Feature
BY SUSAN ABDULEZER

BREAKING OUT

AN UNSCALABLE FENCE ENCLOSES THE MAINE YOUTH CENTER. It's meant to prevent an easy exit for the more than 200 adjudicated youth, ages 11 to 21, who reside in cottages erected among the turn-of-the-century brick buildings on the grounds of this south Portland corrections facility. Incarcerated for a spectrum of crimes, each person's term of confinement and release varies. But while each stay is different, each release has an unfortunate consistency. Upon leaving the youth center, that unscalable fence often goes with these young people as an internal barrier to social acceptance and learning. Unlocking that external gate is easy. Unlocking the internal gate is difficult.

"IT'S SOCIALLY VERY URGENT FOR US TO ADDRESS THE PROBLEM OF KIDS FOR WHOM SCHOOL AND LIFE HAVEN'T WORKED."
-- Seymour Papert

THE LOCKSMITH

According to Maine Corrections Statute 764, "A person residing at the Southern Maine Juvenile Facility is eligible to ... receive ... vocational, special education and alternative education services in accordance with all state and federal requirements." And it was the unusual, and inspired addition of the term alternative education that divined a most facile locksmith to appear and open educational doors. Seymour Papert (LEGO Professor of Learning and Epistemology at Massachusetts Institute of Technology -- MIT), in an unusual confluence of government, school and university think tank, established the Constructionist Learning Lab (CLL) at the Maine Youth Center. The mission was simple: Match the learning experience to the learner. Take the lock to the locksmith and have him fashion the key.

The CLL is a seedbed of alternative educational ideas, a pilot rather than a prototype. The name suggests that the learner "constructs" his or her own learning. Subjects of study come from student interest, and learning is project based. Time is not divided artificially into subject blocks; it expands to the needs of the learner. Kids are engaged because they are excited, not because they are compelled. For Papert, creating this atypical environment with incarcerated youth was more than a challenge; it was a matter of compassion ... and an opportunity.

"This is a population of kids who are really being very badly served by society," said Papert. "And society is serving itself very badly by doing this. The ... way in which kids [who] have fallen out of the school system, sort of fallen off the track, are dealt with ... that's breeding anti-social, criminal behavior. It's socially very urgent for us to address the problem of kids for whom school and life haven't worked. It also is an opportunity to try out ideas for learning activities that most schools are too conservative to try."



GARY STAGER
Adjunct Professor of Education Pepperdine University

To try out these new activities, Papert gathered fellow constructionist "ideasmiths," Dr. David Cavallo of the MIT Media Lab and Gary Stager of Pepperdine University, to create the CLL. The three rotated through the facility, providing support and professional development on the fly. Maine Youth Center teachers Fred Taylor and later, Sue Finch, joined them full time to operate the lab. John Stetson of The Learning Barn completed the staff, bringing a rich set of skills, including the disciplined art of handcrafting guitars, drawing with a camera obscura and plotting sunspots with a daylight telescope. While they might all be labeled teachers, they are,

more accurately, master learners setting up shop for their apprentice learners.

LANDSCAPE OF LEARNING

The "journeyman" learners (12 multi-age students) settled into an ad hoc think tank placed next to the youth center's more traditional high school (the A.R. Gould School). The CLL took shape in a 30-by-60-foot portable structure. It has the large, open character of a studio, or atelier, rather than a classroom. And the nature of its activities is reflected in the chaotic décor of a constructionist-learning environment.

"The first thing you would see is a wall filled with pictures, all kinds of pictures of eyeballs and leaves close up under a microscope," said Sue Finch. "You'd see 14 computers ... half would have individuals sitting at them, and about half would have two or three people. ... You'd see LEGOs everywhere. On the floor. On the tables. And there's a big white board with things like, 'Challenge: Be ready for Friday. Move the superintendent across the floor with LEGO motors.'"

Parked before the computers are soft, gray chairs on rollers, providing joyous transport for students racing across the room in frenetic collaborations. They sail past pieces of plywood and cardboard leaning up against the walls and over blue carpet with lengths of colored tape making inclines and roadways for student-programmed, sensor-laden LEGO vehicles. A microscope sits beside a computer, tethered and programmed to make time-lapse movies of mushrooms shrinking, bugs circling and ice melting. It is a landscape of learning.

Traveling from states of not knowing to knowing, from curiosity to grasping "big ideas," from "learning disabled" to gifted, the taped LEGO roadways map a true learning interstate. And the fuel is hard fun, a term Papert uses to describe the connection to difficult concepts in math, engineering, physics and the arts through the challenge of solving engaging problems.

A problem that provoked both intense learning and intense fun was the Incline Contest. Using programmable LEGO bricks and sensors, students built vehicles that could go up a steep plywood incline. The vehicle that put two wheels over the top of the steepest incline would be victorious.

Gary Stager described what ensued. "There were amazing scientific discoveries being made in the context of doing that rather fun-sounding activity, to build something that climbs a steeper incline," he said. "The kids ended up realizing there are only four ways your car really fails, whether it's too little force, too much friction, center of gravity or a structural problem that causes it to break.

"We had really interesting things happen, like the girl who decided to put sandpaper on the ramps, to increase friction. When she found the sandpaper that seemed to work the best for her vehicle, she decided to put it under a microscope, and look at a [LEGO vehicle] tire under a microscope. It wasn't an ordinary microscope. [It] allowed something that an ordinary microscope wouldn't -- she could print out [both] images at the same magnification level. When she put them side by side, she realized how similar the texture of the wheel and the sandpaper were, which was why it climbed. It was like teeth meshing in a gear. Or another kid ... built a vehicle that climbed 110 degrees by building a four-foot-long car to cross the line. Cheating, or just good science? They're playing with limits, defying conventions ..."

These kids are defying more than the conventions of physics laws. More than 50 percent of the students at the youth center are labeled "special ed," and it is Papert's contention that most are mislabeled, and misled. "In about 30 kids I've worked with this year, there are three clear cases. Their school records claim they are totally



SEYMOUR PAPERT
Professor of Learning and Epistemology, MIT

Q: What have you learned from the Constructionist Learning Lab?

I've learned concretely something that I already suspected; that among kids who are classified with learning disabilities, condemned to special ed

incompetent failures," said Papert. "Put them in a different kind of environment with enough support and the opportunities to challenge them with things they find interesting, which do not smell like school -- they've become totally averse to the smell of school -- and these three do brilliantly."

One student, "Michael," (not the student's real name) is a case in point. At 15, he had been in and out of the youth center several times. Entering the CLL, he soon emerged a latent genius. Soaking in programming and engineering principles, he embarked on a challenge of his own choosing. He decided to build a vending machine out of LEGOs that would charge a higher price for cold drinks when the ambient temperature rose. "This was a kid who was self-contained [in special education classes]," said Sue Finch, "unable to read, write and do arithmetic. [He] then made this incredible machine. ... This is higher-level thinking. The machine itself was an incredible feat of engineering. He made it out of LEGOs. There was a heat sensor, a touch sensor that counted things, a rotation sensor. ... it was programmed with the computer, and all these little motors that made things go back and forth. ... it was incredible."

"We have kids who are [labeled as] illiterate who are desperate not to be." said Gary Stager. And Michael was one of them. Not only did he build a remarkably engineered device, but he also turned out to be a poet. He began to read William Blake, Langston Hughes, Pablo Neruda and Emily Dickinson voraciously. He also wrote poetry, even though he hadn't been in school for several years. And when he did attend, he was confined to self-contained special-education classes. When Stager suggested to Michael that he might actually like high-school English because it's literature and writing, Michael replied, "They don't let me take that. They put me in the classes with the ear-biters."

Michael's progress in the hands-on, frenetically engaging CLL has captured the imagination of Bobbie Niehaus, principal of the Gould School, who has plans to expand the program. "It's certainly a new and different way of looking at education," she said. "The perception was that [students] would do projects that ... were of interest to them, which is very important for kids who haven't had good school experience. ... They have computers, and they program machines that they build. ... But they have also done theater work, radio broadcasts, made movies, animations ... and the group is learning a lot about how kids learn. So it isn't just the kids who are learning."

And what the group -- Papert, Cavallo, Stager and Finch -- is learning is what works in this environment, and why. They are documenting experiences and projects that successfully use technology to create artifacts and to connect students to what Papert calls idea power -- the deep understanding of the discipline, perspective and pattern of thinking that governs the creation of everything tangible and intangible: machines, mathematics, poems, human interactions and learning.

The connection to the "big idea" behind every endeavor is central to constructionism, and to the success of each student, because it is at the core of every personal discovery. It's not enough to build a LEGO vehicle capable of climbing a steep incline, but to understand what the "idea" is behind using materials, math and technology to create moving devices; that's an almost atavistic revelation, like discovering the wheel or lighting the first fire. And

classrooms, there is a significant percentage of those who could perform at what the schools would call gifted and talented, in some cases, genius level.

What I've learned is something, in a way I've already known, but it became much clearer. Everything is crisper here. To change education, you've got to find the teachers who want to do it. You have to find teachers who are inclined in that direction. ... As I visit the future, in education, it will be very diverse, and take very many different forms, and reflect different attitudes and philosophies of life and of teaching. Sue Finch emerged as the lead teacher of the project. She has turned out to be spectacularly, wonderfully good at it. It matches her personality, and her approach to kids and learning and life. She just does things in a way that is much more productive, much more fruitful for the kids. It's not a matter of judgment of who is a better teacher. That's something else that I've learned from this: Find the teachers who want to go with you, who already like to go in that direction but don't know how to do it ... rather than try to convert the others.

Papert, Stager, Cavallo and Finch turn to each revelation, each success and each "big idea" like careful ticks on a combination lock, to find just the right settings to liberate that intellectual confidence students need to flourish, leaving that unscalable fence, that label of failure, behind forever.

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GLOSSARY
Camera Obscura - a darkened enclosure having an aperture usually provided with a lens through which light from external objects enters to form an image of the objects on the opposite surface.
Constructionist Education Approach - children learn through a process of designing, inventing and experimenting.


Susan Abdulezer, multimedia coordinator for New York City Public Schools Special Education, received the Computerworld Smithsonian Award for Innovation in Technology in 1996 and 1997.

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