children — especially poor children — that we can and should take up with the same sense of mission now lavished on computers. We could, for example, invest much more in nutrition programs, health care, high-quality child care, and early-childhood education for low-income families. Lack of access to such services can pose a real threat to a small child's healthy development, cognitive and otherwise.

In contrast, there is absolutely no evidence that the lack of computer technology in elementary school poses any threat at all to a child's development.

Nearly one in five children in America lives in poverty, with all the pressures on parents that implies — and the extra obstacles to school success. The Children's Defense Fund has calculated how much we would need to spend "to give large numbers of children a fairer start in life."⁵³ That also means a fairer start in school. Another 1.7 million of our poorest citizens, for example, could be served if we spent an additional \$800 million a year on the federal food program designed to make sure that young children and their mothers at least have enough to eat.

Millions of children still lack health insurance. For an additional \$2.3 billion a year, according to the Children's Defense Fund, all uninsured children from low-income families

could have access to health care.

As a nation we spend so little on Head Start — the preschool program proven to give poor children and their families a boost into the school years — that only about half of the children who are eligible for it are enrolled. Fully funding this program would cost \$6.23 billion more a year.

And finding safe, affordable, high-quality child care can be a nightmare for the working poor. Providing child care assistance for another 2.5 million children would cost \$5.6 billion a year.

Critical Needs of Our Public Schools

All of these initiatives are far more pressing examples of children's unmet needs. Other critical needs within public schools themselves are also inadequately funded and must now compete with the siphon of technology spending. Teachers, for example, continue to call for smaller class sizes so they can give their most challenging and disadvantaged students the personal attention they deserve. They ask for more human resources of all kinds — more aides and volunteer mentors, more tutors in reading and other subjects, more social workers and counselors, to help meet children's emotional and remedial needs. To its credit, the Clinton administration proposed and secured funding from Congress for a major federal initiative for smaller classes in kindergarten and the early grades. But more money is, and will continue to be needed.

Schools also need large sums of additional money to give teachers the salary increases they deserve, as well as to be able to attract and retain additional qualified individuals to our nation's classrooms. The latter is a particular challenge today, as schools brace themselves for a major wave of retirement among the current

pool of elementary-school teachers.

Because school districts are investing so much in technology, they are less able to repair and renovate aging school buildings. They also find it harder to build the 2,400 new schools that will be needed by the year 2003 to ease overcrowding and make room for growing enrollments.⁵⁴

About 50 percent of all public schools reported in 1999 that they needed to fix basic building problems, such as leaky roofs or plumbing, according to the U.S. Department of Education. And 43 percent reported at least one environmental problem, such as poor ventilation, inadequate heating, or poor indoor air quality.⁵⁵ Two-thirds needed renovations to correct health, safety, or accessibility problems, such as removing asbestos, lead in water or paint, or problem materials in underground storage tanks, according to a 1995 report.⁵⁶ Studies suggest that schools need to spend more than \$100 billion to provide all students with adequate buildings.⁵⁷

Research indicates that deteriorating and overcrowded schools have negative effects on student achievement and behavior.⁵⁸ Yet most schools that reported building inadequacies of all kinds in a survey in 2000 by the National Center for Education Statistics “had no plans for major repair, renovation, or replacement in the next two years.”⁵⁹ Again, compared to this undeniably real and costly challenge, the false sense of urgency around computer investments seems ludicrous.

Finally, the high-tech approach to early

childhood and elementary education is shrinking the time and money available for the simple technologies that are far more developmentally appropriate. Real technology enrichment for children would mean increased

public support for school gardens, camping and other field trips, music and other artistic experiences, time for creative play and physical education, hands-on science labs, handcrafts such as woodworking, library books, smaller classes and smaller schools, and mentors at school and in the community. These are developmentally appropriate precisely because

they are the opposite of “distance learning.”

A New Conversation

The above list of children’s priorities that computers distract us from is not intended to be exhaustive. It is an attempt to begin a conversation about the many ways the billions we now spend on computers for children of elementary age and younger could be better invested if our intention is to offer every child a chance to succeed in school.

Nor do we mean to suggest that simply expanding current public programs in the high-priority areas above would resolve all of these stubborn social problems. In fact, once we recover from the illusion that technical innovations will revive education, then the really critical conversation can begin — the one we have been avoiding for far too long: How can we tackle the social obstacles to children’s healthy development with renewed commitment? And with social, as opposed to

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Eight Billion Dollars: For High-Tech Companies or Children's Needs?

An influential presidential commission has recommended that the nation spend on the order of \$15-billion a year for educational technology in public schools, K-12. Proportionately, that would be about \$8-billion at the elementary-school level. How might those billions in public dollars be better spent? Consider the much higher educational priorities below — especially those aimed at providing low-income children with a fairer start in life:

Critical Needs of the Nation's Public Schools:

- Reducing classroom size.
- Raising teachers' salaries to attract and retain good teachers.
- Funding the aides, counselors, and other adult mentors children need — especially children most at risk of failure.
- Repairing and renovating dilapidated school buildings.
- Building the 2,400 new schools needed by 2003.
- Reviving essential school programs such as music and the other arts, gardening, physical education, outdoor experiences, hands-on education of all kinds, and libraries.

Critical Needs of Our Most Disadvantaged Children:

- Eliminating childhood lead poisoning now.
- Providing quality child care for children of the working poor.
- Insuring access to health care for all children and their parents.
- Meeting the nutritional needs of families in poverty.
- Making quality pre-school programs such as Head Start available to all children.

mere technical, creativity? For example, what kind of assistance do troubled neighborhoods need to capitalize on their own assets? Too often, outside aid concentrates almost exclusively on these neighborhoods' deficits. How can low-income parents be empowered to identify for themselves their families' and their neighborhoods' most pressing needs — and empowered to work creatively to meet them?

Such a conversation might draw on Making Connections, a model of community participation being tested in 22 cities by the Annie E. Casey Foundation. Its aim is to spark and help sustain local movements that engage everyone involved — residents, civic groups, politicians, grassroots groups, school leaders, public agencies, private organizations, and faith-based groups — “to help transform tough neighborhoods into family supportive environments.” The initiative focuses on strengthening families in troubled neighborhoods by helping them to connect to economic opportunities, positive social relationships that boost neighbor-to-neighbor support, and the full range of social services and supports that can help struggling families grow stronger. It also emphasizes the full participation of neighborhood residents in designing their own futures.

This democratic approach seems a far more promising strategy for helping our most disadvantaged children thrive, at home and school, than forcing computers on every teacher as a kind of silver bullet for school reform.

“Making Connections should not be thought of as a housing initiative, neighborhood revitalization project, community safety program, or a school reform movement,” the foundation advises. “Rather, this effort seeks to draw from, build on, and weave together what

our work, the work of others, and the experience of communities show to be the most effective practices and strategies in community building, system reform, family support, and economic development.”⁶⁰

Unfortunately, no powerful coalitions of hardware, software, and telecommunications giants are leading the charge for the empowerment of distressed communities, for safe school buildings and lead-free housing, for proper nutrition, or for health insurance for children whose families, working or not, still struggle to make ends meet — or for the kind of low-tech, hands-on school agenda on which children thrive. Instead, many of these powerful corporations are demanding that parents, teachers, and schools adopt their own agenda for education, which just happens to be based on the products they sell.



1 “Technology Purchasing Forecast 1999-2000,” 5th ed., Denver: Quality Education Data, 2000, p. 5. Figures cited here are based on annual surveys by QED of spending on instructional technology by K-12 public schools. The five years extend from the 1995-1996 school year through 1999-2000. QED estimated spending for 1999-2000 at \$6.2-billion, which did not include the total subsidies that schools would be receiving for their purchase of telecommunications services — the so-called “e-rate” discounts. QED said it was not able to include how much schools would be receiving in e-rate discounts in that estimate, because schools at the time of the survey did not have that information. The Schools and Libraries Division of the Universal Service Administrative Company, however, more recently estimated the total e-rate discount provided to public schools and school districts for 1999-2000 as \$1.6-billion. (Telephone interview with Mel Blackwell of the Schools and Libraries Division, August 17, 2000.) The \$7.8-billion estimate for 1999-2000, then, is derived by adding those two estimates.

2 “Answers to Frequently Asked Questions: Educational Technology Spending,” U.S. National

Center for Education Statistics, published on the official web site of the U.S. Department of Education, at <http://nces.ed.gov/edfin/faqs/technlgy.asp> as of June 21, 2000. The statistics center poses the question: "How much is spent on educational technology in the US?" Its answer: "Unfortunately there are no figures on this. No reports have been done or studies made."

3 "Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge," Washington, DC: U.S. Department of Education, June 1996.

4 *Digest of Education Statistics, 1999*, Washington, DC: U.S. Department of Education, 1999, from Chapter Seven: "Learning Resources and Technology"; and *Challenging the Status Quo: The Education Record 1993-2000*, Washington, DC: U.S. Department of Education, May 2000, from Chapter Five: "Using Technology to Enhance Teaching and Learning."

5 National Center for Education Statistics, "Survey on Internet Access in U.S. Public Schools, Fall 1999," in *Quick Tables and Figures: Elementary and Secondary Education: Fast Response Survey System*, (FRSS 75), Washington, DC: U.S. Department of Education, 1999.

6 U.S. Department of Education, "Challenging the Status Quo: The Education Record 1993-2000."

7 QED, op. cit., derived from statistics on p. 7.

8 President's Committee of Advisors on Science and Technology: Panel on Educational Technology, "Report to the President on the Use of Technology to Strengthen K-12 Education in the United States," Washington, DC: Executive Office of the President of the United States, March 1997, p. 48.

9 QED, op. cit., based on its estimates of the average spending by school districts on both training and professional development related to instructional computing, as a percent of total average spending on instructional technology for 1998-1999. That was \$10.81 per student. Total average spending by district per student for instructional technology was \$140.66.

10 The \$47 billion figure is quoted by the President's Committee of Advisors on Science and Technology: Panel on Educational Technology, op. cit., p. 59.

11 The cost could range from about \$400 to \$3,000 per computer, based on a preliminary estimate in 1999 by an ergonomics consultant at Professional Ergonomic Solutions. The company provides training and products for ergonomic workstations, keyboards, and accessories. Because of the low level of public awareness about this issue, we include their toll-free number here for parents and others interested in more information: 888-744-ERGO.

12 Barbara Means and Kerry Olson, "Restructuring Schools with Technology: Challenges and Strategies," SRI International, November 1995, p. 32.

13 Based on the total day-to-day expenditures for public elementary and secondary schools in school year 1997-1998, as reported by National Center for Education Statistics, *Statistics in Brief: Revenues and Expenditures for Public Elementary and Secondary Education: School Year 1997-98*, Department of Education, May, 2000. The total that year was \$285-billion. By 1999-2000, estimating conservatively that total spending would increase by 3 per cent a year, that total would have grown to about \$302-billion.

14 President's Committee of Advisors on Science and Technology: Panel on Educational Technology, op. cit., p. 8.

15 Ibid, pp. 18-19.

16 *ABC News Nightline*: "The \$50 Billion Gamble: Will Computers Improve Public School Education?" Transcript for September 30, 1998.

17 President's Committee of Advisors on Science and Technology: Panel on Educational Technology, op. cit., especially pp.17, 107, 122, 130.

18 Ibid, especially pp. 34-35, 107, 123, 128.

19 Ibid, especially p. 8.

20 Ibid, especially pp. 44, 116.

21 Ibid, especially p. 118.

22 Ibid, p. 131.

23 Ibid, especially p. 124.

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- 25 Ibid, p. 88.
- 26 Ibid, pp. 42-43.
- 27 Leslie Helm, "High Tech Sales Goals Fuel Reach into Schools," *Los Angeles Times*, June 9, 1997, Home Edition, p. A1.
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- 29 Press release: Sun Microsystems VP Calls on Congress to Invest in Network Infrastructure, Education Content, Palo Alto, CA: Congressional Web-based Education Commission, April 7, 2000.
- 30 U.S. Department of Education, "Revising the National Educational Technology Plan: Emerging Priorities," www.ed.gov/Technology, and www.air.org/forum/ as of July 12, 2000.
- 31 Phone interview, July 11, 2000.
- 32 Terry M. Neal, "Bush Hits Democrats on Tech Education," *Washington Post*, June 20, 2000, p. A6.
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- 36 TECH CORPS, "Child Safety on the Information Highway," TECH CORPS, www.ustc.org/index.html, as of June, 2000.
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- 38 International Society for Technology in Education, "ISTE 100: Partners in Educational Technology Leadership," Eugene, OR: ISTE, www.iste.org/Members/index.html, as of July 12, 2000.
- 39 David Moursund et al., "Foundations for The Road Ahead: An Overview of Information Technologies in Education," International Society for Technology in Education, www.iste.org/Research/index.html, as of July 12, 2000. (The draft includes the disclaimer that it does not represent the views of ISTE, Bill Gates, or anyone but the authors, who are staff of the ISTE.)
- 40 Quality Education Data, op. cit., pp. 121, 123.
- 41 Information about the consortium is from the Consortium for School Networking's Website, www.cosn.org, as of July 31, 2000.
- 42 Ibid, p. 38.
- 43 Leslie Helm, *Los Angeles Times*, op. cit.
- 44 Tipsheet #15: "Title I Funding: Are You Getting Your Share?" and Tipsheet #19: "10 Trends to Watch in Instructional Technology," Denver: Quality Education Data, undated.
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