It's not just information

by M. Resnick

When people think about computers, they often think about information. They talk about information technology, the information age, the information superhighway. They discuss how computers enable people to send, access, and manipulate information in many new ways.

Similarly, when people think about education and learning, they often think about information. They discuss what information people need to know to be literate in today's society, and they discuss new ways for teachers to teach (and for students to learn) that information. Not surprisingly, they expect that new information technologies will open new opportunities for teaching and learning.

But this focus on information is limiting and distorting. If we want to take full advantage of new computational technologies, and if we want to help people become better thinkers and learners, we need to move beyond these information-centric views of computing and learning.

Walk through the MIT Media Laboratory, and you get a very different view. In one room, you see people using new sensor technologies to create new types of musical instruments. In another room, you see people embedding electronics inside LEGO** bricks. Everywhere, you see people designing, creating, inventing. This type of activity makes the Media Lab not just a good research lab, but a good learning environment. As Seymour Papert has pointed out for many years, most of our best learning experiences come when we are actively engaged in designing, creating, and inventing—not just accessing or manipulating information.

Of course, there is nothing unusual about people designing, creating, and inventing at a research lab. What distinguishes our work at the Media Lab is our strong commitment to helping *other people* design, create, and invent. At the Media Lab, we spend much of our time "designing for designers"—that is, designing things to help other people design things. We believe that digital technologies could have their greatest impact on the world not as "information technologies" but as "design technologies." Our goal is to use new technologies to expand what people can design and create, how they share their creations with one another, how they reflect on their creations—and what they learn in the process.

Today most computers in the world are not used in this way. Part of the problem is in the computers themselves. The computers in widespread use today were designed for and by the television generation. They even look like televisions. Is it any surprise that they are used primarily to deliver information?

One reason that many Media Lab initiatives have focused on children (other than the obvious fact that today's children will greatly influence the future) is that children are willing and eager to use computer technologies in novel and expressive ways. We live in an unprecedented era in which children are often more competent and confident with new media than their parents. This type of reversal has not happened before: when the printing press was invented, children were not among the leading-edge users as they are with today's computers. Alan Kay once defined "technology" as anything that had not been invented

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when you were born. For today's children, computers are not a technology, they are simply part of the everyday landscape.

In the Media Lab's new Okawa Center, one of our major goals is to develop a new generation of computer technologies *worthy* of this new generation of children. Ideally, these new technologies should provide children with "expressive leverage," helping them to create things and express themselves in ways that would have been difficult in the past. At the same time, the new technologies should provide children with "conceptual leverage," allowing them to learn ideas that would have been difficult for them to learn in the past.

New technologies, of course, are just one piece of the learning puzzle. Over the years, the Media Lab has developed not only new technologies but also new social and educational contexts in which to try out new technologies and new ideas about learning. The papers in this special issue refer to several of these pilot projects: the Hennigan Elementary School project, Project Lighthouse in Thailand, the Silver Stringers project in Melrose, Massachusetts.

Participants in these projects have learned a great deal—and so have we. An important next step is to scale up our efforts, to spread our ideas and approaches to more people in more places. For example, the previous Media Lab special issue of the *IBM Systems Journal,* in 1996, included a paper about our Computer Clubhouse project,[1] an after-school center where inner-city youth learn to design, create, and invent with new technologies. Since that paper was published, 14 new clubhouses have opened, including two outside of the United States. And recently, Intel Corporation committed $20 million to help open a network of 100 new clubhouses over the next four years.

The Computer Clubhouse network represents one way to spread our ideas about learning and designing. But it will not be easy. Despite funding from Intel, Moore's Law[2] does not hold for clubhouses: it will be very difficult to double the number of clubhouses every 18 months without a significant drop in quality. Seymour Papert has talked about the "epistemological dilution" that often occurs as new technologies move from the research lab to pilot project to widespread use. Indeed, spreading new ideas (and new ways of thinking) is far more difficult than spreading new technologies. Simply "broadcasting" ideas, in an information-centric way, will not work. For new ideas to spread and thrive, they must build upon ideas and practices that already exist in the local culture. As a result, new ideas are likely to take hold in different ways in different places. Finding ways to support and nurture that process is our biggest challenge for the future.

Notes

1. The Computer Clubhouse was cofounded by the Media Lab and The Computer Museum (now part of the Boston Museum of Science).
2. In 1965, Intel cofounder Gordon Moore predicted that the density of transistors on computer chips would roughly double every 18 months, leading to exponential improvements in computer performance. That trend has continued through today, and is expected to continue for the foreseeable future.

Mitchel Resnick *MIT Media Laboratory, 20 Ames Street, Cambridge, Massachusetts 02139-4307 (electronic mail: mres@media.mit.edu).* Dr. Resnick, associate professor at the MIT Media Laboratory and head of the lab's Okawa Center, develops new technological tools and toys in an effort to help people (particularly children) learn new things in new ways. Dr. Resnick led the development of the ideas and technologies underlying the LEGO Mindstorms™ robotics construction kit. He also led the development of several projects (including StarLogo software and the Virtual Fishtank museum exhibit) designed to help people learn about complex systems and emergent phenomena. He cofounded the Computer Clubhouse, an award-winning network of after-school learning centers for youth from under-served communities. Dr. Resnick earned a B.A. degree in physics at Princeton University (1978) and M.S. and Ph.D. degrees in computer science at MIT (1988, 1992). He worked for five years as a science and technology journalist for *Business Week* magazine, and he has consulted widely on the uses of computers in education. Dr. Resnick was awarded a National Science Foundation Young Investigator Award in 1993. He is author of the book *Turtles, Termites, and Traffic Jams,* published by MIT Press in 1994.