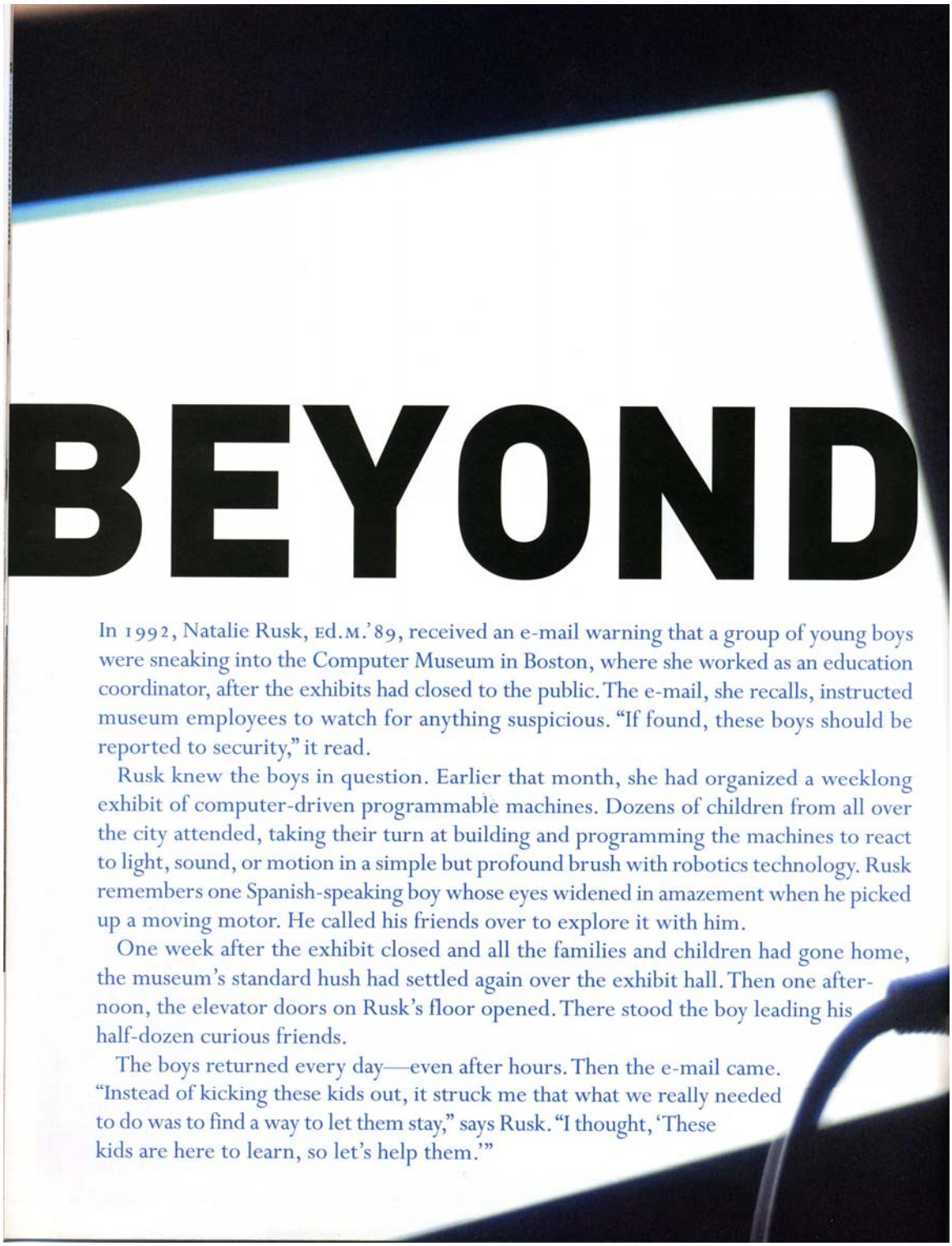


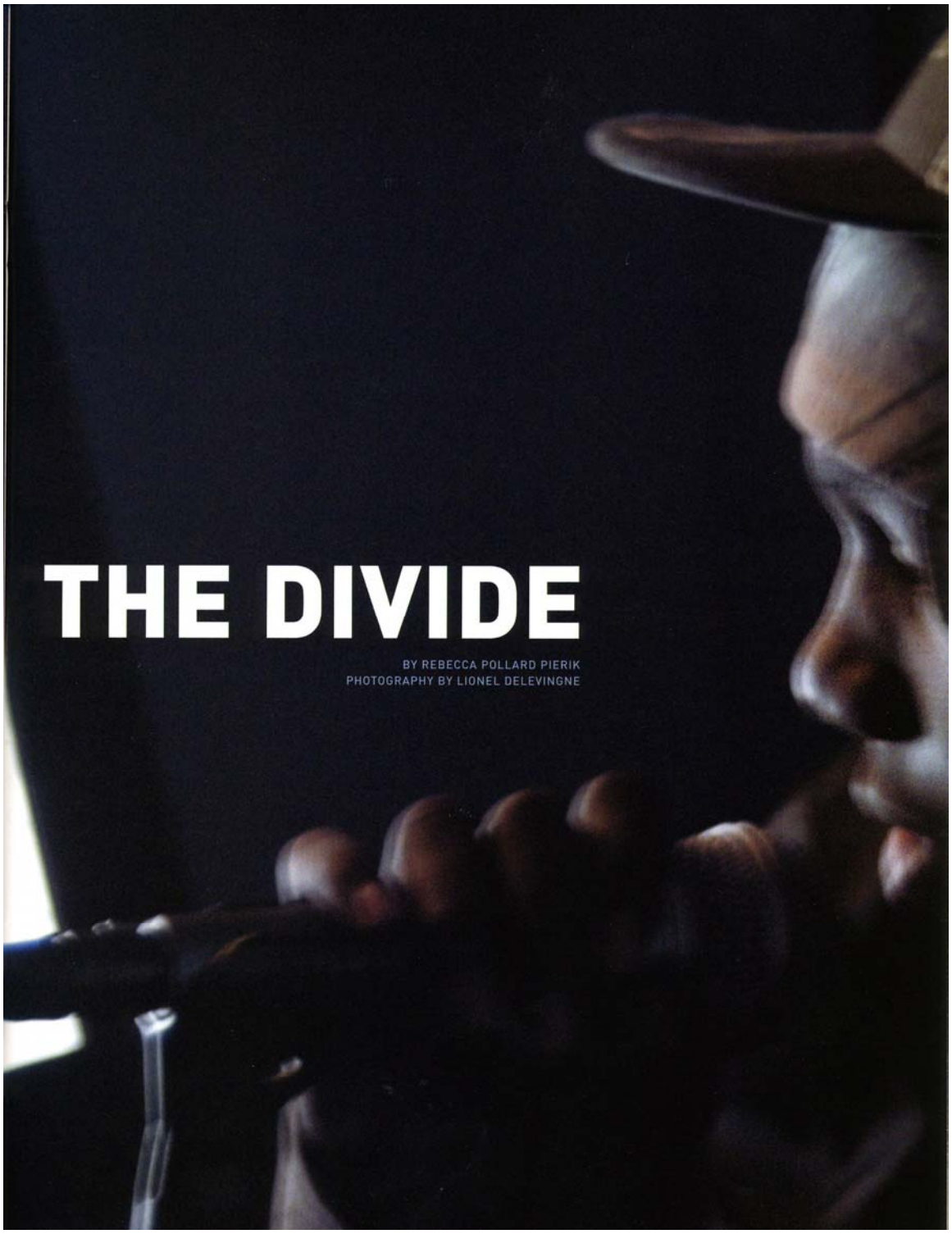
BEYOND

In 1992, Natalie Rusk, ED.M.'89, received an e-mail warning that a group of young boys were sneaking into the Computer Museum in Boston, where she worked as an education coordinator, after the exhibits had closed to the public. The e-mail, she recalls, instructed museum employees to watch for anything suspicious. "If found, these boys should be reported to security," it read.

Rusk knew the boys in question. Earlier that month, she had organized a weeklong exhibit of computer-driven programmable machines. Dozens of children from all over the city attended, taking their turn at building and programming the machines to react to light, sound, or motion in a simple but profound brush with robotics technology. Rusk remembers one Spanish-speaking boy whose eyes widened in amazement when he picked up a moving motor. He called his friends over to explore it with him.

One week after the exhibit closed and all the families and children had gone home, the museum's standard hush had settled again over the exhibit hall. Then one afternoon, the elevator doors on Rusk's floor opened. There stood the boy leading his half-dozen curious friends.

The boys returned every day—even after hours. Then the e-mail came. "Instead of kicking these kids out, it struck me that what we really needed to do was to find a way to let them stay," says Rusk. "I thought, 'These kids are here to learn, so let's help them.'"



THE DIVIDE

BY REBECCA POLLARD PIERIK
PHOTOGRAPHY BY LIONEL DELEVINGNE

// "I SEE THE REAL INEQUITY AS BETWEEN THE KIDS WHOSE INTERESTS ARE SUPPORTED AND THE KIDS WHOSE INTERESTS AREN'T. THAT'S THE DIVIDE WE TRY TO ADDRESS." //

Help them she did. Over the next two years, with funding from local and national sources, including the Intel Corporation, Rusk founded the Computer Clubhouse with Mitchel Resnick, a professor in the Media Laboratory at the Massachusetts Institute of Technology (MIT). The simple idea behind the clubhouse was to create an informal environment where inner-city youth could explore new technologies at their own pace.

That idea, evidently, touched a nerve. Local youth came in droves to the afterschool haven where exploratory learning shattered the experience of listening to lectures or reading textbooks. The clubhouse became a digital playground where young people could polish their computer skills to a high sheen as they built Web sites, designed digital animation, and produced their own comic books and compact discs.

Members swap lyrics and a few laughs in the sound studio. Dozens of youths have capitalized on clubhouse technology to produce their own CDs—complete with original cover art.

The clubhouse's success led to increased funding from Intel, which has since invested some $30 million in building 60 clubhouses worldwide. Today, the Intel Computer Clubhouse Network's virtual reach extends across the United States to 17 international venues as far away as India, Colombia, and China.

Natalie Rusk, cofounder of the Computer Clubhouse, had her first experience programming in the sixth grade. Despite an obvious affinity for technology, Rusk says her primary interest in computers stems from their value as tools for learning.

// CLOSING THE GAP //

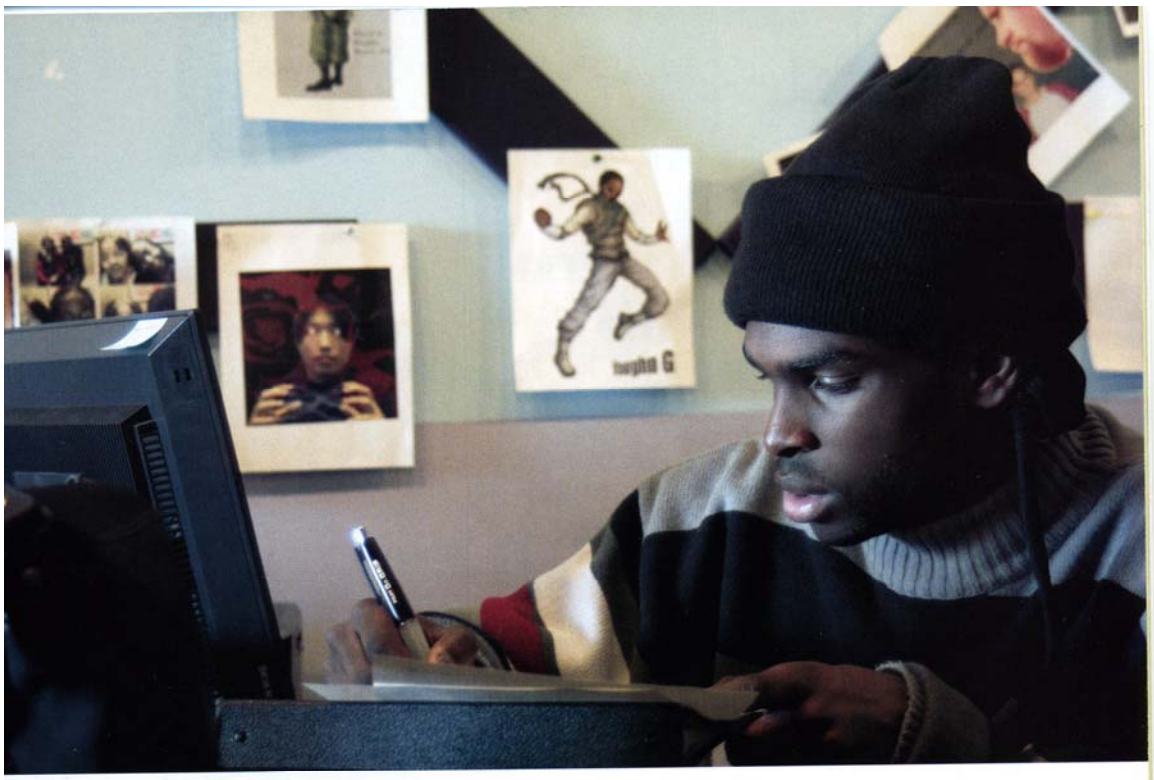
The clubhouse has built a sturdy bridge across what has become popularly known as the "digital divide." That term was coined in the Clinton administration in response to a U.S. Department of Commerce report titled "Falling Through the Net," which charted startling disparities between the haves and the have-nots in terms of access to technology. The report concluded that "individuals' economic and social well-being increasingly depend on their ability to access, accumulate, and assimilate information." Since then, computer and modem connections have become keys to the vault of the information age.

A flurry of federal and private programs, like the clubhouse, that emerged to build computing equity are now starting to close the gap. In fact, the 2002 version of "Falling Through the Net"—fittingly retitled "A Nation Online"—reports that 2 million new users join the digital domain every month. Computer and Internet use, it states, are fastest growing among people in poverty—the demographic previously left out of the new technology loop. The report also declared that public schools have made significant headway in providing students with access. This means, at least in theory, that greater numbers of students than ever can develop the skills required for 57 percent of jobs in the current labor market and more than 80 percent of professional or managerial positions.

In an era when the importance of computing skills cannot be underestimated, these figures represent a tremendous step forward for the most impoverished citizens of our nation. In a controversial move last October, the federal government cut funding to two hallmark Clinton-era digital divide initiatives that provide community technology centers and training in low-income neighborhoods on the grounds that the programs were no longer needed.

But a number of educators, including Rusk, believe that the widespread availability and dropping costs of computers have revealed the more complex issues that created the divide in the first place. "We always say that access is not enough," says Rusk, now a Computer Clubhouse project researcher at the MIT Media Laboratory. "I see the real inequity as between the kids whose interests are supported and the kids whose interests aren't. That's the divide we try to address."

Others claim that the very rhetoric of the digital divide needs revision. "The digital divide is a concept brought into mainstream

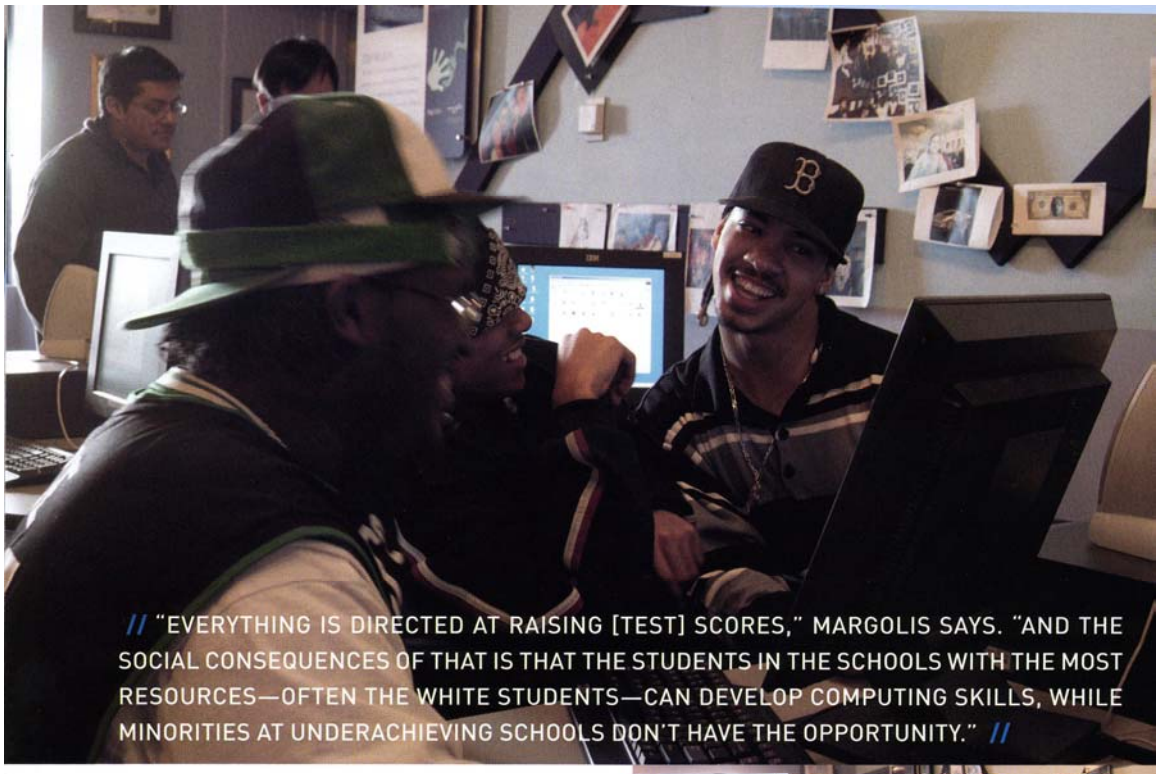


consciousness by politicians," says Jennifer Dorsen, ED.M.'94, who directs ScienceQuest, a science education program of the Education Development Center, Inc., that operates through community technology centers throughout the country. ScienceQuest volunteer teachers challenge largely minority, low-income students to pursue their own scientific questions through technology. Say, for instance, a 12-year old wants to learn how neon can appear in different colors. A ScienceQuest teacher will locate resources—in this case, Web sites, videos, books, and a local neon sign vendor—to help the girl build her own Web site about neon light, complete with digital artifacts. The aim, says Dorsen, is both to generate excitement about everyday science and to polish students' technology skills. But more than anything, ScienceQuest gives young people an afterschool alternative to TV, chat rooms, or other less constructive activities. In Dorsen's mind, closing the digital divide is as much about giving young people enriching opportunities as it is about creating a diverse cadre of computer-savvy professionals. "The digital divide is shorthand for any number of divides between privileged students and students who don't have as many opportunities," she says. "It encompasses the 'quality-science-instruction divide,' the 'field-trip divide,' the 'caring-adult-in-your-life divide.' Those divides are hard to address."

On a typical Wednesday afternoon, Boston's flagship Computer Clubhouse, now located at the city's Museum of Science, buzzes with activity. Six clubhouse members pack into a recording booth that would be the envy of any Los Angeles sound studio. One youth dons a pair of headphones and bobs his head to the beat, watching a digital representation of the sound pass before him on a monitor. Another youth, who has been a clubhouse regular since 1996, tries to figure out how to copy a piece of Japanese computer animation into a new digital format. "This is harder than it looks," he says, as an error message floats to the center of his screen.

Actually, it looks quite hard—and all the more impressive considering that the fledgling Web weavers, graphic designers, and sound producers are largely self-taught. Sure, a few adult volunteers help troubleshoot and answer questions. But in the end, each clubhouse member finds a way to navigate the digicams, editing suites, scanners, and Web site software with little supervision. "This is their place," explains Michelle Hlubinka, ED.M.'00, who has been a clubhouse volunteer mentor for seven years. Hlubinka says she spends as much time building supportive relationships with members as she does giving them computing tips. "The whole environment is designed to encourage exploration. And it does."

Technology professionals, business executives, and artists alike serve as mentors, offering technical—and personal—guidance to clubhouse youth. Michelle Hlubinka, a former graphic designer and a mentor for the past seven years, says the clubhouse showed her how creative endeavors can provide powerful vehicles for learning.

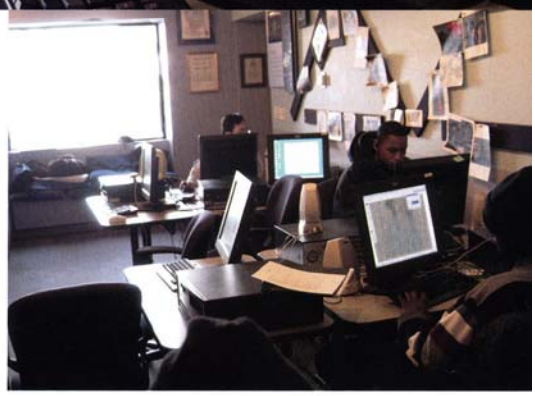


// "EVERYTHING IS DIRECTED AT RAISING [TEST] SCORES," MARGOLIS SAYS. "AND THE SOCIAL CONSEQUENCES OF THAT IS THAT THE STUDENTS IN THE SCHOOLS WITH THE MOST RESOURCES—OFTEN THE WHITE STUDENTS—CAN DEVELOP COMPUTING SKILLS, WHILE MINORITIES AT UNDERACHIEVING SCHOOLS DON'T HAVE THE OPPORTUNITY." //

Vayu Kieta, age 18, considers the clubhouse his home away from home. He started coming to the clubhouse 4 years ago with his older brother, and since then, he has returned there just about every day. He explains this as he attempts to add some remixed tracks from the movie *The Matrix* to his Web site. "I'd always been interested in computers," he says, "but I didn't have a place to learn about them."

"What about in school?" asks a curious visitor.

"Oh yeah, school," Kieta laughs, as if the question has revealed something ironic. "I feel like I've learned more here in 4 years than I have learned in 11 years of school. About computers," he says. "About everything."



// THE E-RATE REVOLUTION //

Carrie Skibba, ED.M.'99, knew she had her work cut out for her when she saw the computer lab at the Burley Elementary School in Chicago, where she had been hired as the first-ever technology specialist one week before the school opened for the 2000–2001 academic year. The "lab" consisted of a handful of old computers without modems resting on rickety folding tables and a stack of dusty textbooks dating back to the 1950s.

Skibba accepted the job because she knew change was imminent. The principal of Burley had already submitted the mountain of paperwork required to apply for E-Rate, a U.S. Department of Education initiative that offers schools big discounts on a network infrastructure—data ports, broadband connections, and servers. Her job was to supervise the installation and help train teachers and students to use the new technology in the classroom. In just two years, Skibba has outfitted every classroom with networked PCs and created a laboratory of wireless notebooks that students can check out. She has even galvanized most of the teaching force around integrating computers into their assignments.

Since the Telecommunications Act created E-Rate in 1996, schools throughout the United States have capitalized on the program to wire up. At nearly the same time, the numbers of instructional computers in schools have more than doubled, according to Market Data Retrieval, a consulting firm that tracks technology in schools.

entor Vaughn Rogers akes a few design uggestions to Otis onille, an author nd illustrator of a omputer Clubhouse omic book.

Even so, schools still vary greatly in terms of quality and use of technology available to students. A 2001 U.S. Department of Education report claimed that students in poverty are 15 percent less likely to have access to computers at school than students in the highest income brackets. And even in the schools that do have adequate equipment, there is no guarantee that teachers can integrate it into their curriculums. "Teacher A might be doing incredible activities with computers, while down the hall Teacher B is using them for drill and kill," says Cheryl Lemke, president and CEO of the Metiri Group, a consulting firm that assesses technology use in school districts across the nation. "There are points of light, but seldom systematized guidance—on a district level—on how to use technology to help students learn in new ways."

Context is everything when it comes to resources for schools, and that has a huge impact on who develops higher-level computing skills and who does not, says Jane Margolis, Ed.M.'88, Ed.D.'90, a researcher at the University of California, Los Angeles. Concerned about the absence of Black and Latino students in the field of computer science, Margolis launched a three-year study of students' computing experiences at three high schools in Los Angeles—one with a predominantly African-American student population, one with a largely Latino student body, and a third with a significant percentage of White students from wealthy families. The third school is the only one that offers advanced placement computer science classes.

Now at the end of the first year of the study, Margolis has already observed how pressure to increase standardized test scores at the largely Latino school has edged "extras" like computer programming out of the curriculum. "Everything is directed at raising the scores," she says. "And the social consequences of that is that the students in the schools with the most resources—often the White students—can develop computing skills, while minorities at underachieving schools don't have the opportunity."

Margolis and Skibba understand how boosting technology skills often gets kicked to the bottom of an already long list of needs in our nation's public schools. But these educators, along with Rusk and Dorsen, have come to view the distinction between basic skills and computing skills as unnecessary—and even counterproductive. They envision a world in which technology provides a powerful means for building the fundamentals of reading, writing, and arithmetic. Efforts to bridge the digital divide have, indeed, narrowed the gap. Closing it, however, may come only as educators in all ranks and in all kinds of schools learn to teach with technology—instead of about technology. That is when computers and Internet access will become more than indicators of access. They will provide solutions to some of the deep inequities still plaguing classrooms. Ed.

// HIGH-TECH GENDER BENDER: NATURE OR NURTURE? //

Although girls and women surpass boys and men in terms of their Internet use, the field of computer science remains a decidedly male one. In fact, girls and young women accounted for only 17 percent of high-school students taking advanced placement computer science tests and only 20 percent of computer science bachelor degrees last year, according to Jane Margolis, Ed.M'88, Ed.D.'90, an expert on gender equity and technology use and the coauthor of *Unlocking the Clubhouse: Women in Computing.*

Margolis says she believes that this shortfall degrades the integrity of the field. "There are abundant examples of what goes wrong when a product design group is not representative of the product's users," she says. For instance, early seat belts, calibrated to fit only adult male bodies, caused injury and even death to women and children, and the first heart valves fit only male hearts. When it comes to designing the Internet or new computer applications, the stakes are just as high. "Technology is the driver of our society in many ways. When you have a homogeneous group—mostly White men—making the decisions, all others are left out of the equation," Margolis says.

Along with Allan Fisher, the associate dean of undergraduate education at the Carnegie Mellon School of Computer Science at the time, Margolis conducted a four-year study of male and female computer science undergraduates at the university, looking at why so few women—only 7 percent in 1995—entered the computer science track.

Based on Fisher and Margolis's findings, Carnegie Mellon retooled its computer science program to offer a wider selection of introductory courses. The university also dropped admissions policies that gave preference to highly experienced applicants. By the study's end, 42 percent of the incoming freshmen enrolled in computer science classes for 2000 were female.

So, should educators act as social architects when it comes to gender, altering policies to increase numbers? Judith Kleinfeld, Ed.M.'67, Ed.D.'70, a University of Alaska, Fairbanks psychologist who studies gender and academic achievement, says such measures can include active recruitment of girls and women—a practice that she believes does more harm than good. "Why should society pressure women into fields they don't prefer?" she asks. She explains the gender gap this way: "In a nutshell, girls use computers as tools, boys use them as toys. With that orientation, the guys, as a group, are going to be better. Anybody is better at what they just enjoy playing around with and thinking about."

Kleinfeld has cast her critical eye on many reports that bemoan the low stature of women in the sciences. In response to a highly touted early 1990s report from the American Association of University Women that highlighted how girls fall behind boys in math and science, she published a study titled "The Myth that Schools Shortchange Girls: Social Science in the Service of Deception." In it she cites statistics showing that, from grade school to college, girls outpace boys in terms of grades, class ranks, college attendance, and honors in every field *but* science and sports. That said, the dearth of women in computing power positions should concern no one. "Medical and legal degrees often lead to high-paying, high-status jobs," Kleinfeld says, "and women are pouring into those fields."