MIT Media Lab: Learning to Play and Playing to Learn

People who truly love cool stuff that can be done with computers have this dream: They die, and then get to go to the MIT Media Lab.

It is beyond imagination. There are children's toys with little robot brains called "crickets" that wink and move and dance to the inscrutable rhythms of their own little infrared sensors. There are musical instruments that look like nothing you have ever seen before, and they produce squawks, squeals and notes of a pitch not hitherto dreamt of in this universe. There are strands of electronic fibers that weave into material to create the ever chic and popular wearable computer. On one cluttered desk is a computer whose dream is to be no thicker than a sheet of paper; on another desk are molecular inks that change color depending on what signals pulse through their atomic structures.
Putting Theory to Work in Computer Clubhouses

The Computer Clubhouse is a collaborative effort with the MIT Media Lab, the Boston Museum of Science and Intel Corporation. It is a network of after-school learning centers where kids ages 10 to 16 can have access to computers to create projects related to their own interests. The Media Lab uses the clubhouse as a test bed for its new technological tools and educational ideas. The goal is to focus on youth from underserved communities and to help them become fluent with new technologies and producers (not just consumers) of new computational media.

Over the next five years, the plan is to extend the Computer Clubhouse into 100 communities, reaching more than 50,000 children. For many of these new users, it will be their first time to experiment and create using animations, robots, video games, music, simulations and multimedia presentations. Treat yourself to a fun Web experience with a visit to the Clubhouse site at www.computerclubhouse.org.

The lab is a veritable cornucopia of high-tech gee-wizardry. Graduate students, professors -- the few, the gifted, the lucky -- sit in front of colored screens, laugh, talk and play surrounded by mind-bending images and sounds that tweak the brain and delight the senses. And within this virtuous reality where intellectual leaps and boundless creativity reign, there is -- wonder of wonders -- a serious purpose: to push the boundaries of computing machines toward ever greater service and power in the growth and development of human beings.

Founded in 1985 by Professor Nicholas Negroponte of MIT and the late Jerome Wiesner, former MIT president, the Media Lab is a unique response to the evolving world of new media and information technologies. Computing, publishing, broadcasting, even filmmaking, are blurring into one another, obliterating old boundaries, encroaching upon new ones, running together in unpredictable ways like a living work of abstract modern art.

The Media Lab has a strong educational and research mission and has made important contributions to such practical and current realities as digital video and multimedia. It partners with industry to bring its fantastical ideas to fruition and practical application. Two current areas of intense activity illustrate the lab's focus on education and its highly effective approach to turning bright ideas into bright horizons for the future of learning and education.

NEW OBJECTS FOR LIFELONG KINDERGARTEN

Mitchel Resnick is an enthusiastic and articulate advocate of constructionist learning. When children are engaged, they learn. When they are happily engaged, they learn even more. "Kindergarten was created by a man named Fröbel," Resnick explained. "He thought very carefully about what objects could be used to help children learn and to deal with important abstract ideas like color, for example, or shape or size."

The objects Fröbel gave to children in order to study their responses were called “Fröbel Gifts.” He was interested in how these gifts engaged the children, how different gifts helped them to learn in different ways and how new gifts could be used to take learning in new directions. “In a sense,” Resnick said, “we are creating new Fröbel Gifts for the 21st century. New materials, advanced electronics and different kinds of computers are the tools we are using to explore a wide range of new learning modes.”
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According to Resnick, certain kinds of objects suggest to the child how they might be used. Young children have no trouble understanding that blocks are good for stacking, putting into containers, throwing, and so on. Similarly, LEGO bricks, for example, suggest to the child that structures such as houses, castles and bridges can be built with them. When children experiment with such objects, they learn useful lessons about how pieces fit together, how some things support others, or how some structures are better than others for certain purposes. All valuable information.

“Today, we have computers and electronic sensors, and different kinds of building materials,” Resnick pointed out, “and it expands the range of things that children can design, create, invent and learn with. They can create things that move, react and interact. They can build a computer-driven machine, program the computer and create things that almost come alive.”

What’s the point? A whole new range of “things” are now possible to engage children and allow them to master information about dynamics, for example -- how things move -- or behaviors, or ways of controlling their world. “It’s a new block in the bin,” Resnick explained with a smile.

“We are interested in providing as rich a learning environment as possible,” Resnick said. “Blocks and bricks, wheels, gears, computers, infrared sensors -- all of these can be assembled by kids to achieve what they want to do. We want to provide appropriate media to let kids visualize their ideas, connect with everyday life and make their ideas come alive in the world.”

Some of the inventions that kids have come up with on their own are intriguing. From bird feeders that activate cameras, to automated ways of keeping track of pet hamsters, to powered in-line skates, kids are testing themselves and their ideas and learning concepts that are already becoming essential skills in an information age where computing machines are proliferating into all areas of life, learning and commerce.
MITCHEL RESNICK: Getting Serious About Playful Work

Mitchel Resnick is something of a paradox. He looks and speaks every inch the professor, but his topic is toys -- having fun with technology and learning. As a professor in the Epistemology and Learning Group at the MIT Media Laboratory, he studies the role of technologies and media in thinking and learning. He is also engaged (one of his favorite words) in the development of new computational tools and toys that help children learn new things in new ways.

A good example of the paradox that is Mitchel Resnick is his description of his research and accomplishments in decentralized thinking: “I developed the StarLogo modeling environment to help people explore and learn about decentralized systems and emergent phenomena. This research is described in my book, ‘Turtles, Termites and Traffic Jams.’” Not quite the title you may have expected for such a ponderous-sounding topic.

Resnick’s work has helped to develop a family of “programmable bricks,” which have been commercialized and are sold under the name of LEGO MindStorms. His research and recent courses are summarized on his unique home page.

www.media.mit.edu/~mres

BUILDING WITH WORDS

Instead of building with blocks and LEGOs animated by computers, Justine Cassell focuses on ways to help kids build and construct with words. Cassell is the AT&T Career Development associate professor of media arts and sciences at the MIT Media Lab. “Building is an important part of learning,” she said, “and we are exploring novel ways of encouraging kids to learn through construction of stories and languages.”

Much of Cassell’s work revolves around “play” and storytelling. “When you engage kids in social exchanges,” Cassell observed, “interesting things happen. When children swap stories, they have a tendency to try to top each other -- tell a better story. They push each other to achieve new ways of looking at the world and of using language to describe the world.”

To better observe how children learn in storytelling and “story-listening” situations, Cassell and her co-workers have created “Sam,” an animated character who can seemingly pass toys back and forth through a projection screen. Sam (who was deliberately designed to be either a Samuel or a Samantha, depending on the eye of the youthful beholder) acts as a peer playmate, magically sharing physical objects across a real and a virtual world, while seeming to be a good listener and evoking turn-taking, storytelling behaviors.

“Children understand that something fantastical is going on here,” Cassell explained. “As they engage with Sam, moving toys around and talking back and forth, we observe that their stories become more narratively advanced, their language becomes more sophisticated. Learning is taking place in a highly engaged atmosphere of fun and wonderment.”

TellTale is another device that highlights the use of language to construct stories and ways of describing the world. Its caterpillar-like body is segmented into five parts that can be assembled in any order -- and each body part contains a recorder. “The child speaks a part of the story into each of the TellTale’s body pieces,” Cassell explained, holding the round plastic sphere to her mouth and speaking into it.

The story can have up to five parts, each part separately contained in TellTale’s body segments. When the story is done, children can assemble TellTale in any order they choose and play it back. They learn that the story has different parts, and it can be changed, made more or less coherent or interesting, by switching the order of TellTale’s speaking body segments.
JUSTINE CASSELL: Storytelling and the Art of Learning

Justine Cassell is an associate professor at MIT’s Media Laboratory, where she directs the Gesture and Narrative Language Group. Cassell and her students study natural forms of communication and linguistic expression and build technological tools that enable and enhance these activities, largely through face-to-face conversation and storytelling. Cassell describes her particular interests as “building with words, peer learning and learning through play.”

Her office is a miracle of interconnected computers surrounded by every imaginable kind of Barbie doll and Barbie paraphernalia, good-humored gifts from her co-workers in honor of Cassell’s 1998 book, which she co-edited with Henry Jenkins: “From Barbie to Mortal Kombat: Gender and Computer Games” (MIT Press, 1998).

www.media.mit.edu/~justine)

“It engages children at several levels,” Cassell pointed out. “They have tactile, audio and visual involvement, along with the storytelling component. And while they are engaged this way, they get to experiment with plot,

transitions, endings, beginnings -- basically anything they can imagine." With TellTale, the concept of story structure and organization is no longer abstract. It is real, visible and tangible. And under the child's control. All good things for deep learning.

FROM MEDIA LAB TO REAL-WORLD LEARNING

The MIT Media Lab has been called a confederacy of geniuses. It is populated by visionaries who look beyond the screens and keyboards of today's computers and see a world where computing power is abundant, intuitive and accessible to all. The toys, the theories and the wondrous things that originate at the Lab are already finding their way into our world -- and making a difference in the ways people live and learn.

A major expansion is currently underway and when it is completed in 2003, the Media Lab complex will house the Okawa Center for children, learning and developing nations. It will also provide new facilities for research on the underlying science and technology needed to merge the bits of the digital world with the atoms of the physical world, as well as an expanded focus on arts and expression in the 21st century. It's a brave new world. And it's here. And if the MIT Media Lab is any indication, it's going to be cool.