

# Computers in Early Childhood Education

## A Jump Start for the Future

By Dr. Renate Long-Breipohl

Computers and related technology have entered the classrooms of children of all ages in the past years. The idea of using computers to teach children programming goes back to the 1960s and to the invention of the Logo programming language. Since then thousands of educators have believed that computers are a tool for enhancing cognitive development in young children.

During the last three years all Victorian state primary schools in Australia have been equipped with computers and Internet access for their students, following similar developments in the U.S.A. and England. Between 1989 and 1992, U.S. schools acquired 1.1 million computers; in 1995 the total reached around 5.8 million, about one computer for every nine students. In New South Wales, computer technology is a newly introduced compulsory subject of study for all future primary school teachers, and primary schools are urged to provide computer access for their students. This development has now reached the early childhood sector, kindergartens and preschools, as well as the childcare industry. Advertising a “fully computerized center” has become a means of attracting enrolments.

Does this herald the dawn of a new educational era and a better future for children, or are we involved in a massive worldwide experiment that puts children at risk?

This question is currently much disputed. Proponents for the use of high tech equipment in education, among them many parents, argue as follows:

- Computers improve the child’s academic achievement.
- The earlier a child is introduced to the use of computers, the better will he be prepared for coping with the demands of workplaces later in life and the greater is the likelihood of a successful future.
- If the latest technology does not find its way into general education, many children, especially those from low-income families, will miss out and be disadvantaged.
- Today computer related technology is playing a decisive role in accessing information. Learning is highly dependent on information and on linking to the world. Therefore computers need to be available for students.
- Computers are great motivators for learning and they promote interaction.
- Currently available educational software can be trusted to help children’s learning.

In the U.S.A, a group of 75 educators, child-development and health authorities, technology experts, and researchers has recently turned to the public to express their concern about the current “experiment of computerizing childhood.” They have pointed to the lack of research regarding the impact on child development and learning and call for a moratorium on more computers for children. Fourteen experts from seven universities in the U.S.A. have contributed to a comprehensive report on research in the area of educational technology over the last 30 years. In this report, *Fool’s Gold: A Critical Look at Computers in Childhood*, The issue of potential harm to children in the recent development of technology in education is investigated as well as the issue of benefits.

Research so far does not support the current and proposed expenditure of billions of dollars on technology in primary schools. (The proposed expenditure by the U.S. government amounts to 8 billion dollars per year.)

Larry Cuban of Stanford University, former president of the American Educational Research Association, finds that: “Drill-and-practice programs appear to improve scores modestly—though not as much or as economically as one-on-one tutoring—on some standardized tests in narrow skill areas. Other than that, there is no clear, commanding body of evidence that students’ sustained use of multimedia machines, the Internet, word processing, spreadsheets, and other popular applications has any impact on academic achievement.”

The March 1997 report of the President’s Committee of Advisers on Science and Technology to Strengthen K–12 Education in the United States, concludes that:

- The quality of research to date on the impact of computers on academic achievement has been low, relying partly on anecdotes.
- No one has established how to use technology in ways that actually improve education.
- Not only is there no consensus on how to use technology to support the best pedagogy, but there is also no agreement on which pedagogical approaches are best for children.
- Schools will have to make significant cuts in other programs to fund the billions needed for technology.
- There is 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.

Research is able to advise on conditions that promote early development and learning:

- Strong emotional rapport of children with responsible, caring adults is important for later academic achievement and the development of literacy. As one researcher puts it: “It has been shown in study after study that warm, close interactions with loving adults promote language and literacy skills in the most powerful and natural way.”  
Computer programs designed to help children learn to write have not been particularly effective. Words and images on-screen invite constant change or substitution. Speed and control are emphasized at the expense of thoughtfulness and understanding.
- Movement is important as the natural kinesthetic mode of learning in early childhood.
- Real world experience and exploration on a sensory and emotional level promote intellectual development and mathematical comprehension.
- Creative play supports the foundation of later lateral thinking and a creative approach to scientific and cultural concepts.
- Artistic activities (Music, drama, dance, painting) assist in establishing a positive attitude toward learning and improve students’ achievements in academic subjects.
- Hands-on activities help to establish trust in one’s own abilities. The authors of the U.S. Department of Education publication *Doing Science With Your Children* (1994) advise:  
“To give your children a firm foundation in science, they should be encouraged to think about and interact with the world around them. Concrete experiences that require the use of children’s senses, such as planting and watching a seed germinate, provide a strong framework for abstract thinking later in life. Rich sensory experiences can help children become more observant and curious. Science begins for children when they discover that they can learn about the world through their own actions.”

Paul Nitze, global operations director at Allied Signal, an aircraft and automotive company, says about his own elementary education:

“If you’ve had the experience of binding a book, knitting a sock, playing recorder, then you feel that you can build a rocket ship—or learn a software program you’ve never touched. It’s not a bravado, just a quiet confidence. There is nothing you can’t do.

In contrast, children trained from the earliest ages to expect that they will need computers for even the most elementary lessons may experience learning as a manipulation of random facts

stored in an electronic box outside themselves, behind a seemingly all-knowing screen. Such children receive a debilitating message: that they—unlike generations of children before them—are incapable of learning the basic skills of arithmetic, reading, and writing without expensive and sophisticated machines.”

Further possible effects are that: “computing and cyberspace may blur children’s ability to separate the living from the inanimate, contribute to escapism and emotional detachment, stunt the development of a sense of personal security, and create a hyper-fluid sense of identity.”

- The deepening of the understanding of key concepts seems to be more important for the development of science literacy than large amounts of information, yet the internet’s infinite trail of links discourages concentration on key concepts and is likely to distract students from staying focused.
- Community support and a strong personal bond between teacher and student have a positive effect on the school performance of at risk children.

### ***Are there potential risks or disadvantages in the current trend of providing computer technology for young children?***

In chapter two of *Fool’s Gold* a broad range of potential risks and developmental setbacks is listed, including: health risks such as musculoskeletal injuries due to repetitive stress over years, eye strain, obesity as consequence of a sedentary lifestyle, and electromagnetic radiation; lack of self motivation and self discipline; emotional detachment and social isolation; lack of creativity; impoverished language; and poor concentration.

### ***Why is there such a rush and eagerness to introduce technological tools to young children?***

Considering the rapid development in technology, it is likely that high tech tools used by young children now will be outdated by the time they graduate from high school. What then is the purpose of jump-starting children with drill-and- practice programs at the age of five or even earlier? There is not enough evidence of any benefit to introducing computer skills into educational programs for young children.

Even though the U.S. President’s Advisory Committee on Science and Technology, Panel on Educational Technology, acknowledged the lack of relevant research, this committee recommends a drastic increase of school spending on computers, especially in educational software. The committee states that the increase in expenditure in computer related fields would mean cuts in other areas of the school budget. There is information available for the U.S.A. and Canada about consequences, which are already visible, such as a higher teacher-student ratio, and cuts in spending for art subjects, excursions, and outdoor learning.

High tech companies have great influence on the political decision making process in the field of educational technology. The above-mentioned 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.”

The Congressional Web-Based Education Commission included no current elementary school teachers, no child-development experts, and only one high school teacher, but several members of Congress and three executives from high-tech companies. This group aims “to help ensure that all learners have full and equal access to the World Wide Web” without discriminating between developmental needs of a five year old and a college student.

The CEO Forum on Education and Technology demands: “We need to apply technology’s

powerful tools to change the way our students, of every age, learn.” Among the 25 members of this Forum, 23 are from industry, including Apple Computer, Compaq Computer, IBM, Computer Curriculum Corporation, and America Online, and only two are non-corporate members, one from the National Education Association and the other from the National School Board Association.

The International Society for Technology in Education now has a new corporate program for industry leaders in the educational technology field, with the goal of “improving education through the appropriate use of technology” with an interest to promote technology from preschool through high school. The draft report was funded by Bill Gates from Microsoft.

### ***What are educational alternatives?***

More clearly than ever, educational research is pointing to the importance of the “human factor” in education, the real adult-child relationship and communication. There is enough evidence that independence and self-confidence develop only on the basis of a strong bonding, of the experience of belonging, of being loved and accepted. Other fundamentals of early education are the exploration of the environment and undisturbed, self-motivated, creative play. This is not a surprise for an early childhood educator, and it encourages a non-directive approach toward the young child, an approach which embraces all aspects of the child and supports real world experiences and creative expression.

In brief, technology does not help with the fundamentals of early education and quite often distracts the caregiver’s effort from these fundamentals. Even Steve Jobs, co-founder of Apple Computer, comments that:

“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 is wrong with education cannot be fixed with technology. No amount of technology will make a dent.”

### ***What is wrong with early childhood education today?***

To look at just one problem, there is the stress of parents, caregivers, and teachers and the difficulty of retaining one’s human qualities under the pressures of everyday life. In a recent German study, ten-year-old children were interviewed about their biggest wish for Christmas. Eighty percent answered that they wished their parents had more time for them.

In the U.S.A., children today spend forty percent less time with their parents than they did 30 years ago.

An experienced early childhood educator used to tell parents about an invisible sign above the door of her center, which said: “Here we have time,” time to be with children, to talk to them and provide the space they need to unfold their own activity.

Two computer scientists, who elaborated in their book on the achievements and the dangers of computer technology, indicate a possible positive alternative for the future: “Our hope is that the introduction of computers only after a childhood environment steeped in love, beauty, and respect for children’s natural, holistic growth may make it possible for them to put these machines in their proper place.”

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