

tc TODAY

The Magazine of Teachers College, Columbia University

“GAMIFYING” THE
CLASSROOM

WHAT WE CAN
LEARN FROM ROBOTS
THAT GET IT WRONG

INTELLIGENT
TEACHING:
THE ART
BELONGS
TO DATA



Rewiring the
**LEARNING
LANDSCAPE**

TC IS BREAKING NEW GROUND IN
APPLYING TECHNOLOGY TO EDUCATION

TACTILE SOFTNESS

In our technology-driven era, even nature can be reduced to discussions of data and data access. But for Michelle Lee, a student in Richard Jochum's Art & Art Education course "Field Work in Education," both art and teaching are about the experience of the moment.

In the assignment shown here, a visual representation of Lee's teaching philosophy, she created a sculpture and then used a typical desktop scanner—a technology that generates light from within to expose an image (as opposed to a camera, which relies on external light)—to capture its two-dimensional image. Blogging about her work and where it came from, Lee writes, "I hope the form speaks to a mixture of textures and tensions...to the organic practice of teaching. I think the materials I used... remind us of the delicate yet strong stitching of our own experience."

For more from TC's Art & Art Education Program, check out page 16, or visit www.tc.edu/a&h/ArtEd

spring '12

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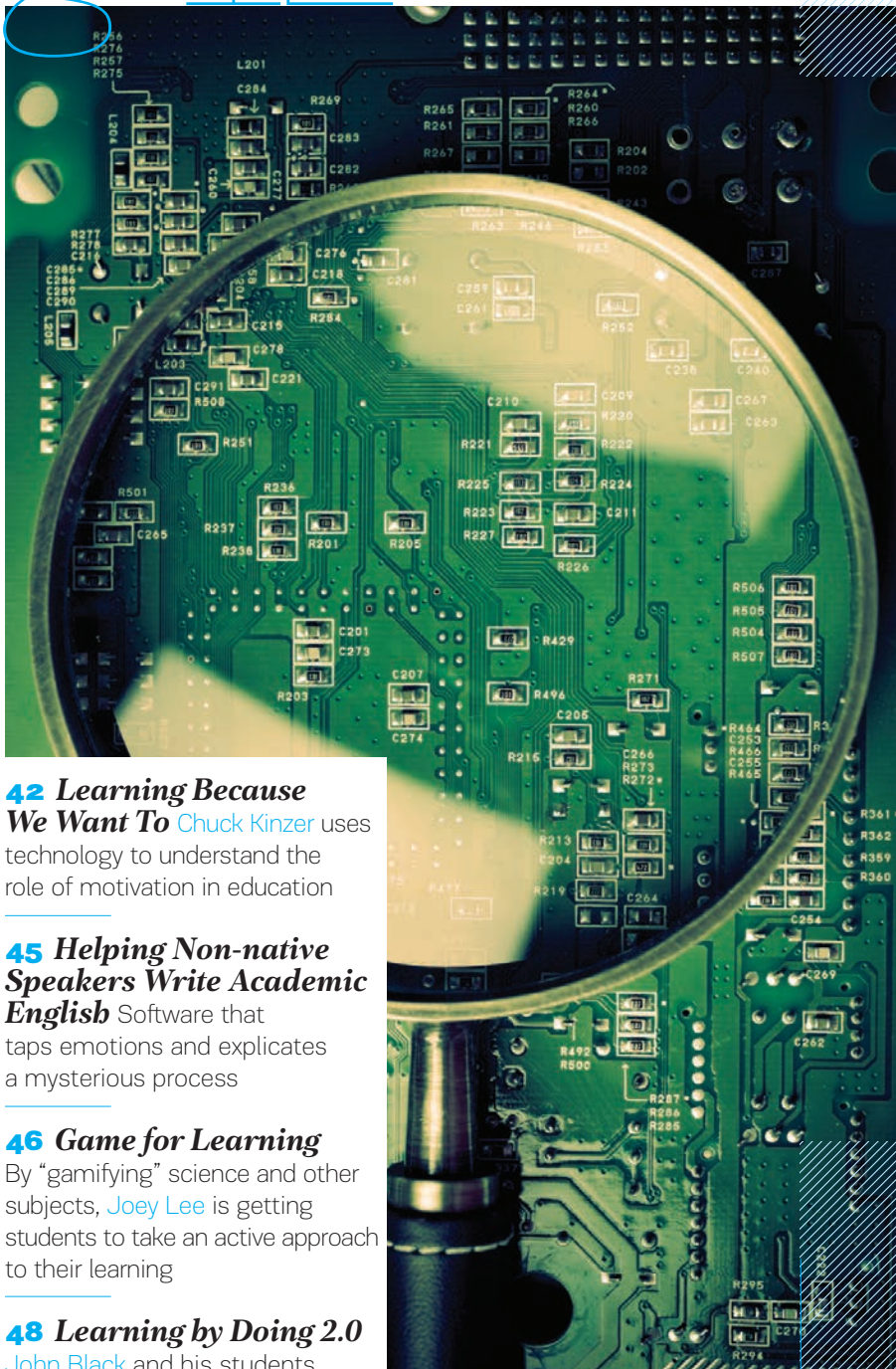
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Photo illustration by
C. J. Burton/Corbis

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editor's note You'll see throughout this issue, from cover to cover, that we've done a little redecorating. Visit our website to read about our redesign, or drop us a line to share your thoughts: www.tc.edu/news/8444

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WHAT IF WE HAD technologies that could give teachers insight into precisely what is going on in students' minds as they grapple with a difficult math problem? What if technology could enable a teacher to help each student work at his or her own pace and receive individualized instruction and attention? What if teachers could use technology to draw on the best work of other teachers and to keep parents up to date on whether and how well their children were completing assignments?

What if technology could make all of our skilled teachers even better?

Skepticism is understandable among readers who are old enough to recall the hype that accompanied the arrival of computers, television and even radio in classrooms. However, as you will discover in these pages, new adaptive education technologies and tools are being used with encouraging results at a small but growing number of schools around the country.

At Teachers College, our work in this burgeoning field of technology is a natural continuation of our legacy as pioneers in learner-centered, hands-on education. Theories of grounded cognition and learner decision-making advanced by current TC faculty members such as John Black and Charles Kinzer build

directly on the foundational ideas of John Dewey, E. L. Thorndike and others, who held that people learn by making sense, often on the most tactile level, of their environment. Studies conducted by these researchers have shown that using adaptive education technologies can result in significantly deeper understanding than simply reading information from a page.

The intelligent technologies now coming into use also have another capability that excites education researchers: By recording literally every keystroke that users make, the new tools generate a wealth of data about how people learn. That information ultimately will enable us to create better curricula and employ more effective teaching methods that are geared to the needs and strengths of each individual learner.

Make no mistake: This is a defining moment for the future of education throughout the world. Technology is the new frontier, and the time for exploration is now. That is why we at TC are helping to lead high-powered discussions in academic circles and beyond on how best to capture, standardize and share the data mined from new technologies for the benefit of all. We need to convince policymakers and the public at large of the great opportunity before us and of the critical need to make intelligent long-term investments in education technology. If we succeed, I believe that our efforts—and those of our colleagues around the world—will help to shape a new era in which teachers are empowered to help all students and learners of all ages reach their full potential. And that is no hype.

A handwritten signature in black ink that reads "Susan Fuhrman". The signature is fluid and cursive.

SUSAN FUHRMAN (PH.D., '77)

This is a defining moment for the future of education throughout the world. Technology is the new frontier, and the time for exploration is now.

First Editions

Members of the TC Community in Print

Looking Back On Life As It Could Be

Robbie McClintock envisions an idyllic post-industrial world made possible by a digital commons

THE CYBER REVOLUTION IS THE SUBTEXT OF Robbie McClintock's intriguing new book, *Enough: A Pedagogic Speculation*, which is equal parts fiction, anthropology and philosophy.

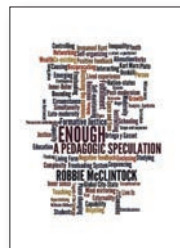
Enough's premise: It is 2162. Three generations have passed since "the Stabilization"—a leveling off of the world's population accompanied by a massive reaction against materialism, environmental endangerment, corporate fascism and the concentration of wealth and power among elites. Bickering nations have been supplanted by a harmonious global city-state, and the marketplace by a "commons" of shared ideas and resources. People have become disillusioned with the imperative to produce and

consume. They live according to an ethos of "enough"—a moderate zone where "honest equals... care for natural resources, the human mind, and the social infrastructure."

McClintock, who retired last spring after 44 years on TC's faculty, argued two years ago in this magazine that digital

resources have become "infinitely reproducible without diminishing quality and at negligible cost," resulting in a "digital commons" that favors communal production, shared resources and a general shift "away from mine and thine." Through the fictional device of looking back at such a shift, *Enough* seeks "not to marvel at a utopian world to come, but to give ourselves some perspective on our own." Above all, the book articulates McClintock's passionate belief that education should be a learner-driven process of self-formation. The book ends with the assertion, from Plato's *Republic*, that "The soul of every man does possess the power of learning the truth and the organ to see it with."

Enough is available in paperback and hardback through Amazon, Barnes & Noble and other online booksellers.



Virtual Virtue

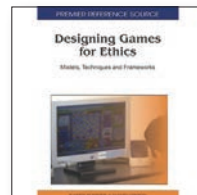
What games can teach us about making ethical decisions

ASK ABOUT THE MORAL ISSUES RAISED BY DIGITAL games, and most people will talk about the violence in "Grand Theft Auto" or "Red Dead Redemption." But many games also require users to act for good or evil. Make off with the loot or save the village? Be the self-sacrificing hero—or grab for all you can get?

"Play has always been a way to allow people to experiment with other perspectives, to reenact scenarios and possibilities, to practice collaborating and competing," writes TC alumna Karen Schrier in the preface to *Designing Games for Ethics: Models, Techniques, and Frameworks*, which she co-edited with David Gibson (Premier Reference Source, 2011). "Games may be particularly well-suited to the practice and development of ethical thinking [because] they enable players to reflect on their decisions and outcomes, and allow them to consider the implications of their choices, without many of the risks of real-world consequences."

Both in this volume and its predecessor, *Ethics and Game Design: Teaching Values through Play*, Schrier, Assistant Professor of Communication at Marist College, and Gibson, Research Assistant Professor in the College of Engineering and Mathematical Sciences, University of Vermont, ask: What do games tell us about our ethics? How are cultural values and beliefs represented in games? How do we use games in classrooms and informal educational settings to support moral development?

Schrier, who studied with TC technology professor Charles Kinzer, points out that commercial developers are themselves increasingly integrating overt moral choices into off-the-shelf games. Recounting a dream in which she was a jewel thief, she writes: "Games have the potential to engage the imagination in a way that you feel like you really are a jewel thief, or a renegade, or a paragon, or any of the millions of possibilities in between. Being able to access the diversity of ethical perspectives is perhaps even necessary for fully appreciating humanity, life and beyond."





News 6 EPSA inaugurated; new master's program with Singapore institute; Bailey leads national committee on two-year colleges; the history of ed-tech, and more | **Essays 11** Budin on expectations; Varenne on democratized learning; McNulty on schools of the future; and more | **Giving 16** Supporting students through the TC fund



From left: Jack Jennings, Wendy Puriefoy, EPSA Chair Jeffrey Henig and Christopher Cross discuss the impact of federal policy in the classroom.

INAUGURATING A NEW POLICY DEPARTMENT

THREE DISTINGUISHED EDUCATION POLICY ANALYSTS, speaking in February at the formal inauguration of TC's new department of Education Policy and Social Analysis (EPSA), agreed that national education policy has had an enormous impact on U.S. classrooms.

In a discussion moderated by Jeffrey Henig, Professor of Political Science and Education and EPSA department chair, the speakers—Christopher T. Cross, a former U.S. Undersecretary of Education and current Chairman of Cross & Joftus, an education-policy consulting firm; Jack Jennings, founder and recently retired Director of the Center on Education Policy; and Wendy D. Puriefoy, President of the Public Education Network (PEN)—cited a list of major federally driven changes to American schools. These included Title I funding, instituted in 1965 to provide extra money

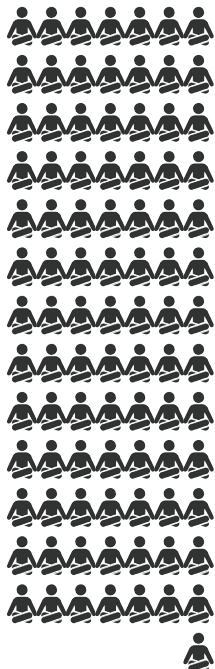
for schools with economically disadvantaged children; the Education for All Handicapped Children Act (later the Individuals with Disabilities Education Act, or IDEA) of 1975; No Child Left Behind, enacted in 2002; and the Obama administration's Race to the Top program.

"The question of whether national policy has influenced education unquestionably has to be answered, 'yes,'" Cross said. "The reality is that almost everything that goes on is, in fact, guided by what happened in federal policy at some point, even though people in the classroom may not recognize it."

Launched in the fall of 2011, EPSA serves as a central academic hub for TC's education policy work across all phases of educational and human development, with both a national and a global focus.

(Re) Watch "The Future of Education Policy: The 2012 Election and Beyond" bit.ly/H9shYU

1980



1:92

In 1980, there was one computer for every 92 students in U.S. schools.

2012



1:4

Today, there is one for every 4 students.

TC CREATES MASTER'S DEGREE PROGRAM WITH SINGAPORE INSTITUTE

TEACHERS COLLEGE AND THE National Institute of Education (NIE) in Singapore have established a joint Master of Arts in Leadership and Educational Change degree program, with a dual focus on instructional and curriculum leadership. According to a written statement from the NIE, the new program, to be based in Singapore, will prepare "a new generation of educational leaders for Singapore, the Asia-Pacific region and the larger international community."

The program was launched in early February in coordination with the signing of an agreement in Washington, D.C., to enhance educational collaboration between Singapore and the United States. TC's Provost and Dean, Thomas James, and A. Lin Goodwin, Vice Dean and Professor of Education, took part in a ceremony in Singapore for launching the joint master's program, which will begin taking applications this May for enrolling its first cohort of 30 students in January 2013. The program seeks applicants from Singapore and the Asia-Pacific region, as well as prospective students from the United States and other Western countries who wish to pursue a higher degree "in an Asian context," the NIE said. Degrees will be jointly awarded by TC and the NIE, which is part of Singapore's Nanyang Technological University.

A HUMANITARIAN AWARD FROM GHANA FOR TC'S SPEECH PATHOLOGY WORK

IN EARLY MARCH, THE NATIONAL Council of Ghanaian Associations (NCOGA) gave its 2012

Humanitarian Award to two Teachers College faculty members. Cate Crowley, Distinguished Senior Lecturer in the College's Speech-Language Pathology (SLP) program, and Miriam Baigorri, an instructor and clinical supervisor in the SLP program, were honored for their "dedicated and devoted services to the disabled children and higher institutions in Ghana." The award, presented by Ghana's Ambassador to the United Nations, Ken Kanda, also honors TC President Susan Fuhrman and Provost Thomas James.

Each year since 2008, Crowley and Baigorri have brought 18 master's degree students in the SLP program to Ghana to provide free services for children and adults with communication disorders and to offer professional development for their Ghanaian



Cate Crowley (left) and Miriam Baigorri

colleagues. While in Ghana, the TC group collaborates with teachers of students with intellectual disabilities and works with the ear, nose and throat departments and cleft palate teams in the two teaching hospitals in Ghana. The TC students also make media appearances to increase understanding of the potential of Ghanaians with disabilities.

During her tenure, President Fuhrman has greatly expanded the international initiatives undertaken by Teachers College. Provost James has provided continued support, including a Provost's Investment Fund Grant that partially funded the first trip to Ghana in February 2008.

NCOGA also recognized the significant benefits that TC's Ghana program offers Ghanaians in New York, citing the deeper understanding that SLP students in the program bring to the provision of quality services to people from diverse backgrounds, including Ghanaian-Americans.

PSYCHOLOGISTS DISCUSS LIFE IN A TRAUMATIC WORLD

THE 9/11 TERRORIST ATTACKS. Hurricane Katrina. The Gulf oil spill. The earthquake, tsunami and nuclear disaster in Japan. It's rough out there, and we all feel it in some way. With that in mind, a panel of faculty and alumni gathered

COOL TOYS FROM TC

We're a hotbed of app and game development! Check out:



Jessica Hammer

ADVANCE

Game about gap between reality and beliefs about racial and gender disparities in America. Player acts as a headhunter, identifying clients an organization is biased against and strategizing to place them

anyway. **DEVELOPED BY:** Jessica Hammer, Mellon Interdisciplinary and Graduate Research Fellow. replayable.wordpress.com/projects/advance

ART BY SUBWAY NYC App for iPhone or iPod Touch. Describes artwork in NYC subway system and how to get to it.

CREATED BY: Matt Vincent, Associate Web Editor, mattvincentart.com

GREENIFY National Science Foundation-funded project. Uses gaming and real-world situations to teach adults about climate change. **DIRECTED BY:** Joey Lee, Assistant Professor of Communications, Computing and Technology. greenifygame.com

MAD-DASH iPhone app for preschoolers and caregivers. Promotes literacy via physical play. Players complete activities captured by iPhone camera and anthologized, Mad Libs-style, in a storybook.

CREATED BY: Mad-Dash, with the Fred Rogers Center. Mary Gillis, TC Applied Physiology doctoral student and Rogers Center Fellow, works on the project. etc.cmu.edu/projects/mad-dash

MAT-MATICS Video game with dance pad. Develops fluency with whole-number arithmetic. Player must tap in answers before falling equations hit screen's bottom.

DEVELOPED BY: Dan Hoffman, Seungoh Paek, Selen Turkey, Zhou Zhou, doctoral students in Instructional Technology & Media. seungoh.com/development

TC EDUCATOR, SECOND LIFE

The College's island in Second Life's virtual world. Attend classes in the sky and presentations in an amphitheater.

CONTACT: Selen Turkey. Bit.ly/HaJ3KK

(Re) Watch the TC Psychology Roundtable, "Living in a Traumatic World," anytime at youtu.be/CtIOB9bccQ4

at the College in December for the inaugural event of the TC Roundtable Series in Psychology, titled "Living in a Traumatic World." Introduced by Provost Thomas James and moderated by Marla Brassard, a TC expert on psychological and emotional abuse in children, the panel included psychology faculty members George Bonanno, an expert on resilience to grief and trauma; Philip Saigh, a pioneer in describing and treating post-traumatic stress in children; Lisa Miller, an authority on spirituality in psychotherapy; and Ghislaine Boulanger (Ph.D., '81), a prominent New York City psychoanalyst who conducted early studies of post-traumatic stress disorder in Vietnam veterans, and who has since taught at TC and New York University.

TC was the birthplace of education psychology, and today roughly one-third of its full-time faculty members are psychologists.

NATIONAL COMMITTEE, LED BY BAILEY, URGES CHANGES

THIS PAST DECEMBER, Thomas Bailey, George and Abby O'Neill Professor of Economics and Education at Teachers College and Director of TC's Community College Research Center, handed U.S. Secretary of Education Arne Duncan



Thomas Bailey

a report urging the federal government to make major changes in how it tracks the success and productivity of community colleges.

The report was the work of a 15-member national Committee on Measures of Student Success, led by Bailey, which was created in the wake of the 2008 reauthorization of the Higher Education Act. The Act required that two-year colleges report their completion rates to the federal government, but college officials argued that this statistic alone did not accurately reflect the achievements of the populations they served. The committee led by Bailey was appointed to develop recommendations for more comprehensive measures of student success.

By current measures, only 37 percent of community college students complete their postsecondary education within four years. The committee's report urges the U.S. Department of Education to include, in its calculation of student success, those who transfer to a four-year college without a degree as well as those who earn a community college credential. It also recommends that colleges report graduation rates for distinct student cohorts, including part-time students, students who require remediation and those receiving financial aid.

3%

of U.S. public schools had Internet access in

1994; by 2009 all public schools were connected to the Net.

ERNEST MORRELL IS NEW VICE PRESIDENT OF NCTE

ERNEST MORRELL, PROFESSOR OF English Education and Director of TC's Institute for Urban Minority Education (IUME) in Harlem, was sworn in in November 20 as Vice President of the National Council of Teachers of English (NCTE), the premier organization of literacy educators in the United States.

Morrell, a prominent scholar in literacy, urban education and ethnic studies, was installed at NCTE's annual meeting in Chicago to begin a four-year term of leadership. After serving for a year as Vice President, he will be named Incoming President, then President, and finally Immediate



Ernest Morrell

To view an interview with Morrell, go to bit.ly/fsqebF

Past President of the organization, each for a one-year term. Morrell was elected through a balloting of NCTE's 35,000 members.

As Vice President, Morrell will advocate for and shape literacy education, particularly in urban settings, and to help translate education research into usable data for policymakers and educators. He will play a key role in a leadership meeting in July of early-career educators of color.

In addition to his work with NCTE, Morrell will participate

in the Teaching Edge Series at the annual convention of the International Reading Association (IRA) in late April. The IRA is a nonprofit network of individuals and institutions committed to worldwide literacy.

E-TOOLS FOR LIFE AT TC

New online tools from The Gottesman Libraries' Edlab help users navigate TC geographically, intellectually and socially.

THE TC ROUTEFINDER

(maps.edlab.tc), the equivalent of Google Maps for 120th and Broadway. Type in where you want to go, and presto, you get directions.

PUNDIT (pundit.edlab.tc),

a course search and recommendation tool that employs Amazon-like technology to anticipate your interests. Course readings, times, dates and numbers are all conveniently provided. Your user profile builds with each selection you make.

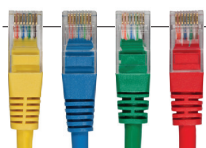
EDNODE (ednode.edlab.tc),

an intelligent social networking tool that creates your personal profile and mines it for keywords to suggest matches with other users. A page allows alumni to identify themselves as potential mentors.

VIALOGUES (vialogues.edlab.tc),

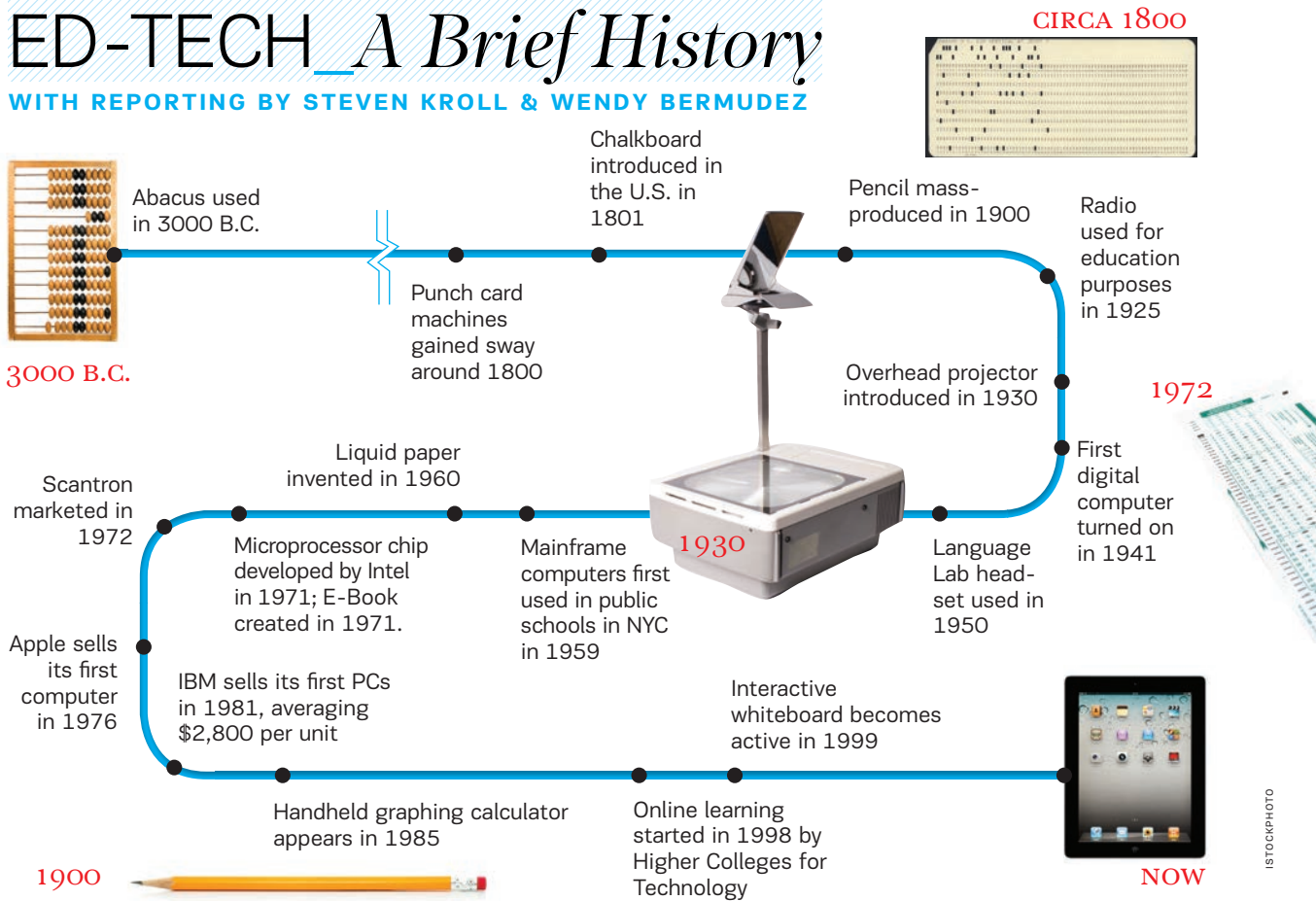
a new tool to upload videos from YouTube or your own computer and conduct threaded group discussions. TC faculty users can embed obligatory questions to guide students directly to specific time-stamped video sections.

Other EdLab tools included **PocketKnowledge** (pocketknowledge.tc.columbia.edu), TC's social archiving system, and **Pressible** (pressible.org), a network of TC-created blogs.



ED-TECH *A Brief History*

WITH REPORTING BY STEVEN KROLL & WENDY BERMUDEZ



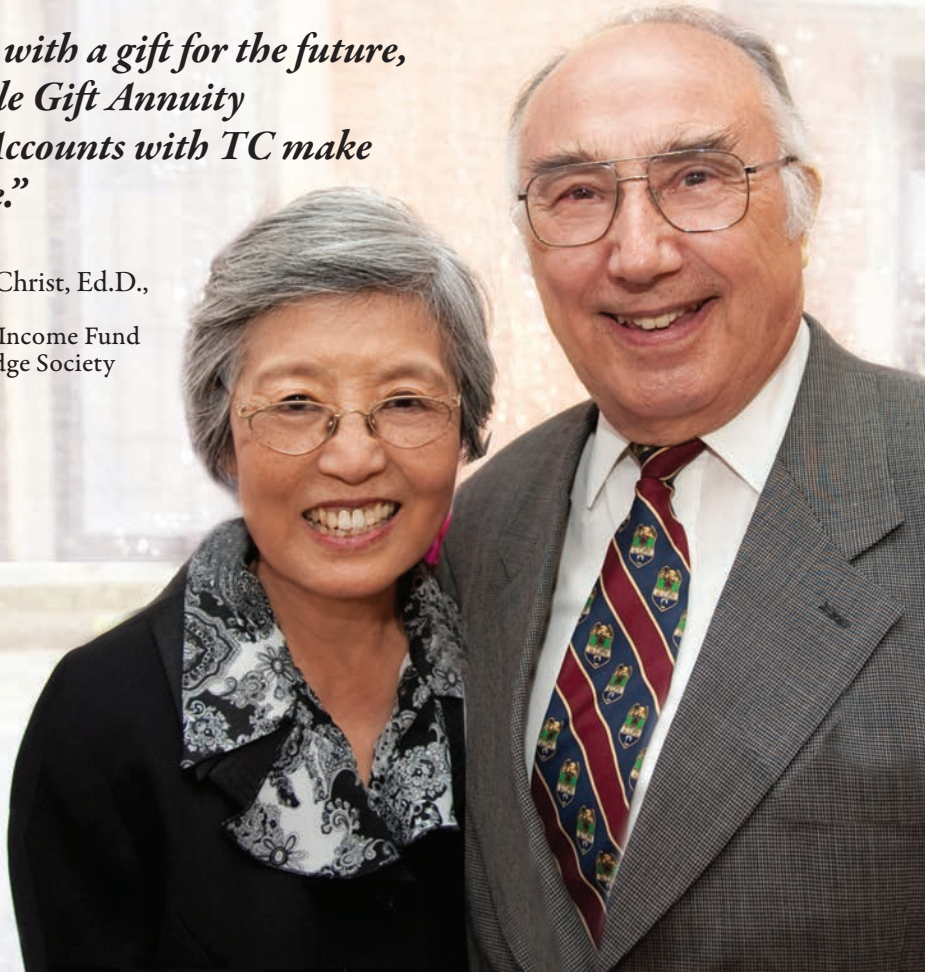
“Our IRA will provide TC with a gift for the future, and our multiple Charitable Gift Annuity and Pooled Income Fund Accounts with TC make our retirement comfortable.”

—Duane M. Christ, Ph.D., and Lily E. Christ, Ed.D.,
MATHEMATICS EDUCATION.
Charitable Gift annuitants and Pooled Income Fund
participants since 1989, and Grace Dodge Society
members since 2001



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please contact:

Louis Lo Ré
Director of Planned Giving
212-678-3037 or lore@tc.edu





Howard Budin:

HIGH TECH, LOW EXPECTATIONS

A PROMINENT EDUCATOR once said that there are two main problems in American schools: the education received by poorer students, and the education received by everyone else.

So it is with school technology. The term “digital divide” typically describes a gap in access to the best hardware, software and network connections, in and out of schools. Yet as the media scholar Henry Jenkins has powerfully described, there is also a gap in the skills needed to use technology to participate fully in modern society—skills in literacy, reasoning and decision-making, working successfully with others online and in person, and expressing oneself using a variety of media. Students who lack these abilities are at a major disadvantage, one that is reinforced in many poorer schools that use computers mainly for drills and practice.

Almost from the introduction of microcomputers into schools more than 30 years ago, I, like many other educators, have believed they are best suited for learning that is student-centered, active, inquiry-based and collaborative. This learning model has been supported by the International Society for Technology in Education (ISTE) and other organizations, yet the vast majority of American schools, richer or poorer, have never adopted it. Instead, as historian Larry Cuban described it 27 years ago in his article “Computer Meets Classroom: Classroom Wins,” computer use has reflected and reinforced a

“factory” model of schooling in which teachers and texts transmit information that students memorize and recall on tests.

Ultimately, technology is only as good as the educational models that employ it. At present, our schools are failing to equip students with the knowledge, skills and dispositions they need to function well in society. Modern digital technology provides a rich array of tools that is becoming increasingly necessary for work, for personal life and for democratic citizenship, but to use them well, schools will need to rethink the skills they teach and the ways they teach them.

The new tools are only as good as the educational models that employ them

Howard Budin is Director of TC's Center for Technology and School Change.

tc





Hervé Varenne:

TECHNOLOGY'S LESSONS FOR LEARNING



Did anybody dare predict that so many would learn so much with so little expert guidance?

Hervé Varenne is Professor of Anthropology and Education.

HOW MANY OF US, watching an apparent expert manipulating a computer, have said, “I’ll never learn to do that!”—only to soon find ourselves performing the very same thing? As an educator and researcher, I am amazed at how easily the ignorant can become knowledgeable about new technologies. Did anybody dare predict in, say, 1980 that so many would learn so much with so little expert guidance? Or that grandmothers would one day learn the art of “friending,” writing on “walls,” and other new skills with odd names? Perhaps the grandmothers were amazed to discover that “LOL” stands for “laughing out loud” rather than “lots of love,” and perhaps their grandchildren did indeed laugh at them, but the grandmothers

persevered to weave new ties across far-flung kin.

There’s a lesson here for schools of education. What if teaching and learning are not specialized activities? What if they are ubiquitous processes regularly activated when conditions require them? Dewey intuited this, but we must investigate a more radical set of opportunities. Could schools simulate the conditions under which newcomers realize that they must learn a skill and find the people who will help them? Perhaps by specifying curricula, pedagogies and the experts one must go through to be certified as knowing something, schools have been unwittingly limiting educational activities and the rewards they produce. Perhaps we should try to imagine schools where teachers really are facilitators of learning, even in areas about which they know little. Like a truly intelligent Google or Wikipedia, teachers could “just” lead students to resources while making sure they are applying themselves. Schools could cease to be involved in assessment—or even degree granting—and instead let students’ friends, neighbors and potential employers decide what they are good at.

True, that vision threatens to overturn much of what education schools currently do. But if, as the technological revolution suggests, better education would result, we should embrace that vision rather than resist it, or else we may find that others are indeed laughing out loud as they bypass us. **tc**



Lalitha Vasudevan: TOWARD A MULTIMODAL STANCE IN PEDAGOGY

Educators
can no longer
engage students
by print
or linguistic
means alone

Lalitha Vasudevan is
Associate Professor of Technology
and Education.

A YOUNG MAN BOUNDS into class 15 minutes early, a bright grin on his face. He sloughs off his leather jacket, pushes up the sleeves of his oatmeal-colored thermal Henley shirt, and pulls a PlayStation Portable (PSP) out of his pocket. He connects the device to a laptop, clicks on the icon for iMovie, and plugs in his headphones. His grin widens. The tracks he composed at home using an audio editing program have transferred without incident. He's ready to work on his film.

As a researcher and teacher, I have spent more than 15 years working with adolescents inside and outside of school, and I have consistently been impressed by their unyielding spirit of inquiry, exploration and discovery—whether they are in the

classroom, mastering a video game, or listening to family stories.

Just as the former student of mine, described above, turned a handheld video game into a tool for data transfer, today's youth are routinely changing the digital and communicative landscapes through which they maneuver. So, too, must educators be inventive, changing their practices of seeing and knowing students in order to better support their educational experiences. They must actively engage the knowledge that students bring into the classroom by providing ways for them to demonstrate proficiency through multiple modes and media rather than by print or linguistic means alone. This doesn't mean transforming classrooms into video arcades. But it does mean treating the mobile phone as a site of educational exploration rather than a distraction, or perhaps adapting practices such as texting and the use of handheld devices to work with curricular goals.

Such a multimodal stance in pedagogy can help to bridge the real digital divide in classrooms today: the lack of opportunities for youth to be seen as digitally fluent. Educators must constantly look closely so that we might see differently. As the novelist Henry Miller observed: "The moment one gives close attention to any thing, even a blade of grass, it becomes a mysterious, awesome, indescribably magnificent world in itself." **tc**





Anne Welsh McNulty:

THE SCHOOL OF THE FUTURE

A charter network models a marriage between technology and traditional teaching



THE UNITED STATES FACES a major education challenge. Millions of students need personalized instruction to identify their learning issues and work successfully. Yet we lack the means to provide a teaching workforce equal to the task.

Fortunately, the past decade has brought a solution in the form of new online teaching and learning programs that generate real-time information about what students understand in their daily work.

In 2007 Rocketship Education, based in California's Silicon Valley, opened the nation's first blended-learning charter school, employing technology of this kind. Today, Rocketship is a national network that each year opens additional schools in San Jose and other cities. Rocketship students—most of whom come from low-income families—spend significant time in the school's Learning Lab, where they access curricula through adaptive online technology that tracks their growth. The students also work intensively in small, tutor-led groups to master core reading and math skills. Rocketship teachers thus are freed to devote classroom instruction time to teaching critical, higher-order thinking skills.

Rocketship schools rank in the top 1 percent of all public schools in California serving low-income students. They even outperform wealthier school districts in Silicon Valley. The Rocketship model also saves \$500,000 per year for each school in the

charter network—money that is reallocated to higher teacher salaries, a full-time academic dean at each school and a three-year leadership development program that provides a career ladder for teachers. Consequently, Rocketship is able to attract, mentor and retain talented teachers and academic leaders.

I am proud that in 2010, the Aspen Institute awarded the John P. McNulty Prize to Rocketship Education and its cofounder John Danner. The award celebrates the spirit of my late husband, a man who regularly dared those around him to think in terms of higher orders of magnitude. Danner, who was honored for his audacious vision of giving underserved kids across the nation access to a top-tier education, was chosen by a jury that included Rockefeller Foundation President Judith Rodin; former U.S. Secretary of State Madeleine K. Albright; and Olara Otunnu, President of the Uganda People's Congress and former United Nations Under-Secretary General.

When such distinguished experts concur on a solution to a complex problem, it's clear that something is working. Creating Rocketship Education took a lot of hard thinking. Recognizing that it can serve as a national model shouldn't require rocket science. **tc**

Anne Welsh McNulty is co-founder and Managing Partner of JBK Partners, with businesses including investment management and a private philanthropy foundation.



Gary Natriello:

UNITING OUR HOUSE BEHIND EDUCATION TECHNOLOGY

IN HIS 1963 BOOK *ANTI-Intellectualism in American Life*, the historian Richard Hofstadter lamented a historic divide between scholarly researchers and classroom teachers in which “academicians scornfully turned away from the problems of primary and secondary education, which they...saw as the preoccupation of dullards,” and “too many educationists were happy to see them withdraw, leaving the educationists free to realize their own credos.”

Bridging that divide has never been more important than it is right now, when a new technological infrastructure, anchored by the Internet and growing upon it, promises to support the kind of individually responsive learning environments that were only a dream to earlier generations.

Past “technological revolutions” in education, heralded as sure

to transform the classroom via everything from slides and audio recordings to TV and software, have understandably left many people skeptical. But three qualities distinguish today’s technologies. First, they are *networked*—that is, continuously connected both to end users (whether teachers or students) and to creators or providers—and thus embedded in increasingly robust lines of communication. Second, they are *adaptive*, responding to differences in learners to create more personalized learning experiences. And third, they are *self-improving*, generating information that drives a continuous cycle of design, development, application,

Gary Natriello is the Ruth L. Gottesman Professor in Education Research and Director of the Gottesman Libraries at Teachers College.

assessment and change.

Yet obstacles loom. There are substantial commercial pressures to develop technology in directions that limit educational benefits. Well-established routines and procedures in the education sector also make accommodating the latest technologies difficult. Most worrisome, however, is that many practitioners and even some researchers in education distrust technology. They believe it threatens the primacy of the teacher or creates an impersonal approach to students, when in fact, used correctly, the new tools empower teachers to understand and connect with students as never before.

Whether in designing and testing new software, preparing entrepreneurs to lead educational start-ups, or creating the research base for new technologies, we at Teachers College and other leading research institutions are positioned to ensure that the latest technology revolution delivers on its promise. Because we bring together education researchers and practitioners under one roof, we have a unique opportunity to bridge the divide between these two communities so that students—our ultimate clients—are the beneficiaries. That union has always been a worthwhile goal, but with the opportunity currently before us, it now becomes imperative. Otherwise, future historians will rightly accuse us of much worse than “anti-intellectualism.” **tc**



Supporting Students through the TC Fund

Teachers College has reinaugurated its Annual Fund Scholars Program, through which, with a gift of \$5,000, donors can establish a one-year named scholarship for an individual student.

“There is often a gap between the cost of attendance and the resources that a student or family can allocate toward the TC education,” says Thomas Rock, Executive Director of Enrollment Services. “A gift of this amount would help to close that gap and help decrease the financial burden many students face when considering enrolling at Teachers College.”

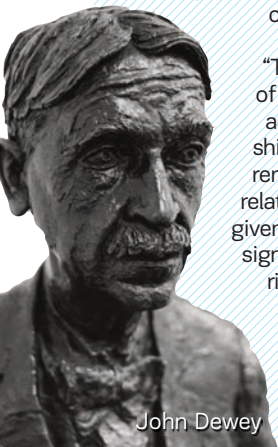
“Raising spendable funds to support students for the here and now builds our capacity to reach our number one priority of increasing student financial aid,” says TC Fund Director Susan Scherman. “Participation in this program will reinforce our ability to offer competitive financial aid packages that will attract and retain the gifted students whose achievements will advance TC’s legacy of excellence in scholarship, policy and practice.”

In addition to enjoying John Dewey Circle benefits at the Scholar’s Circle level, donors to the Annual Fund Scholars Program will have the opportunity to meet the students they support at the College’s annual scholarship celebration in order to learn about their work.

Donors can make multiple gifts in \$5,000 increments, and choose to support one student for several years, multiple students in a single year, or both. A \$5,000 gift can also be made in installments over the course of a year.

“The TC Fund is major source of general scholarship support, and this new named scholarship opportunity sends a strong reminder to donors that even a relatively small amount of money given through the Fund can create significant benefits for students right away,” Scherman said.

For more information, call Susan Scherman at 212-678-8176.



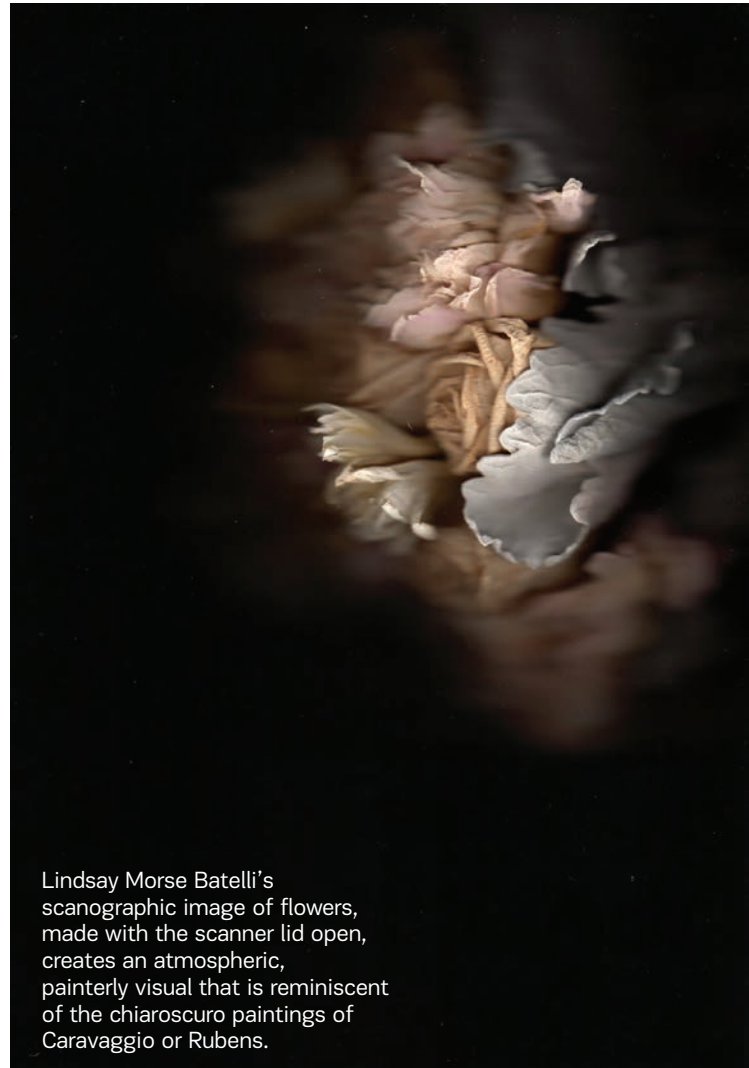
John Dewey

Media Ingenuity

EVERYONE EXPERIENCES THE WAY TECH HAS INFLUENCED the lives we live now: 'berrys and iDevices; tweets and likes; walls and feeds. The way we speak blurs subjects and verbs; the ideas engaged are one-liners, or so it often seems. But technology giveth, too. In the work displayed here, by students in TC’s Art & Art Education program, today’s tools offer a new way to think, work and dialogue visually with their art and the work of other artists.

These images were all produced using a scanner, a tool that employs a lightwand and optics inside a glass box to capture a picture of the objects it scans. In one sense, the journey to creation followed a traditional line, starting with ideas and ending with images. The unique beauty created en route, however, suggests that this new media landscape has deepened rather than attenuated our experience of art.

ERIK SPOONER



Lindsay Morse Batelli’s scanographic image of flowers, made with the scanner lid open, creates an atmospheric, painterly visual that is reminiscent of the chiaroscuro paintings of Caravaggio or Rubens.

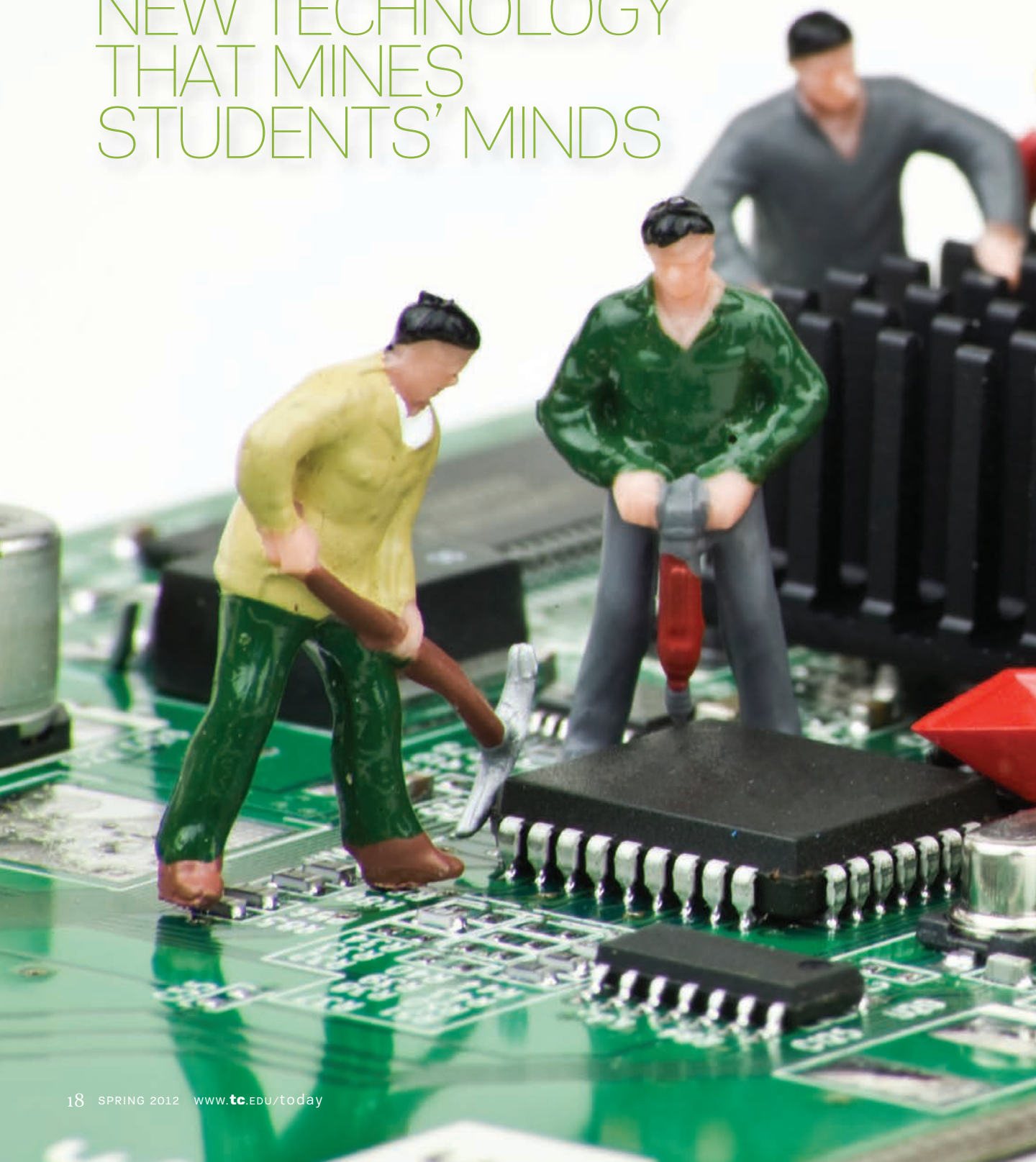
← In this work, Victoria Bertotti says she “wanted to explore the static scan with the dynamic aspect of the scanning bar as it moves across the scanner bed.” For Bertotti, the surprise was in how these flowers created a different kind of fabric in their appearance—like that of a layered dress. “These were single scans that I created by dancing and ‘crunching’ the plastic fake flowers across the scanner bed. As the scanner bar moved, so did I. I would move with the light, then stop and wait, and then perhaps move opposite the direction of the scanner bar—all on a whim!”

→ Weaver Nicole Yates’ work (right) always starts with thread. When it came time to examine scanography, “I naturally chose to use scraps of yarn as my subject,” says Yates, who calls weaving a “structured experience.” She adds: “My fascination with structure, geometry and sequence has allowed me to relate to and greatly admire Sol Lewitt’s wall drawings. This particular series of scans was inspired by his work with lines, in which he methodically plans and executes drawings that explore the concepts of time and construction.” Below, a snapshot of one of Yates’ frames just before the scanner passes by.



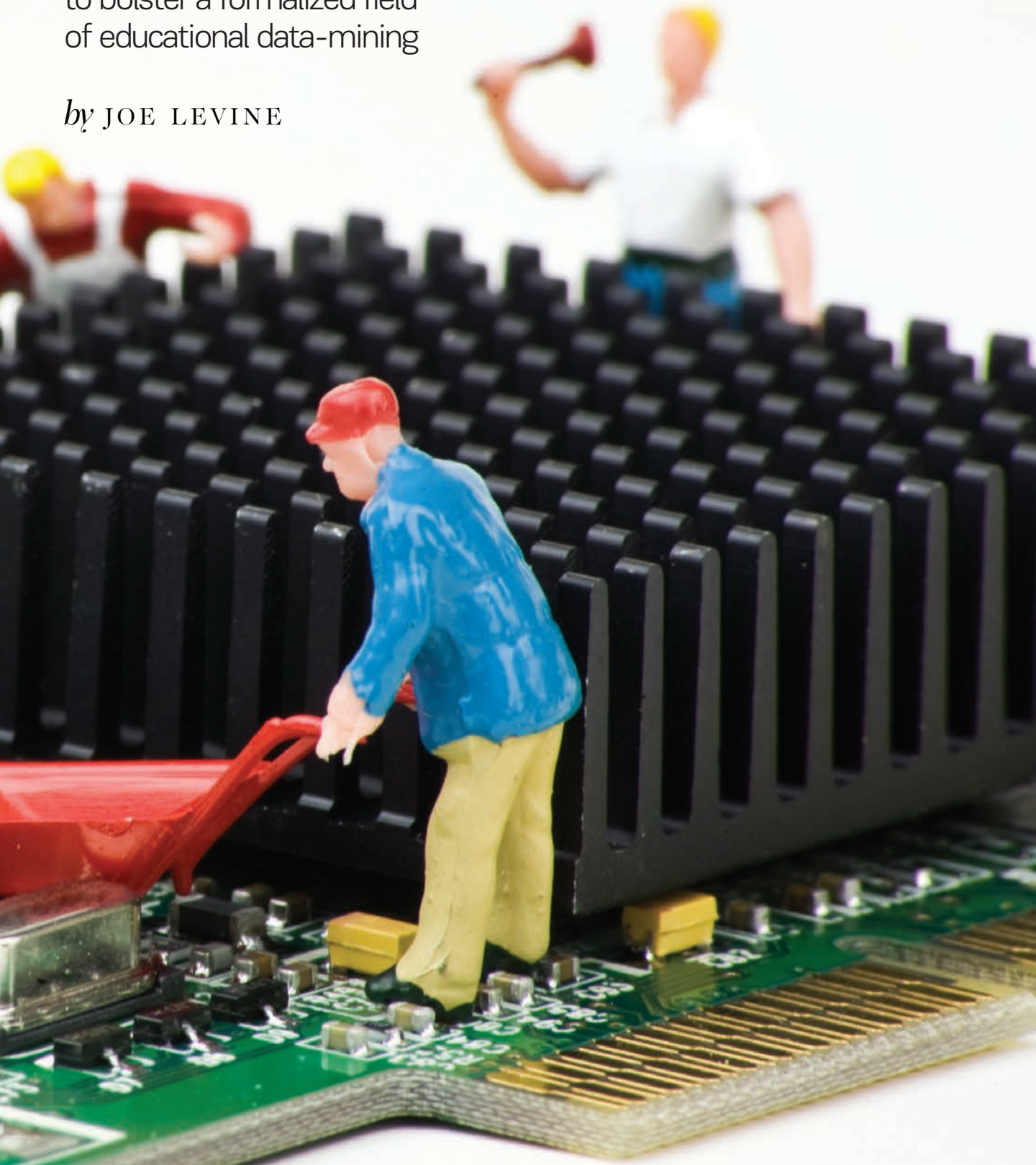
Gold Rush!

NEW TECHNOLOGY
THAT MINES
STUDENTS' MINDS



TC President Susan Fuhrman has convened an effort to bolster a formalized field of educational data-mining

by JOE LEVINE





T'S NO SECRET THAT TECHNOLOGY HAS ARRIVED IN EDUCATION. FROM middle school on up, kids live on their laptops. Classroom work is conducted on smart boards that allow the user to turn a square into a rectangle with the tap of a finger. Thanks to the Internet, an eighth grader writing a research paper can access the most sophisticated scientific findings without ever leaving her room. With toddlers using tablets and textbook apps, we can expect that more and more content will be delivered through technological tools. ¶ Now — with less fanfare, but with perhaps even greater potential benefit—comes the next wave of the revolution.

Over the past year, in her role as President of the National Academy of Education, TC President Susan Fuhrman has convened researchers and developers from around the world to bolster a new era of research based on the mining and analysis of data from adaptive education technologies (AETs).

These powerful new tools can perform many valuable functions, including assessing student learning and engaging students in exciting learning environments. Among the better-known AETs are:

- ▶ the Carnegie Learning Math Series, a core and supplemental middle-school curriculum that uses problem-centered activities and games that trade on sports, art, money, the environment and other topics of interest to motivate students to think about mathematical ideas;
- ▶ PhET Interactive Solutions, developed at the University of Colorado at Boulder, which provides simulations of physical phenomena to aid in visual comprehension of physics concepts;
- ▶ the Web-based Inquiry Science Environment (WISE), developed at the University of California, Berkeley, which provides access to a library of more than 50 weeklong inquiry assignments developed by partnerships of

researchers and teachers around the country;

- ▶ ASSISTments, a web-based application developed at Worcester Polytechnic Institute that generates sets of practice math problems geared to a range of skills. (See story about WISE and ASSISTments, page 22.)

But the potentially bigger news is that AETs also record a gold mine of as yet mostly untapped data that could redirect teaching strategies on a broad scale and improve the management of schools and school systems. AETs record every keystroke a student makes. Analysts can link students' performance in the games or simulations offered by AETs to specific teacher interventions. And AETs also aggregate data for whole classrooms and even entire school systems.

Prior to the meetings convened by Fuhrman, there had been few concerted efforts to establish a common framework for sharing and analyzing this information. Most of the data analytics work was being conducted by computer scientists, with little input from education researchers. With a veritable *Who's Who* of experts culled from universities around the world and companies such as Cisco, Pearson PLC, and Wireless Generation, Fuhrman's gatherings in Washington, D.C., took on historical significance.

To learn more about the Carnegie Learning Math Series, visit them online at mathseries.carnegielearning.com

“If we knew everything about students’ learning challenges, we wouldn’t need data. But there’s so much we don’t know, and the challenges that are directly visible to us are just the tip of the iceberg,” said Kenneth Koedinger, a cognitive psychologist and computer scientist at Carnegie Mellon University and Director of the Pittsburgh Science of Learning Center.

Just as the Human Genome Project has enabled scientists to begin developing treatments that target the underlying genes and proteins that govern our biology, data-mining from AETs could help education researchers design curricula and teaching strategies that are more directly calibrated to an understanding of human cognition.

Interactions between people and adaptive technologies generate valuable data about how individuals think, decide and learn. Hence, the ability of companies such as Amazon and Facebook to suggest new books and other products that you might be inclined to buy, or of your laptop to anticipate email addresses that you frequently use.

Indeed, the past decade has seen the emergence of an entirely new field of computer science called “knowledge discovery in databases,” or KDD. The focus, whether in business, science or other areas, is on the “secondary analysis” of vast amounts of data computers record on user behavior that may not previously have been directly targeted by a specific study. Perhaps the best recent example of commercial data-mining research was the Netflix Prize competition in 2009, in which independent researchers vied to create a better algorithm for predicting viewer preferences. The competition was managed and judged by Charles Elkan, a University of California, San Diego, computer science professor who runs an annual data-mining competition of his own for students and postdoctoral researchers.

Now, versions of the Netflix com-

Interactions
between people
and AETs
generate
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decide
and learn.

petition have begun to spring up in education. “Secondary analysis is critical for making education a more scientific field than it currently is,” says Allan Collins, Professor Emeritus of Education and Social Policy at Northwestern University. “In certain fields, like children’s language, developing archives available to lots of researchers was a critical step in

getting more people talking to one another. That provides a grounding that lets a field advance in a way it can’t when people are simply doing their own things.”

Hence the excitement at the two meetings convened by Fuhrman in Washington, D.C.—a gathering in May 2011 of 40-odd leading researchers and a larger meeting this past December that included a wider array of representatives from gaming companies and software developers. Colorado Senator Michael Bennett, a noted technology enthusiast who recently introduced a plan to “turbocharge education R&D,” was also in attendance.

First and foremost on the agenda of both meetings was the “Tower of Babel” problem—the current lack of common standard formats for archiving research data, which prevents investigators from accessing one another’s study data for making comparisons, conducting meta-studies,

Data entré



or teasing out new correlations. With the advent of data repository centers, such as DataShop, at the Pittsburgh Science of Learning Center (see story on page 28), common formats are beginning to emerge—but the bigger challenge is getting researchers to think about data-sharing up front, so that archiving is built into the process.

The groups also discussed issues of study design, primarily the relative merits of a theory-driven experiment that seeks to test a specific hypothesis versus a large mining study that simply correlates performance with one factor or another. The consensus? Both approaches are necessary, and neither alone is sufficient.

Other discussions focused on a range of topics: whether and how to draw on digital gaming, an industry that has clearly learned how to engage users, but not always with educational results in mind; how to know whether teachers and students are implementing intelligent tutoring technologies in the ways originally envisioned; and how to identify “noisy data”—patterns that turn out to be artifacts created by the technology, rather than genuine representations of significant human behavior.

There was also considerable debate over how to secure the privacy of students and grapple with the proprietary interests of commercial technology companies. For example an idea that has been championed by a team led by Gary Natriello, TC’s Ruth L. Gottesman Professor of Educational Research, is to ensure that data includes identifying information about individual students only within a student’s school, while data fed into any central repository would be stripped of identifying information.

At the conclusion of a comprehensive background paper he wrote to anchor discussion at the meetings, Natriello presented a vision of the future in which intelligent tutoring systems come into widespread use, giving rise to “a new generation of researchers who blend the skills of educational research and systems development,” and who bridge the worlds of learning theory and technology. To that, the participants offered a heartfelt *amen*. **tc**

PUSHING THE *Right*

Teachers have long struggled to understand the learning issues of each individual student. Now technology is helping them do the job. Who knew?

By Joe Levine

It’s 6:30 a.m., and over her morning coffee, Christine O’Connor, a middle-school math teacher in Shrewsbury, Massachusetts, is reading a computer-generated email that’s telling her how each of the 26 students in her algebra class fared on last night’s homework assignment, which involved a series of one- and two-step problems. Here is what she knows with one click of the mouse: Two students didn’t even attempt the assignment, the rest of the class spent between 11 and 35 minutes on the work, and 87 percent of the class got stuck on problems 10 and 11.

That is a lot of data to digest at this early hour, but knowing where every student stands gives O’Connor a jump on her day and the edge in class, where she will devote the first 10 minutes to focusing on the two problems that gave almost everyone trouble.

“This has changed how I teach,” O’Connor says. “It saves me at least a couple of hours a week.”

“This” is ASSISTments, a web-based application developed by Neil Heffernan, a computer scientist at Worcester Polytechnic Institute and former eighth-grade math teacher. Hosted at WPI but run in middle-school and high-school students’ browsers with no installation needed, ASSISTments is neither an online curriculum nor a substitute for direct teacher instruction. Rather, it is an intensive practice tool that reinforces and builds upon what teachers already do. The system performs many valuable tasks: generating sets of practice math problems geared to a range of skills; providing cues to students when they cannot answer problems correctly; sending teachers same-day reports on students’ progress, along with aggregated reports about how the entire class is



BUTTONS

doing; furnishing additional assignments in which students either practice specific sub-skills or move to the next level of difficulty; and enabling teachers to communicate weekly or even daily with parents about how their children are doing. There's even an open-response function, which prompts students to describe the logic they employed in tackling specific problems.

O'Connor, who works primarily with English language learners, is a big fan of ASSISTments. "I can explain to them about 'there,' 'their,' and 'they're,' assess their vocabulary, test their ability to restate problems or refer to diagrams," she says. "It puts all their skills on display."

ASSISTments is just one of an emerging new class of teaching tools known as intelligent tutoring systems or, more broadly, adaptive education technologies (AETs). Most intelligent tutors are instructional tools. But where some are designed to be "teacher proofed"—set up so students can work alone, with the computer in charge—ASSISTments empowers teachers to conduct formative assessment, so that they can alter their instruction from day to day based on the real-time insight the technology is providing them about students' perceptions and misperceptions.

That kind of insight typically eludes even the most knowledgeable observers, including Heffernan, who likes to recall the moment

"Predictions are the *ideas* students have already constructed, so constructivist learning needs to *start with these ideas.*"

—MARCIA LINN,
PROFESSOR OF
COGNITION &
DEVELOPMENT,
U.C. BERKELEY,
GRADUATE SCHOOL
OF EDUCATION



Find out more about ASSISTments at assistments.org

a few years ago when a houseguest—a cognitive scientist visiting from Australia—picked up his son's fourth-grade math homework and pointed out that it reflected a consistent subtraction error.

"He said, 'Look, he's confused about borrowing across the zero in the tens place,' which the literature has identified as one of the most common misconceptions about subtraction in kids that age," Heffernan recalls. "My wife and I were a bit mortified. And then, being busy people, we compounded the problem because we forgot to flag it for the teacher."

Intelligent tutoring systems have emerged thanks to faster web connections, better servers and improved programming languages, such as Javascript and Ajax, that let users run complicated functions within a web browser at no cost. Many of the new tools are the product of open-content authoring, a Wiki-like environment in which designers can link to other programs and libraries of problems and assignments on the web.

Many systems are open-source and offered for free, reflecting the fervent egalitarian philosophy of the community that has produced them. Marcia Linn, a professor at the University of California, Berkeley, spent 20 years researching how young people learn science and how scientific visualizations can contribute to the process. She and

a colleague, Jim Slotta, eventually built the Web-based Inquiry Science Environment, or WISE. The program includes access to a library of more than 50 weeklong inquiry assignments developed by researchers and teachers around the country, spanning a range of topics such as chemical reactions, global climate change, photosynthesis, recycling and plate tectonics.

Heffernan resolved to build ASSISTments six years ago after being told he had terminal cancer, a diagnosis that, to date, happily has failed to materialize. He has tapped at least one retired teacher to help create new problem sets and hints that he can incorporate into the system, and he hopes at some point to visit retirement communities to recruit others to lend their skills and expertise.

Intelligent tutoring systems vary in content and focus, but they seem to share the decidedly Deweyan philosophy that learning best occurs when learners draw on their own experiences in order to make sense of the world.

WISE, for example, employs a “knowledge integration approach,” which is premised on the idea that, whether they realize it or not, young people enter a classroom with their own repertoire of what Linn and Slotta call “rich, confusing and intriguing ideas” about how and why phenomena occur. Right or wrong, those ideas become the starting point for inquiry because they have direct relevance to students’ lives. Students often use scientific research skills such as observation and experimentation to develop incomplete ideas such as “Objects in motion come to rest.” The goal of each WISE project, then, is to get students to articulate their initial thinking, to test it to see where it falls short of reality, to refine it—and then to repeat the cycle, again and again, in order to arrive at a progressively fuller understanding.

The act of prediction is critically important in this iterative process



Find out more about WISE at
wise.berkeley.edu

because it forces students to make their ideas “visible” to themselves and to their teachers. Or, as Linn told listeners at a conference on educational data-mining convened last May by TC President Susan Fuhrman, “Predictions are the ideas students have already constructed, so constructivist learning needs to start with these ideas.”

Predicting is not sufficient for learning, though. Students also need to add new, accurate ideas. Yet phenomena such as global warming and albedo (the fraction of solar energy reflected from Earth back into space) are often too complex, or occur over too long a period, for students to make sense of or visualize. WISE offers a number of nifty features that get around these limitations. Students can experiment with an interactive global warming visualization to test their conjectures. They can use the WISE Data tool to draw several different kinds of graphs using their data points and then modify them based on new results. They can use WISE Draw to, say, sketch predictions of a temperature graph, map the location where they think an invasive species might appear, or construct a model of hydrogen combustion at the molecular level. With a tool called the Idea Manager, they can generate ideas and then visually categorize pieces of data and evidence according to the viewpoint or argument they buttress. Students can use MySystem to create a concept map with arrows that show the order of connection between different causal factors. And through a threaded Discussion Forum, they can talk to one another. These discussions accelerate learning in two ways: One, those who “get it” can often appreciate or more readily relate to a misconception that a peer holds; and two, they avoid the standard classroom format in which the so-called smart kids do all the talking.

Another feature of WISE is a “Show All Work” icon that enables

As the field hammers out
a common format for archiving data,
it will be possible for researchers
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the classroom or met any students
to draw conclusions based
on secondary analysis of information.



the student or teacher to access, at any time, a page showing all of the student's work, providing teachers with an invaluable window onto his or her thinking. Teachers can access student work in real time, flag ideas for class discussion, assign grades and send comments.

"The detail you get is so different from the knowledge you get from just teaching from a textbook or looking at a year-end test, which doesn't tell you where students' knowledge and understanding broke down," Linn says.

The benefits of intelligent tutoring systems like ASSISTments and WISE to teachers and students are obvious. At the same time, researchers like Heffernan and Linn are equally excited about these systems as research tools that could improve instruction and school management on a system-wide or even nationwide basis. The systems record every keystroke that a student makes. In many instances they can recognize and tag certain sequences of keystrokes as successful or unsuccessful attempts to implement defined skills. And they can aggregate data for groups of almost any size.

These features, Heffernan says, are "ideal for enabling researchers to conduct randomized, controlled experiments of large numbers of students." And as the field hammers out a common format for archiving data, it will be possible for researchers who have never entered the classroom or met any students to draw conclusions based on secondary analysis of information from these studies, or to construct meta-studies that pool information from many experiments.

For example, with Ryan Baker, another WPI faculty member, Heffernan has received a National Science Foundation grant to analyze whether young students' level of engagement with math, as measured by certain ASSISTments-generated indicators, can be used to effectively predict whether these same students will go on to pursue careers in the so-called STEM fields—science, technology, engineering and math.

The project will follow students into college and the workforce (and also look at their academic records going back as far as seven years), correlating predictions with survey measures of vocational interest, self-efficacy, math attitudes and choices of college majors, as well as job placement. The hope is to ultimately establish guidelines for identifying and intervening early on with "at risk" students in these subjects, as well as to recognize gifted students and accelerate their progress.

For Andrew Burnett, a middle-school math teacher in Millbury, Massachusetts, who uses ASSISTments, it all gets back to an issue he has struggled with throughout his career.

"As a teacher, I think I'm good at a lot of things, but my weakness has always been differentiating my instruction to help all my students in the areas they need. Now, with ASSISTments, I can have students practice math questions on the same topic but with different numbers. Plus, I don't need to grade the practice work and pinpoint areas of weakness anymore, because ASSISTments does that for me. It's honestly made me a better teacher."

tc

How Old Are You NOW?

Asking the right questions
to assess math knowledge in kids

BEAR MADE A BIRTHDAY WISH: He wants you to count to a really big number because that's how many presents he'll get today."

So begins *The Birthday Party*, a math skills assessment tool created by TC's Herbert Ginsburg, the Jacob H. Schiff Foundation Professor of Psychology and Education. *The Birthday Party* addresses two challenges unique to the preschool milieu: Very young children will submit to an assessment only if they enjoy it, and their answers typically require additional probing and interpretation.

"In very young children, learning is informal, often through play, so a quality assessment has to be adaptive," says Sandra Pappas, a former student of Ginsburg's who is Project Director for *The Birthday Party*. "Often there's more to children's knowledge than you'd think because they're not just learning about number operations but also about shape, pattern, color and space. *The Birthday Party* taps those skills, and it's also a form of professional development that

broadens teachers' views of what constitutes math knowledge and skill."

Put in simplest terms, *The Birthday Party* is an interview that teachers can conduct one-on-one with students, aided by computer prompts. The tool includes a flip-book that offers hints on how to cajole tongue-tied children to speak; how to recognize the seeds of understanding in a seemingly vague or confusing answer; and how and when to challenge a correct answer that may mask fundamental misconceptions or guesswork.

For example, a child may not answer "triangle" when asked to identify a three-sided shape but may, with prompting, be able to say that it *is* three-sided and that other shapes listed as possible answers are not. Or she may be able to count in sequence but may not yet have grasped the principle of cardinality—that is, that the last counting word (say, five) represents the numerical value of a whole set of objects (five apples).

The questions and hints offered by *The Birth-*



Herbert Ginsburg

day Party are based on extensive research—much of it conducted by Ginsburg, who has spent thousands of hours observing young children in classrooms and at play. Teachers administering the assessment can log on to a site to watch videos of children behaving in ways that demonstrate specific forms of mathematical understanding and misconception, as well as clips of Ginsburg himself discussing the cognitive basis of his work. The Birthday Party also feeds assessment data to an online archive that is searchable by child, classroom or school.

The Birthday Party is still being developed, and plans for distribution are not yet in place. But Ginsburg—who has authored a widely admired curriculum called Big Math for Little Kids and collaborated with a software company on another assessment—is an eloquent spokesman for his work. As he put it in a television interview last year, “Our approach is that we need to build math instruction on the knowledge that the kids already have.”

J L



Cheap Data

A repository for information generated by the new education technologies stands as a model for the field

IT'S CALLED DATASHOP, and it is probably the world's largest repository of data generated by intelligent tutoring systems. Based at the Pittsburgh Science of Learning Center, which is funded by the National Science Foundation, DataShop boasted, as of this past February, some 192,000 hours of student data from studies around the world. (Student actions are recorded roughly every 20 seconds, and the data in DataShop are longitudinal, spanning semester or yearlong courses.) At the most detailed level, that data reflected 71 million individual "transactions," or computer keystrokes, made by students. No names are linked to any of the data, and researchers who hold accounts can decide whether to make their data accessible to others or keep it private.

Yet DataShop's most impressive accomplishment may be that researchers who use it are compelled to put their data into a standardized format—which means that, should they choose to share that information, other investigators will be able to use it for comparisons, meta-studies or even secondary analysis. DataShop thus makes it possible for researchers to test their hypotheses without the bother and expense of ever entering a classroom.

This does not mean that the proprietors of DataShop (or anyone else in the field) have yet

cornered the market on how to actually make use of all that information. In fact, in 2010 DataShop hosted the annual competition of an organization called SIGKDD (the Association for Computing Machinery's Special Interest Group on Knowledge Discovery and Data Mining), challenging teams from around the world to analyze a year's worth of data from 9,000-plus algebra students to predict the students' future academic performance. The sample was so large —9 gigabytes—that only 130 of the 600 teams entering the contest successfully submitted a possible solution. (Although the competition has since ended, its website is still open and people are still using it.)

"The issue is how to create algorithms that can turn millions of data points into information that educators can use," says John Stamper, a Carnegie Mellon faculty member who is DataShop's Technical Director.

At a presentation by Stamper at the first of two conferences on educational data-mining convened by TC President Susan Fuhrman in Washington, D.C., researchers were uniformly enthusiastic about being able to access data from other studies. Still, they saw plenty of room for improvement.

"One problem with secondary data analysis is that it's secondary," said Kurt Van Lehn, Professor of Computer Science and Engineering at Arizona State University. "The people doing the secondary analysis weren't there. So if DataShop could be a video recording shop, too, that would be great. Otherwise you risk getting theories that are not grounded in the reality of what was going on when the data were recorded."

J L

WHY WE STILL NEED HUMANS DEPT.

States were collecting a mountain of school data that no one looked at. Priscilla Wohlstetter is using it to learn what makes charter schools tick



Over the past decade, the federal government has required states to develop vast, sophisticated computer systems for tracking school and student performance, part of the general push for greater accountability in education. The result, attests Priscilla Wohlstetter (TC's Visiting Tisch Professor in 2010-11 and now a Visiting Professor), has been either a goldmine of data or a national case of "too much information," and sometimes both.

Several years ago, Wohlstetter—the Diane and MacDonald Becket Professor in Educational Policy at the University of Southern California's Rossier School of Education, and Director of USC's Center on Educational Governance—was approached by a group of California charter school leaders with a problem. Under state law, they were required to submit reams of "compliance data" on their schools' finances, demographics and academic results, information that, in theory, could explain why some schools' students might be performing poorly on standardized tests. But as representatives of relatively new schools, where cultures of success were not yet fully entrenched, these school leaders knew that improvements in test scores take several years. Could Wohlstetter help them develop additional indicators of performance and growth?

As Wohlstetter and her team began sifting through the state compliance data, she realized that no one had ever looked at most of it, let alone tried to transform it into useable information. She also realized that she now had a new window onto a central question in her research: What makes good charter schools good?

"People say charters are preparing students for the 21st century, but we're here now—it is the 21st century—and these schools are still black boxes to a large extent," she says. "We know that many of them employ project-based learning, have smaller classes and use a lot of technology, but we don't really know how that plays out with respect to performance. So we began looking at all these data points—the finest grains of sand, really—to see how we could turn them into meaningful indicators of performance."

The result was the 2006 launch of the School Performance Dashboard, a comprehensive annual performance assessment of each of California's more than 900 charter schools. Assessments are based on 12 indicators, ranging from standard measures such as Average Yearly Progress to metrics of the Center's own devising, such as School Productivity and Academic Momentum. The Dashboard, which last year included a first-ever ranking of California's top 10 charter schools, has come to be regarded as the most comprehensive and substantive effort of its kind.

Indeed, one of the top 10 charters used its ranking to build a case for a high bond rating. The school eventually received the bond and used the money to construct a new building.

The Dashboard now also includes an interactive website that users can employ for a number of



Priscilla Wohlstetter

purposes. These include comparing individual schools over time, checking the performance of a specific school that one's child attends, looking for foundations that invest in charter schools, finding a job at a charter school, and providing evidence for charter school authorizers who are considering whether to renew or revoke a school's charter. Meanwhile, Wohlstetter is working on expanding the Dashboard to other states.

"The key is to work with stakeholders in each state in developing different indicators, because each state values different things," she says. "In California, the performance of English Language Learners is very important. In Louisiana it is not; they are very focused on special education and college readiness."

The Dashboard also takes pains to distinguish between value-laden indicators—clear-cut "more is better" factors, such as the number of highly qualified teachers in a school—and neutral information that's of interest to stakeholders but depends on other factors for a positive or negative impact.

For example, Wohlstetter says, "We'll report on how many computers a school has, but we won't attach a value to it, because as many principals have pointed out to us, you can have a whole bunch of computers sitting in the back of a room gathering dust, and you can have a classroom with no computers where the kids are very productively engaged in learning."

J L

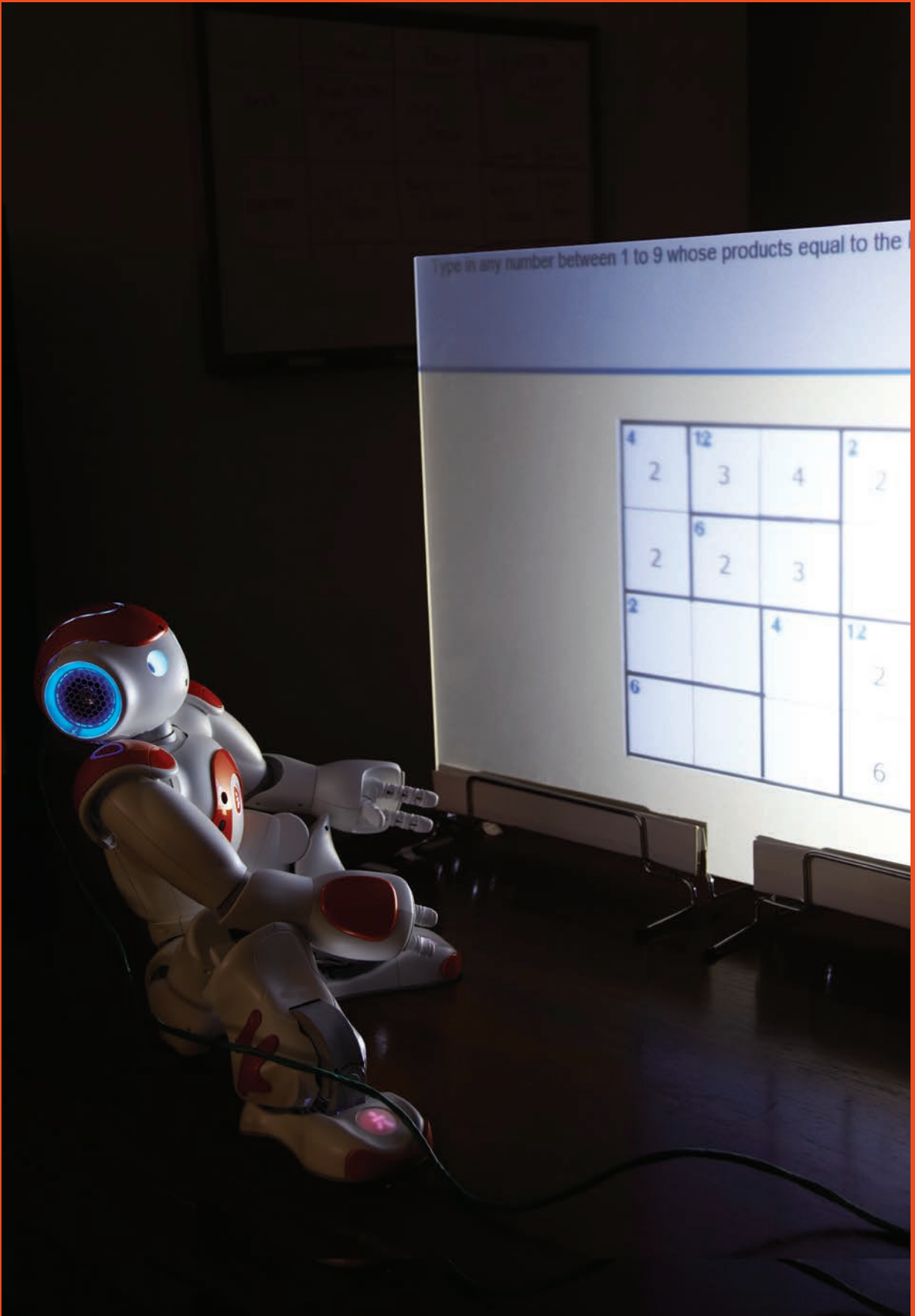
ROBOTS WRONG

that get it

To err is human—but machines can do it, too. Sandra Okita believes we can learn from their mistakes

by PATRICIA LAMIELL

photography by SAMANTHA ISOM



ON A RECENT AFTERNOON IN TCC'S HUMAN ROBOT INTERACTION AND LEARNING LABORATORY,

an 18-inch, white plastic robot named Projo was staring, with lightbulb eyes, at some math problems on a computer screen.

"Hi, Projo, how's it going?" Sandra Okita, Assistant Professor of Technology and Education, asked the robot casually. "We're going to be math buddies today."

"What happens if I get something wrong?" Projo asked in a wispy, plaintive voice. "I don't want to make mistakes."

As it turned out, Projo (short for Projective Agent) was able to solve the problems, and he drew a plastic hand across his forehead in relief when Okita praised him for a job well done. But in many ways, his potential fallibility was the point. Okita and her students write programs for robots and avatars—virtual characters animated by humans through computers—to help small groups of learners (mostly elementary- and middle-school students) practice sets of problems in English, math, biology and other subjects. On the one hand, the artificial critters can assume the efficient, machine-like role you might expect, monitoring kids as they progress through their lessons and tracking the problems they get wrong, prompting

repetitions with the patience that perhaps only a machine could summon. But on the other hand, the robots and avatars that Okita designs can also make the same mistakes students make—a highly valuable service that reflects Okita’s belief that learning, at its best, is a social enterprise.

“The key phrase across all my projects is ‘peer learning,’” Okita says. “Peer learners either teach us something we didn’t know or mirror back to us something about ourselves. Sometimes the peer is human, sometimes it is an agent or avatar or a computer graphics character that resides inside a computer. Sometimes it’s a physical robot.”

Why use technology to approximate human roles? For starters, as demonstrated by Okita and two collaborators from Stanford University—TC alumnus Daniel Schwartz of Stanford’s School of Education (see story, page 59) and Jeremy Bailenson of its Department of Communications—children love working with nonhuman peer learners. Kids identify with robots and virtual characters that they create or customize, and they make imaginative leaps when working with them. Peer learners also generate data that teachers can analyze to see which problems are the most difficult for individual children or an entire class.

“Projo has an assessment side to him and also helps kids self-correct their math calculations,” Okita says.

Then, too, she adds, human peers can’t always be available and may not be at the ideal learning level—slightly, but not too far, ahead of the student—to be of maximum benefit. And while human peers or teachers can do their best to make information accessible, they may lack the time or expertise to verify that the student has actually learned it.

One powerful technique for making such a determination is by behaving humanly—specifically, by replicating a student’s own mistakes. Imagine a sixth grader who learns a certain math concept at school, Okita says, under the guidance of a teacher. He logs in later at home and, with the help of a personalized computer ava-

tar (which he may have designed and named, or downloaded from the Internet and customized), he reviews the day’s math problems and takes a quiz. All of this is good practice and will help strengthen existing skills. But now comes the twist: The avatar, too, can take the quiz, make the same mistakes that the student is making, and provide the student with an opportunity to make corrections. It is a variation on the old adage that the best way to learn something is to teach it to someone else.

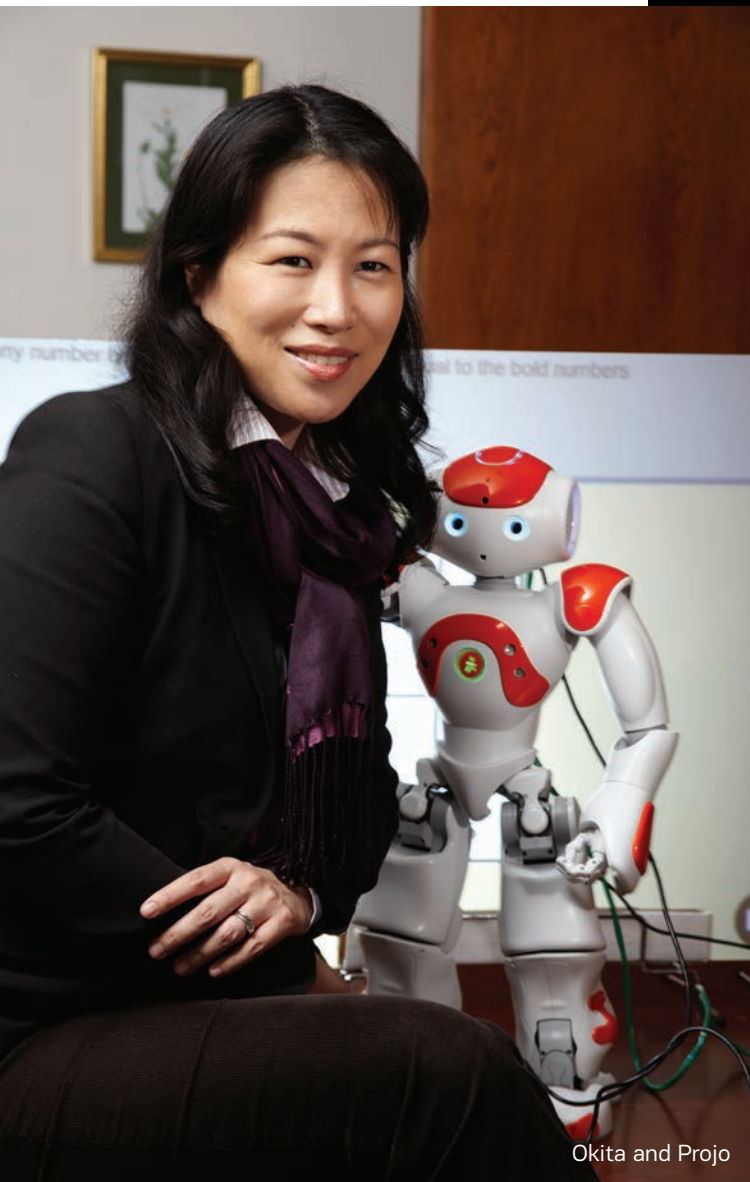
“I really believe that an influential educational technology isn’t the kind that’s infallible, but instead, the kind that is most human,” Okita says.

The concept of using robots and computers in educational settings began in the late 1970s, triggered in part by the endearing androids of *Star Wars*, R2-D2 and C-3PO, which spawned an entire industry of robotic toys and educational games for children. At that time, robotic science was already evolving as a higher-education discipline in which engineers and computer scientists pursued the development of increasingly intelligent, sophisticated robots and avatars, mostly for manufacturing and military use. In subsequent campaigns reminiscent of the United States’ Sputnik-era competition with the Soviet Union, private businesses began sponsoring contests to encourage children to learn to build and program robots.

Still, robotics remained the domain of the physical sciences until the 1990s, when cognitive scientists started to explore how humans interact with robots. That line of inquiry heated up when avatars entered the educational and recreational computer-game scene. At first they were off-the-shelf, online figures that could be downloaded, “claimed” and sometimes named by a gamer who controlled them anonymously in cyberspace. But by the early 2000s, gamers could create their own avatars as alter egos and control them, still anonymously, in online games and virtual communities. Psychologists and educators became interested in avatars as representations of a person’s identity, fantasies



Projo takes a load off.



Okita and Projo

“I REALLY BELIEVE THAT AN INFLUENTIAL EDUCATIONAL TECHNOLOGY ISN’T THE KIND THAT’S INFALLIBLE, BUT INSTEAD, THE KIND THAT IS MOST HUMAN.”

—SANDRA OKITA, ASSISTANT PROFESSOR,
TECHNOLOGY AND EDUCATION

and ego, and robotics and computer science began to attract researchers like Okita, who holds a doctorate in educational psychology.

Around 2005, Okita began to add her voice to the academic study of human-robot interaction. Previous computer research had focused on giving robots superhuman memory and infallible computational skills, and on imbuing avatars with extraordinary physical prowess. Building on the premise that peer learning can be the best way to teach and absorb knowledge, Okita and a small number of education researchers began asking whether students would do better with a robot that behaved more like a human. Would the robot be more effective, they asked, if it maintained eye contact for a longer period? If it mimicked human gestures or voices even more closely? If it actually made a mistake?

When Okita joined TC’s Mathematics, Science and Technology Department in 2008, John Black, the Cleveland E. Dodge Professor of Telecommunications and Education and Chair of the Department of Human Development, was pursuing a very similar line of inquiry. Black’s research focuses on grounded, or embodied, cognition and the theory that learning is most successful when it is reinforced or even precipitated by a physical experience—or, as Black puts it, when the learner is able to “create both a mental and perceptual simulation of a concept or process” (see story, page 48).

“Simulation” is the key word here, because it implies comparison and the reconciliation of difference, as with someone fitting a shape to a preexisting space. For example, using technologies based on the concept of grounded cognition, a dancer or athlete might digitally capture his or her own movement, then overlay it against a move perfectly executed by an on-screen avatar to compare the two. Or a learner could execute physical gestures that direct an avatar to do something, such as stack and count a group of blocks on a screen, and then observe how well those directions play out. In both cases, the avatar acts as a peer learner, and the gestures by which the student moves the avatar serve as a physical reminder of the process.

Okita is studying which virtual peer learners, programmed to be humanly imperfect, are the most helpful in encouraging grounded cognition, and she also is teaching educators how to use them. In Tokyo last summer, she worked at the Honda Research Institute, designing and testing robots for educational settings.

“Technology and robots present an array of interesting design choices when modeling inter-

actions with human learners,” she says. “Isolating features through empirical studies can help us examine the cause-and-effect relationship, which can help in designing interventions that contribute to human learning and behavior.”

One important finding, made by other researchers and emphatically corroborated by Okita, is that it is not good for a robot or avatar to be *too* human. Researchers describe a phenomenon they call “the uncanny valley,” in which a robot mimics human behavior or appearance so perfectly that people of all ages become uncomfortable and children become afraid. Hence the importance, particularly with young children, of leaving room for the imagination by designing robots and avatars with cartoonlike or exaggeratedly robotic features.

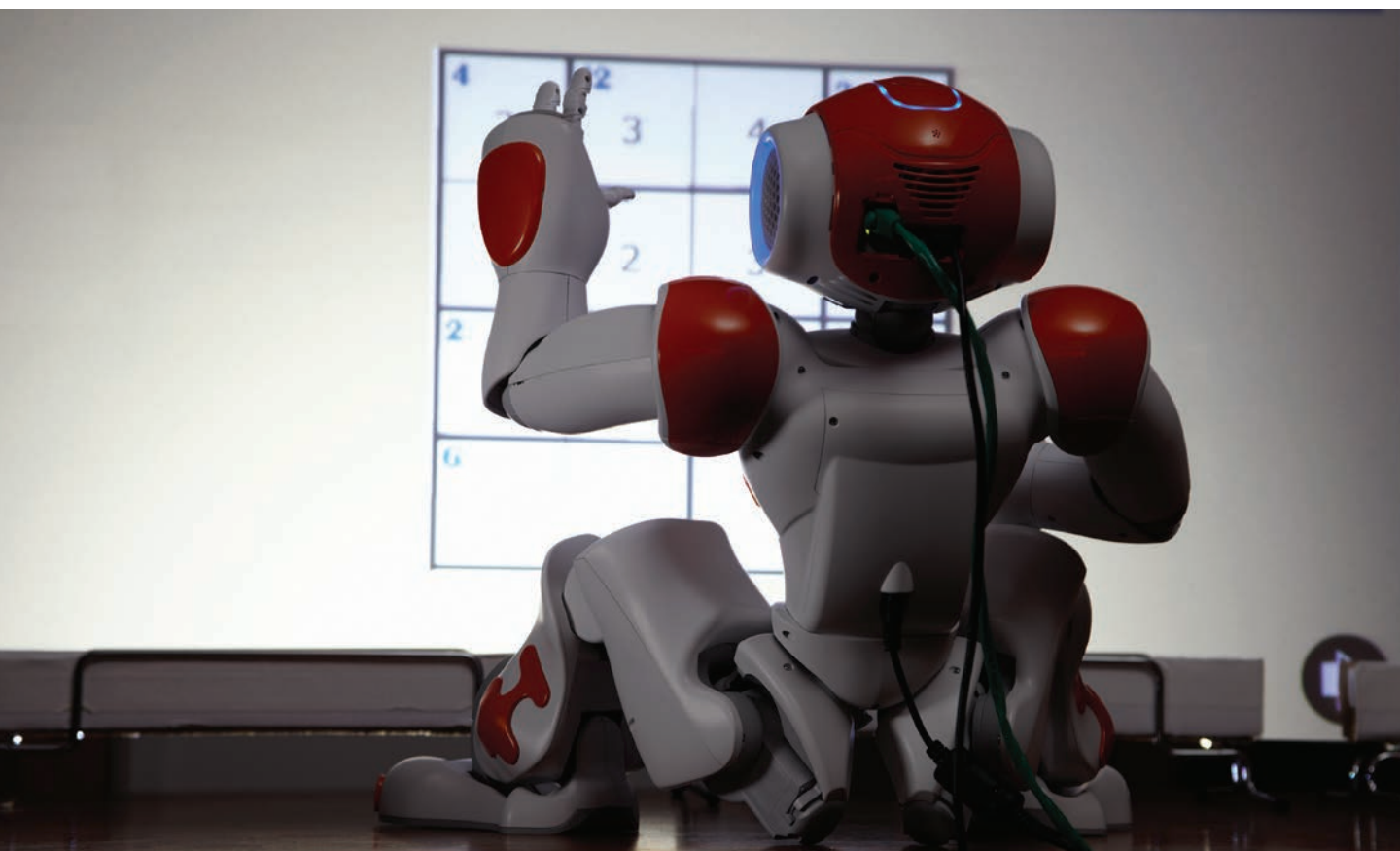
In addition to their work with robots, Okita and her students in the Instructional Technology program (who are also studying with Charles Kinzer, Professor of Education) are designing instructional avatars for the Second Life virtual world and testing them with children. The aim is to discover which avatar and robot features, and what level of customization, are best for young learners. The team initially tested the effectiveness of learning from the teaching of a human peer. Then they tested how students fared with

virtual peer learners. The next step, Okita says, is to see how well humanoid robots like Projo perform as peer learners for students.

Ultimately, the goal is to find what Okita calls “the sweet spot” in technological design in order to determine how finely one can calibrate the responses of avatars and robots to human commands, and how humanlike to make them in order to be most effective while avoiding the uncanny valley. Currently Okita is looking for funding to support this research.

Of her students, Okita says, “We’d like to develop the next generation of robot programmers, to learn how to design human-to-robot interactions.” She believes that robotics can be used as an effective and exciting vehicle to get elementary- and middle-school students interested in the type of work she herself is doing.

As excited as she is by what technology can do in encouraging learning, Okita keeps its power in perspective. She is first an educator and researcher for whom learning is paramount, and it is learning—not technology—that drives her work. “The curriculum should always be at the center of whatever technology you use,” she says. “Technology should support your curriculum—not the other way around.” **tc**



BETTING
THEY'D
RATHER

PLAY

THAN

SMOKE

A digital game developed by TC students
could help end that three-pack-a-day habit

by PATRICIA LAMIELL



A SELF-IDENTIFIED SMOKER SITS QUIETLY IN THE computer lab conference room in Thompson Hall, playing a digital game with an iPhone. She could be a student on break between classes, except that she sprouts dozens of wires from an MRI cap, an electrocardiograph and a skin conduction device on a forefinger. The wires transmit readings of her brain activity, heart rate and skin response to be graphed on a laptop computer. ¶ The object of the game is to blow into a microphone attached to headphones in order to prevent a shiny spaceship icon on the screen from sinking. Short, shallow breaths move the icon up; long exhalations make it hover. The subject does well at first, but after a good start at breathing rhythmically, she struggles to stay on pace, sending jagged lines up and down the multicolored graph on the laptop screen. TC doctoral student Adrienne Garber calls time. ¶ Garber and fellow doctoral student Jessica

Mezei are testing Lit2Quit: A Game Intervention for Nicotine Smokers, which they created for the iPhone with several other students in the Advanced Game Design seminar taught in the Communication, Computing and Technology in Education program by instructor Jessica Hammer. Specifically, they want to see whether playing Lit2Quit can simulate the two primary perceived effects of nicotine smoking on the brain and body: relaxation and stimulation. Relaxation is evoked in Lit2Quit by slow, measured breathing and game play along with calming music, colors and graphics; stimulation is provided by rapid breathing and game play as well as stirring music, colors and graphics, which increase brain activity, heart rate and electrical conduction on the skin. The hope is that Lit2Quit will someday be commercially packaged as a cigarette substitute and that, to borrow from the old Tareyton cigarette commer-

cial from the 1960s, people would rather play than smoke.

As focused as they are on game design, the creators—Garber, Mezei, Pazit Levitan, Azadeh Jamalian and Dan Rabinowitz, as well as Nisha Alex and Rosanna Lopez—are education researchers first. They broadly define *education* to include any input that modifies human behavior. Underlying their work on Lit2Quit is the question “What makes games uniquely useful for education?” In this sense, TC stands out in the computer design world. Game design is a huge field, and educational game design is a burgeoning one, but both are still dominated by computer programmers and engineers. The guiding principle at TC, says Hammer, is to create games with educational value that are grounded in proven cognitive science and pedagogy. Or as Garber puts it, “Learning theory drives our design decisions.”

Lit2Quit reflects the approach of the project’s principal investigator, Charles Kinzer, Professor of Education and Director of TC’s Communication, Computing and Technology in Education program as well as its Game Research Lab in the Department of Mathematics, Science and Technology. (See story, page 42.) “There is something inherently motivating in the use of technology,” says Kinzer, who researches the social as well as cognitive principles of learning. He believes that research on gaming, which is popular across all age groups, might help educators learn what it is about digital games that makes people love to play them. Kinzer hopes that once they learn that, researchers can leverage the games’ blockbuster popularity to build successful instructional systems and behavior modification programs that work.

Perhaps unique in the country, TC’s game design classes draw graduate students from diverse disciplines and programs. Some have little

or no grounding in gaming or even technology but see the potential of these tools for teaching and learning.

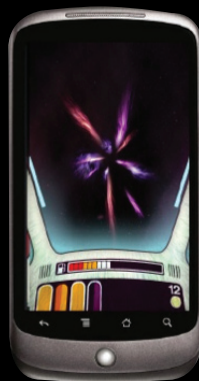
And Lit2Quit's design team is as interdisciplinary as they come. Garber is a former attorney who worked on educational game licenses before coming to TC. Levitan is an award-winning independent film producer. Jamalian has a background in systems engineering and developed (with Hammer) a smartphone game for preschoolers called BoogieBash, which received a certificate of innovation from the Cooney Center at Sesame Workshop.

"At TC, we are culturally about teaching people," Hammer says. "The program says it's OK if you come in without design skills; you can learn them."

It was in this spirit that in the fall of 2009 Hammer issued a challenge to students in her Video Games in Education class: Divide into teams and write a funding proposal for an educational video game tied to health care. One team came up with Lit2Quit, and what began as a classroom exercise quickly became part cognitive research, part marketing research. With Kinzer's help, the team secured funding from the Robert Wood Johnson Foundation and got to work. Hammer's and Kinzer's aim, beyond giving the students experience in writing grant proposals, was to foster learning by doing, and the team members did precisely that. They researched the



↑ Breath of Fire



Fast-Paced Play ↑



↑ In-Game Challenges



Surprise and Tension ↑

physiology of smoking and adapted breathing techniques used in yoga, outlined the graphics, supervised the game's programmers and found a composer to write the music.

THE LIT2QUIT PROTOTYPE has successfully completed its testing phase and has shown that the game generally mimics the perceived effects of smoking and the body's physiological response to nicotine. The team hopes to secure additional funding to refine its research and, ultimately, conduct field trials to document that the game supports smokers who want to quit. Meanwhile, taking a leaf from Kinzer's theory of video games as a form of social interaction, they have ideas to put the project on social media sites like Facebook and Twitter and leverage the social aspects of gaming, including competition, which appears to be an important motivator for many gamers. Lit2Quit players could support each other with online forums or contests. "Research on smoking cessation shows that people who want to quit smoking need support," Levitan says.

The team may yet have a blockbuster game on its hands; its funding proposal cites research showing that 70 percent of adult smokers want to quit. But one result is already clear: Lit2Quit's developers are learning a great deal about the educational value and social principles of learning through digital games. **tc**

LIT2QUIT

REPORTED BY STEVEN KROLL

An interactive app for smartphones, Lit2Quit encourages smokers to reduce their habit, ultimately leading them to quit, by playing a game that simulates the stimulating and relaxing sensations experienced while smoking. Players choose between two modes of play—Relax and Rush—and then breathe into their headset micro-

phones, depending on their choice in mode, to control the avatar and speed of the game, avoid enemies and complete levels. Research shows that breathing therapy helps to significantly cut back smoking. So rather than reaching for a cigarette, the thinking goes, pick up your smartphone and play Lit2Quit.

Learning Because We Want To

Chuck Kinzer uses technology
to understand the
role of motivation in education

by JOE LEVINE

A CENTURY AGO, THE PIONEERING TEACHERS COLLEGE psychologist E. L. Thorndike proposed the Law of Effect: If an association is followed by a satisfying state of affairs, it will be strengthened, and if it is followed by an annoying state of affairs, it will be weakened.

Today, Chuck Kinzer, who directs TC's program in Communication, Computing and Technology in Education (and the program's Game Research Lab), is applying a similar lens toward finding ways that technology motivates people to learn. More broadly speaking, he seeks to extract—from human interactions with technology—fundamental principles of how learning occurs.

"Technology is inherently motivating," says Kinzer. "People want to use it. They like their smartphones and touch pads. We're trying to figure out why these things motivate people and use the underlying principles to build instructional systems. We believe that although learning is



Charles Kinzer

content-specific, there are learning processes in a larger sense.”

Like Thorndike, Kinzer defines *learning* broadly, to include any experience-driven change in behavior, with motivation, social factors and cognitive processes as the operative forces. For example, Lit2Quit, the smoking-cessation game developed by an interdisciplinary group of Kinzer’s students, is designed as a replacement therapy that taps some of the motivators that make people smoke. The game can induce breathing states similar to both the adrenaline rush and the more relaxed, yoga-like experience that smokers seek. Like a cigarette break, playing Lit2Quit takes three to five minutes, and it involves hand movements so that players use all of the modalities involved in smoking when playing the game.

“The ultimate goal would be to have people think, ‘Why not reach for the game?’” Kinzer says. “So right now, we’re doing physiological studies of people who use Lit to see if the same areas of the brain are activated as in smoking, and to see if we’re getting other, similar physiological responses such as elevated heart rate and perspiration. We’re also recording emotional measures.”

In another project, conducted through a multi-institutional collaboration called the Games for Learning Institute (G4LI), Kinzer and his students are trying to tease apart the components of educational games that are central to engaging young people’s interest and attention. They have studied the role of narrative, the effect of gender and appearance of avatars (figures that represent the user), the size of the screen as an element of game-playing, the relative appeal of single-user games versus those that involve multiple players, and, using an eye tracking system, the effect of graphics on comprehension. The results of these inquiries, while still preliminary, have often been surprising. For example, in

“Children learn best in a socio-cognitive context.. We couldn’t easily test that because kids would have to physically meet after school or on weekends... But then we get a chat function, and suddenly three kids can get online and work together.”

—CHARLES KINZER, PROFESSOR OF EDUCATION

one published study, middle-school students preferred a book-reading activity to a single-user Nintendo game or a similar comic book.

In another project, Kinzer and a colleague, project director Jo Anne Kleifgen, are using a multimodal web-based program to enhance academic writing and subject-matter learning among Latino middle-schoolers who are learning English (see story, page 45).

“If you succeed at something difficult, that’s satisfying because you feel better about yourself,” Kinzer says. “We provide learning support structures for children so that when they write and can see their writing get better, and see that they’re doing meaningful research, that’s a satisfying, motivational thing for them.”

Kinzer is quick to point out that he is not a motivational psychologist nor, in fact, a psychologist at all. He majored in English as an undergraduate and earned his Ph.D. from U.C. Berkeley in language and literacy education—an orientation that has given him an appreciation for the social and cognitive factors that play into motivation.

“My training is to look at people and to understand the interrelations that make them act as they do,” he says. “We don’t develop language in a vacuum, for example. So right away there are social factors within a cognitive process.”

Ultimately, unlike many research-

ers who are inspired by the “gee whiz” factor—the seemingly magical prospect of enabling people to talk to friends across the ocean using a pocket-size square of plastic and metal, or to get driving directions from a disembodied voice—Kinzer studies technology because of what it reveals about behaviors and processes that people already engage in.

“Until very recently, many theories about learning were difficult to test and implement, but now technology allows us to test them in new and very powerful ways,” he says. “Take the idea that children learn best in a socio-cognitive context. We couldn’t easily test that because kids would have to physically meet after school or on weekends in social activities. But then we get a chat function, a technology that lets you collaborate and do things at a distance, and suddenly three kids can get online and work together. Or remember learning to write a letter? It was so inauthentic because you knew the only person who was going to read it was your teacher. Or maybe the class would write to a famous children’s author, but it would take weeks before there was a reply, if ever. Now technology gets you a response in a meaningful period of time, which is much more motivating and can affect learning. So I’m interested in not just testing a technology but understanding its effects on thinking, social interaction and learning.” **tc**

HELPING NON-NATIVE SPEAKERS WRITE ACADEMIC ENGLISH

Software that taps emotions and explicates a mysterious process

by SUZANNE GUILLETTE

During a recent social studies class at a Bronx middle school, seventh graders were using a new software program developed by faculty at Teachers College to conduct research for an essay on civil rights. Maryam (not her real name), a seventh grader from the Dominican Republic, grew increasingly angry as she viewed images of the Star of David identification badges that Jews were forced to wear in public under Nazi rule.

“That would be like me having to wear something because I’m Dominican!” she exclaimed.

It’s no secret that students learn more, and more effectively, when they care about the material. But motivating them to write essays can be a challenge of a different order, even with a topic as emotionally resonant as the Holocaust, and particularly when, like Maryam, they must do so in a language other than their native tongue.

Enter the Teachers College software, a multimodal web-based program called STEPS to Literacy: An Integrated Digital Writing Space for English Language Learners. Developed by Jo Anne Kleifgen, Professor of Linguistics and Education, and Chuck Kinzer, Professor of Communication, Computing and Technology, STEPS to Literacy was funded by a three-year, \$1.5 million grant from the U.S. Department of Education.

“Our work is based on real need,” says Kleifgen. “There are lots of children whose home language is different from English who aren’t succeeding academically.” For example, among all eighth graders who speak English as a second language, only 4 percent are proficient readers.

Students learning English are often particularly challenged by what Kinzer calls a major component of academic writing: “find-



Jo Anne Kleifgen

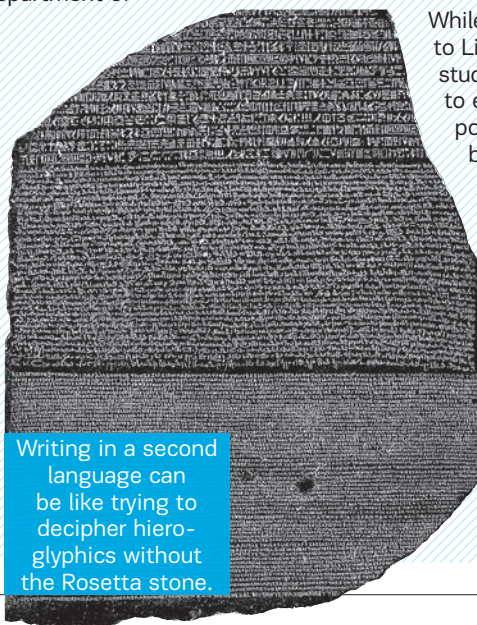
ing relevant, disparate sources and synthesizing the material in meaningful ways to create a structured, logical argument.” To aid in this process, Kleifgen and Kinzer have built their software around a framework, developed earlier by Kinzer and colleagues, called STEPS plus G, which encourages students to learn about and discuss the scientific, technological, economic, political, social and geographic aspects of a given subject.

The STEPS to Literacy program includes a series of learning modules devoted to these conceptual categories, each of which begins with an “anchor video” that provides a context for topics that students learn and write about. Students can then use STEPS to Literacy to explore a variety of resources: photos, audio and video, and written materials, including transcripts, many of which are available in both English and Spanish. The interface allows students to keep all materials open onscreen while writing. Students also can work in their native language to grasp concepts, form ideas and create notes and drafts before writing a formal draft in English.

During the first year of its development, STEPS to Literacy was piloted at Maryam’s Bronx middle school. More recently, Kleifgen, Kinzer and their team of TC students have conducted testing at additional schools in Harlem.

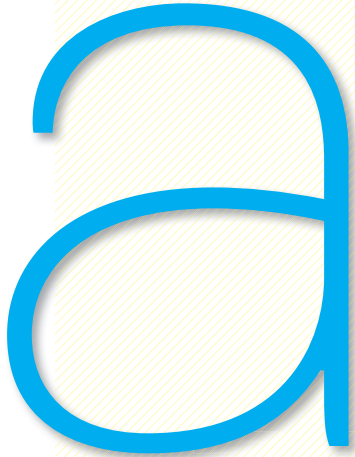
While the initial focus of STEPS to Literacy has been on social studies, Kleifgen and Kinzer hope to expand the program to support learning across disciplines, beginning with science.

“Writing in any subject area can be daunting because the process can seem mysterious,” Kinzer says. “STEPS helps to explicate the thinking involved, and it creates a way to tap learners’ emotions and experiences.” And that, as the expression goes, seems worth writing home about. **tc**



Writing in a second language can be like trying to decipher hieroglyphics without the Rosetta stone.

game FOR LEARNING



According to a 2008 Pew Center report, 97 percent of teens across the country are avid game-players who invest substantial time in their virtual lives.

“Kids are having intrinsic needs met in well-designed games,” says Joey Lee, TC Assistant Professor of Communication, Computing and Technology in Education. “They apply lots of time and energy in game worlds in order to pursue things like mastery, autonomy, purpose, status, social contact, acceptance, curiosity, self-expression and competition. When similar game principles are applied to real-world educational settings, there are rich opportunities for changing the culture of the classroom and shaping identities that are better for learning. There are opportunities to structure and model processes and strategies for success; encourage peer teaching and self-directed learning; offer tailored, customized feedback; provide recognition for academic skills and achievements; and encourage leadership, problem-solving and creativity.”

Prompted by that observation, Lee has begun designing what he calls a “gamification” layer for science classrooms: activities that lend a gamelike flair to a space that, despite its seemingly obvious allure, all too often fails to engage kids’ imaginations and motivation to learn. His broader goal is

By “gamifying” science and other subjects, Joey Lee is getting students to take an active approach to their learning

By Suzanne Guillette

to help students form more positive self-concepts and identities as scientists and to cultivate what Christopher Emdin, TC Assistant Professor of Science Education, calls “science-mindedness.”

“What if we could raise up winners in real life by taking the same mechanics, elements and processes that have proved vastly successful in commercial games and applying them to traditional classrooms in science and other subjects?” asks Lee, Director of the Real-World Impact Games Lab, part of the Games Research Lab at TC.

This past academic year, Lee, together with Emdin and Jenny Ingber, Director of Science Programs at the Bank Street College of Education, launched a pilot program called the Science City Heroes Gamification Project at two New York City middle schools, one in the Bronx and one in Brooklyn.

The project employed a series of color-coded Pokémon-like cards to help both teachers and students



Joey Lee

emphasize and reflect the processes and traits that characterize science-mindedness. For example, a young girl who created a chart depicting the hierarchy in which humans, snakes, mice and other animals function as producers and consumers was recognized with a red “science victory card” for analytical thinking. Green “success” cards were doled out to students who displayed positive academic identities, while blue “action” cards were peer-awarded, a way to promote teamwork and collaboration. Students could then use the cards they amassed to purchase and upgrade buildings, vehicles and parks in a virtual Science City.

“One of our main goals was to get these students to see themselves as scientists,” says Lee. “We want to promote learning as a lifestyle, not something that happens only in the classroom.”

When the aforementioned student received her red card, Emdin recalls

that three male classmates from the Dominican Republic, all of whom had limited English skills, took note. Previously, the trio had spent their time in the classroom talking to one another instead of paying attention. But once they saw that their classmate received recognition for her efforts, they wanted to participate too. They soon created their own charts and won their own red cards.

“Kids who have different ethnic and linguistic backgrounds can become keyed in to play because they want to succeed in the game,” says Emdin.

For his doctoral dissertation, Lee explored “identity-supportive games” that use game mechanics to challenge racial and ethnic stereotypes and encourage the player to reflect on his or her self-concept. He was interested particularly in Asian-American culture and the myth of Asian-Americans as the “model minority,” a stereotype that has been associated with high rates of depression, suicide

and anxiety within the Asian-American community. His dissertation addressed how stereotypes in general create barriers for people aiming to reach their full potential.

“Games are a powerful way to get people to step out of their shoes and into the life of the other,” says Lee. “They allow people to have different experiences that they otherwise wouldn’t be able to have.”

Currently Lee is exploring gamification on other fronts. At TC he’s working on a project called Scholar’s Quest, an innovative attempt to gamify the graduate school experience in ways that will help students maximize feedback from advisers, build community and share advice with their peers and improve interpersonal and technology skills. “Often, grad students don’t use their time in school effectively and wisely,” says Sam Ahn, a TC doctoral student in Communication, Computing and Technology in Education who is working with Lee on the graduate school project. “By using gamification, our plan is to make the transition from the undergraduate experience to the graduate experience seamless, engaging and fun.”

Lee is also bringing gamification to climate-change education. As part of a \$1.2 million grant from the National Science Foundation that brings together TC, Barnard College, the Columbia Climate Center, the Lamont-Doherty Earth Observatory, the American Museum of Natural History and others, he is designing a Real-World Action Game for adults that takes advantage of social networking, crowdsourcing and real-world missions to get adults to learn about and take action on climate change.

The focal point for Lee, in any area he’s addressing, is learning. “I’ve always been interested in how games can make a difference with real-world problems and challenges,” he says. “Whether it’s shaping identities, changing perspectives or motivating action, the learning that can take place in games is powerful.” **tc**

Learning *By Doing*

20

Remember physics in junior high school, and those boring experiments with marbles that were supposed to teach you about concepts such as potential energy and kinetic energy? Well, physical science classes look a lot different nowadays, even in the fifth grade. To learn about potential and kinetic energy, students can go online to watch animations of falling rhinoceroses and speeding roller coasters. With a mouse-click, they can change the roller coaster's speed and the steepness of the track incline. When



John Black

John Black
and his students
are leaders
in exploring
technology that
makes use of
grounded cognition

By Joe Levine

they make those changes, the program provides a readout of corresponding changes in energy expenditure.

John Black has shown in many studies that students who engage with such simulations develop a better conceptual understanding than peers who learn by more traditional methods. For Black, Cleveland E. Dodge Professor of Telecommunications and Education and Chair of TC's Department of Human Development, the explanation isn't simply that such presentations are more fun or that kids enjoy using cool technology. Rather, Black believes that such programs enhance learning because they create powerful perceptual experiences and promote what he calls grounded or embodied cognition.

According to the guiding paradigm in TC's Cognitive Studies in Education program (which Black directs), and particularly in the Intelligent Technologies concentration, full understanding depends

to a large degree on the learner's ability to create both a mental and a perceptual simulation of a concept or process. Studies have shown, for example, that for children reading a story about farming, manipulating actual farm objects leads to better retention of the story.

As digital technology has become more sophisticated, it has provided increasingly powerful forms of grounded cognition. The hierarchy of effectiveness, from least to most, is *watch, do, feel, move*. Watching a simulation is great, but becoming a participant by actually feeling or performing the activity in question reinforces underlying concepts. In a study last year, for example, Black and TC Instructional Technology and Media doctoral student Insook Han found that adding "force feedback," or weighted resistance, to a simulation further increased learning. Students worked with a program that simulated the movement of interacting gears. To increase the output force

of the gears, the students had to pull harder on a joystick, or lever.

The newest and most exciting area of inquiry is technology that responds to human movement. In 2002 the movie *Minority Report*, starring Tom Cruise, envisioned precisely such a gizmo: a three-dimensional computer interface that the user controls with hand gestures. Since then, gaming technology that responds to movement, like Nintendo's Wii, Microsoft's Xbox 360 and Sony's PlayStation 3, has come online. Tools such as the iPad Touch and Microsoft Kinect respond to smaller movements.

Why is movement important? A growing field, led by experts such as TC's Barbara Tversky, Professor of Psychology and Education, posits that physical gesture corresponds with and can enhance different kinds of thought processes. For example, Tversky and others have shown that when people are solving problems, they make characteristic gestures that reveal underlying mental imagery. And when people watch others engage in a specific activity, the neurons activated in their brains are the same ones that are employed in that activity.

Technology that responds to gesture can therefore promote learning. In a study presented in November 2010 at the Psychonomic Society Conference, Black and Tversky, along with TC Cognitive Studies doctoral student Ayelet Siegel, demonstrated that when children solved arithmetic problems that had simple, defined answers, they used tapping, pointing and beating gestures that were best supported by use of a traditional computer mouse. But when the children performed a "continuous task," such as estimating where a specific number would fall on a number line running from 0 to 100, they made smooth, continuous hand gestures such as sweeping, arcing and dragging, which were best approximated by running their fingers across a touch pad.

Cameron Fadjo, a Research Associate with TC's Institute for

"When you bring in technology without reference to quality research about how learning really occurs, you're dooming yourself to failure.... Hands-on activities that are conceptually congruent with what is being learned can improve that learning."

—JOHN BLACK,
CLEVELAND E. DODGE
PROFESSOR OF TELECOMMUNICATIONS & EDUCATION

Learning Technologies, and Black have shown that movement can turn young learners into programmers of on-screen or tangible avatars—which in turn can enhance their understanding of concepts in subjects such as physics. In another study conducted last year through the Institute, which Black also directs, Black and three students—Carol Lu, Seokmin Kang and Douglas Huang—enabled elementary school students in TC's Harlem Ivy After-School Network to build and program LEGO robots. The robots performed specific activities, such as striking balls of varying size and weight with different degrees of force, in response to signals of touch, light and sound.

As a result of observing how far and fast the balls traveled, all the elementary school students demonstrated an improved understanding of the principles governing the relationship between force and mass. But a subgroup of students who were also asked to initially imagine

themselves as the robots, and to move their own bodies in the ways that they wanted the robots to perform, scored best on a test of conceptual understanding given after completion of the unit of study.

Then again, when it comes to grounded cognition, it may be that imagination tops the hierarchy. In a recent project, Black and TC student Saadia Khan showed that when children interact with a simulated historical event by controlling an avatar in the virtual world called Second Life, they learn that history much better than students who merely read about it.

When Black sums up the importance of technology in education, he often talks about the opportunity to connect with students whose potential isn't being tapped—and the concurrent danger that educators will be led down the primrose path. Adapt a video game successfully to the classroom, and you've got a built-in draw for kids who don't necessarily take to books and paper. Get seduced by flashy technology in which the movements and interaction do not match the conceptual structure of what you want the students to learn, and not only will you fail to promote learning, but you may even make things worse.

"There's a lot of so-called educational technology out there, but while the technology is very advanced, it often reflects very little knowledge of education," he says. "And when you bring in technology without reference to quality research about how learning really occurs, you're dooming yourself to failure. Using hands-on activities that are conceptually congruent with what is being learned can improve that learning, and adding simulations that help students also imagine and manipulate those experiences can improve learning even more. This approach improves memory for what is being learned, but even more important, it improves the flexible ability to use what was learned to solve problems." **tc**

LEARNING FROM SCRATCH

A user-friendly design and programming language has gone viral, with help from some advocates at TC

by SUZANNE GUILLETTE

News flash: *Boredom: Yet Another [Ridiculous] Animation*, a video narrative about a stuffed animal who plays with yo-yos and offers wry commentary on Kant's theories of moral action, was viewed by more than 50 people during the first 12 hours after its author, Cheddargirl, posted it last summer.

"Nice animating—that dancing was really good :D." wrote Jonathanpb of New Zealand.

Welcome to the world of Scratch, a design and programming language that enables creative spirits such as Cheddargirl to create and discuss interactive stories, games, music and art. Released in 2007 by MIT Media Lab, Scratch has attracted more than 1 million registered users who have generated more than 2.5 million unique projects.

"Scratch enables people of all ages and backgrounds to meet on common ground," says TC doctoral student Cameron Fadjo, Research Associate with the College's Institute for Learning Technologies (ILT), who has been researching the use of Scratch in the classroom. "The beauty of Scratch is that it is not exclusively confined to programmers or designers. It breaks down barriers to learning computing by creating opportunities for anyone to create and share their work."

Scratch derives its name from the technique of DJs who create music by spinning records on phonograph turntables. Like that practice, the Scratch environment enables users to work without knowing the medium's syntax. Instead, Scratchers employ a system of graphical blocks, each representing a different animation element (for example, "play sound") that can be used in a nearly endless number of combinations. Scratchers program by dragging together these blocks, which resemble puzzle pieces and fit only when they make sense.

This intuitive, visual approach makes Scratch accessible across all ages and cultures. At ILT, Scratch has been a catalyst for exploring the development of video games and visual novels to improve mathematical and computational thinking. Under the direction of John Black, Cleveland E. Dodge



Cameron Fadjo

Professor of Telecommunications and Education, and Susan Lowes, ILT's Director of Research and Evaluation, Fadjo and other students explore how elementary and middle-school students learn abstract concepts and develop problem-solving skills.

Scratchers can meet online to tap the growing Scratch community for creative input. A user can post an idea for an adventure game character—say, a girl who is good at math and speaks eloquently—and get immediate feedback and suggestions for ways to bring her to digital life. Fadjo also notes that

Scratch's design arose in part from the cognitive development theories of Jean Piaget, who believed that children learn by, among other ways, making mistakes, discovering their errors and correcting them. Seymour Papert, an MIT epistemologist and artificial intelligence researcher mentored by Piaget, developed the Logo programming language to help children explore mathematical problems. Papert, in turn, influenced younger computer scientists such as Mitchel Resnick, head of the Lifelong Kindergarten group at MIT Media Lab, which created Scratch.

Recently Fadjo and Black hosted Resnick and Karen Brennan, also of MIT Media Lab, at the first-ever Scratch Educators Meetup at TC. Some 45 classroom teachers, after-school coordinators, researchers and museum staff gathered for workshops and lectures on how to use Scratch.

"Teachers are taking this tool and applying it as creatively as the Scratchers," says Fadjo. Meanwhile, Scratch researchers are seeking a better understanding of how learning occurs in informal settings and of how Scratch might increase motivation and engagement.

The response to Cheddargirl's recent post suggests the answer to that last question is "a lot."

"Really great art, good animating, great music, even," wrote Sunrise-Moon, a user in the United States. "If I might point out one problem, though—many of the scenes get a bit repetitive. For example, if the dancing scene had more moves, it'd be funnier. Still, very good animation :D." **tc**



TC FILE PHOTO

FRIEND
OF THE
COLLEGE

Thinking It Through

Jack Hyland is the adviser we'd all like to have

by JOE LEVINE

If YOU DO AN INTERNET SEARCH FOR JOHN W. HYLAND, JR., Co-chair of the Teachers College Board of Trustees, so many different incarnations surface that you start to wonder if they can all be the same person. ¶ There's the Jack Hyland who has served in top roles at some of the nation's leading investment banking firms, including Morgan Stanley, SG Warburg, and PaineWebber/Young & Rubicam Ventures. ¶ There's the Jack Hyland who wrote *Evangelism's First Modern Media Star: The Life of Reverend Bill Stidger*, a widely admired biography of his grandfather. ¶ There's Hyland the photographer, whose pictures from Bhutan and other far-flung locations show up in newspapers and magazines. ¶ There's the art enthusiast who has chaired the board of the American Academy in Rome and served on the boards of the Sterling and Francine Clark Art Institute in Williamstown, Massachusetts, the College Art Association, and the National Building Museum in Washington, D.C. ¶ And then there's the real shocker, quietly buried midway down in his bio on the website for Media Advisory Partners, which he cofounded two years ago to help companies navigate the volatile new media landscape: As an undergraduate at Williams College, Hyland majored in theoretical physics. ¶ "We had to declare our majors at the end of freshman year," Hyland recalled almost sheepishly during a recent interview at his office in midtown Manhattan. "The Soviet Union had just launched Sputnik. When I went in to ask

my adviser what I should choose, he said, 'Physics, because you'll always have a career.' I said, 'But this is a liberal arts college; there are all these great courses in music and philosophy and literature.' He said, 'Don't worry, you can still take all the liberal arts courses you want.'" Hyland laughs. "Which was a total lie. You have to take a ton of math for physics."

Hyland ended up working harder than most of his classmates while auditing humanities courses "to keep up with my interests." He switched gears as soon as he graduated, earning an MBA at Harvard. But he doesn't regret his original choice.

"Physics is a fascinating, philosophical sort of discipline," he says. "It gives you a really interesting view of how things work, both in science and in life."

The story reveals a lot about Hyland, from his wide-ranging curiosity about the deeper workings of systems and institutions to why he is so excited about the possibilities technology holds for improving teaching and learning. Most of all, Hyland's sense of debt to that long-ago Williams counselor may shed light on his own affinity for playing an advisory role. "If I do anything in my board work, it's to help people identify what needs to be done, without a lot of fuss, and then stay fixed on that course rather than other things that come up that may be very nice, but that are distracting." Hyland grins. "Which doesn't mean I'm always right. And it's the same in my financial work. I deal with people who run companies, who have problems, and I help them to think through what's most important, so they can get to where they want to go."

In the case of TC, that destination includes nothing less than the reshaping of American teaching and the closing of the U.S. achievement gap.

"We have a dropout rate in this country of 50 percent or more in our

THE HYLAND YEARS—THUS FAR

Jack Hyland joined TC's Board of Trustees in 1988 and has served as Board Co-chair, first with Antonia Grumbach (who remains a TC Trustee) and currently with William Rueckert. He also guest-teaches a class each year in a course on writing about family, taught by Hope Leichter, Elbenwood Professor of Education in the Department of International and Transcultural Studies.

"Jack commits incredible amounts of time to TC, and he gets involved with all aspects of the College," Rueckert says. "He's an extremely thoughtful, calm person, who is easy to work with and a very good listener. And that's great, because you don't want a board chair to be a heavy-handed leader who mandates his own opinions. The board's role is to advise the president, and the chair's role is to advise the board, and Jack plays that role extremely well."

Grumbach says that as a board chair "you can't have a big ego—you have to put the institution first, and Jack has always done that." She recalls particularly appreciating Hyland during the year when the board was working with an acting president—a time when, among

other things, decisions had to be made about allowing TC faculty to work in Afghanistan. "You need to have absolute trust and confidence in your co-chair during a time like that, and I always had that with Jack."

Among the College's major accomplishments under Hyland's board leadership:

- ▶ successful searches for two presidents, Arthur Levine and Susan Fuhrman, and the extension of Fuhrman's contract
- ▶ a revision of the College's bylaws and statutes of governance
- ▶ the reorganization of TC's academic offerings into nine departments and 60 programs
- ▶ a major capital campaign, extending from 2002 through 2007, that raised \$154.6 million—at the time, the largest campaign ever conducted by a graduate school of education
- ▶ the refurbishing and recasting of the Gottesman Libraries as a cutting-edge, web-enabled facility
- ▶ the creation of the Cowin Conference Center
- ▶ the launch of TC's Campaign for Educational Equity
- ▶ the creation of a new academic department, Education Policy and Social Analysis
- ▶ the creation of TC's Harlem Schools Partnership and the opening of the Teachers College Community School.



Rueckert and Grumbach

Hyland, who along with Rueckert was reelected as board Co-chair last year, credits these milestones to Levine and Fuhrman, as well as to his fellow board members. He is particularly pleased by the recent extension of Fuhrman's contract. "Susan's commitment to research and national reputation for brilliant scholarship have been invaluable."

urban high schools, and the lives of so many of those kids are reduced if not wasted," he says. "We can't afford that, not least because we could end up spending thousands of dollars per year per kid on jail. Education comprises a tough set of problems, but beyond being a major force in making great teachers be what they should be, TC must inform policy to make education as a whole better."

Hyland believes that early childhood offers a critical window for intervention ("I've read that a five-year-old child raised in a medium-to-affluent family typically hears at least twice as many words as a child raised in poverty. How does that poor child compete?"), and he describes two recent encounters to illustrate the critical role that technology can play in education.

"I got on the elevator here at work, and the TV screen was showing a short video of a scene at Westminster Abbey, where they were celebrating the 400th anniversary of the King James Bible. These four courtiers in Renaissance-like costumes were carrying red velvet pillows with Bibles on them. I thought that might symbolize the burying of books. Well, just an hour earlier, I had been in the elevator in my apartment building, and a woman got on with her daughter in a stroller. This girl, who was two years old, was deftly playing a game on an iPad. I said, 'That's remarkable,' and her mother said, 'That's nothing, you should see how many other games she can play, and how she can start them and pause them, with no help from me.'"

Hyland shakes his head, still amazed. "You see the juxtaposition there: on the one hand, a way of life that's existed for 400 years, and on the other, a young child who's completely at home and adept with technology. And the problem is that some children like that go into a school environment, and we're not always accommodating the elements of technology that they bring in with them. We need to take ad-

**"That's really
the key—
turning the
equation
around from
teaching
to learning and
maximizing
people's ability
to learn."**

—JACK HYLAND,
TC BOARD CO-CHAIR

vantage of technology's ability to provide immediate feedback and serve up questions to promote further learning. And that's really the key—turning the equation around from teaching to learning and maximizing people's ability to learn."

Hyland says he has seen TC make important strides toward that goal during the 24 years he has served as a Trustee. He cites the recasting of the College's Gottesman Libraries, under the direction of Gary Natriello, as a major accomplishment, and is particularly excited by the work of the library's EdLab creative services unit.

"The library, which was once this quiet place where you went to take out books, has been transformed into a major thoroughfare, where there's always this tremendous buzz going on," he says.

Hyland is also enthusiastic about the College's partnerships with public schools in Harlem and, more recently, the launch of the Teachers College Community School.

"Our partnership work puts us right in the thick of the nation's largest school system, and having a school of our own is really the ultimate test of our own ideas," he says.

Perhaps most characteristically, Hyland, the perennial adviser, is excited about TC's launch this past fall of a new Education Policy and Social Analysis department, which for the first time unites the College's diverse cast of policy experts.

"The policy work is so important because it allows us to become even more of an intermediary, a place of trust, for research—and not just our own, but that of other institutions as well," he says. "We'll never have all the answers, but we want to be the place that forgoes the polemics, and acts as a source that can help people evaluate the controversial questions."

There are other areas where Hyland would like to see TC exert its influence, both for education in general and to secure its own future. He laments the near-disappearance of arts programs from public schools, which he sees as the result of an overemphasis on testing in math and English Language Arts dictated by the federal No Child Left Behind legislation. He also applauds the College's willingness to take a page from for-profit institutions such as the University of Phoenix, which has aggressively promoted online learning.

"They have something like 500,000 students and 200 campuses worldwide, and they've approached the issue of teaching from the moment someone clicks a website through an individual's graduation and successive employment. I'm pleased that we're making an effort to understand how to use technology to extend our own reach, without overextending ourselves and without diluting the quality of our course offerings."

He considers for a moment. "These are really tricky issues," he says at last. "But that doesn't mean they can't be thought through." **tc**

alumni*news*

CALLING ALL INTERNATIONAL ALUMNI!

TC is eager to (re)connect with alumni both in the United States and around the world. The International Outreach Committee of the Alumni Association especially wants alumni overseas to connect with others in their country or region as well as to increase their participation in College activities “virtually,” if not in person. We are asking you 1) to provide/update your contact information in the Teachers College Alumni database and 2) to spread this message to any and all TC alumni whom you know. Talk to your colleagues to see if they know any TC alumni... expand your own TC network!

Our goal is to spread this message to as many TC alumni as possible around the world using the powerful “grass roots” energy of each graduate’s own network.

To update your information, visit www.tc.edu/alumni/update. Alumni without email can send their information to:

**Office of Alumni Relations,
Box 306, 525 West 120th
Street, New York, NY 10027
USA.** Please include your name, the name you used while attending TC, your graduation date, all contact information and any additional information you would like to share.

HOW CAN YOU CONNECT WITH TC ALUMNI IN YOUR COUNTRY AND REGION?

First, check the TC website to see if there is an International Alumni Network Country Representative: www.tc.edu/alumni. Contact your Country Representative to help her/him build local networks.

If you are living in a country with no Country Rep, or if you are in a country with a large number of alumni, we hope you will consider volunteering to become an IAN Country Rep. Visit our website for a job description and application information.

We are excited that Teachers College will be celebrating its 125th anniversary in 2013. To include overseas alumni in the celebrations, we need to build our International Alumni Network and increase the number of Country Representatives, who will serve as the College’s liaisons in planning anniversary events around the world. We are enthusiastic about the opportunities that the 125th anniversary will provide for alumni to (re)connect with each other and with the College.

FAREWELL, FRIENDS

TC President Susan Fuhrman (center), with graduating international students and their families, at the International Graduate Tea in May 2011.



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ALUMNI ASSOCIATION PRESIDENT'S MESSAGE

Dear Fellow Alumni,

As you know, the mission of the Alumni Association is to reconnect you to Teachers College. I hope you have taken advantage of the many opportunities that exist for you to engage with the College and with fellow alumni. I encourage you to stay up to date with all of the latest news and events for alumni by updating your contact information or visiting www.tc.edu/alumni.



Academic Festival is TC's annual signature homecoming event, and this year, with the theme of "Rewiring the Learning Landscape," the focus of the faculty- and alumni-led sessions is the intersection of technology and humanity. Academic Festival is a true celebration of the TC community, and on this day we also recognize the six alumni chosen by the Alumni Council's Awards & Recognition committee to receive our Distinguished Alumni Awards (including one alumna who will receive our Early Career Award for her achievements during the first decade following her graduation). To submit your nominations now for the 2013 awards, use the form included in this edition of *TC Today*. To learn more about Academic Festival and the sessions or speakers, please visit www.tc.edu/festival.

Congratulations to this year's graduates. We welcome you as the newest members of the TC Alumni Association and hope you will stay engaged with the College. I know that your focus will and should be on your work and careers. You are destined to do important things in education, development, health care and as leaders of organizations. But please know that in TC you will always have a home and an intellectually rich and diverse community that you can tap into physically and virtually. If you have not already done so, please update your contact information with the Office of Alumni Relations. You can send your updates to tcalumni@tc.edu.

I would like to thank all of my colleagues on the Alumni Council for their many hours of service to our College and our Alumni Association, and for the progress we have made together. Additionally, I would like to recognize this year's ad hoc members for their hard work and dedication. If you would like to learn more about how to get involved with the Alumni Council, visit www.tc.edu/alumni. We say goodbye and express our gratitude to those whose terms on the Alumni Council end this May—Connie Belton Green, Elaine Heffner, Carolyn McNally, Kathleen Morin and Robert Weintraub—and we look forward to welcoming our new members in September.

We also eagerly anticipate TC's 125th anniversary celebration, which will begin in 2013. We hope you will all reconnect with us at one of the many events planned throughout this milestone year.

Sincerely,



Adam Vane, President, Teachers College Alumni Association

TEACHERS COLLEGE ALUMNI ASSOCIATION

The Teachers College Alumni Association is led by the Alumni Council, which consists of 35 members who represent all 90,000 graduates. The Council partners with the Department of Development and External Affairs to advance the goals of the College by providing alumni with opportunities to remain involved in the life of the College through social activities, volunteer efforts and financial support.

EXECUTIVE COMMITTEE

Adam Vane, PRESIDENT

Robert Weintraub,
IMMEDIATE PAST PRESIDENT

Patrick McGuire, PRESIDENT-ELECT

STANDING COMMITTEE CO-CHAIRS

ALUMNI WANTS & NEEDS COMMITTEE
Peter Dillon, Carolyn McNally

AWARDS & RECOGNITION COMMITTEE
Susan Diamond, Diana Newman

INTERNATIONAL OUTREACH COMMITTEE
Marion Boulton, Fred Brodzinski

NOMINATING COMMITTEE
Connie Green, Maryalice Mazzara

PROGRAMS & RESOURCES COMMITTEE
Patrick McGuire, Kathleen Morin

MEMBERS-AT-LARGE
Maritza Macdonald, Tara Niraula

HISTORIAN
James J. Shields

All alumni are encouraged to get more involved with the Alumni Association by serving on one of the standing committees. If you would like to serve on the Alumni Council, you can find a nomination form on the alumni website. Council members serve a three-year term. For more information about the Alumni Council and to download your nomination form, please visit our website: www.tc.edu/alumni.

2013 Alumni Awards

Help us celebrate the distinguished service and accomplishments of our alumni community! Teachers College's 90,000 graduates include leading educators, psychologists, administrators and other professionals. The Teachers College Alumni Association is seeking nominations for several **Distinguished Alumni Awards**. We invite you to nominate Teachers College graduates who have distinguished themselves in their fields; have earned a high degree of respect among their colleagues and in the general community; and whose impact has been felt on a regional, national and/or international level. A recent graduate who has

been out of Teachers College 10 years or less, has earned distinction in her/his field, and demonstrates outstanding future potential will be honored with the **Early Career Award**.

The **Distinguished Alumni Award** and the **Early Career Award** recipients will be announced in December 2012 and will be honored during **Teachers College's Academic Festival 2013**. Final selection of recipients is made by the President of Teachers College upon the recommendation of **the Alumni Council's Awards & Recognition Committee**.

NOMINATION FORM

Also available online at www.tc.edu/alumni/DAANominationForm

Select the award for which you would like your Nominee to be considered:

The Distinguished Alumni Award

The Early Career Award

Nominee's Name: _____

Nominee's TC Degree(s) including Year(s) Awarded and Program(s), if known: _____

Nominee's Phone Number: _____

Nominee's Postal Address: _____

Nominee's Email Address: _____

Your Name: _____

Your Relationship to Nominee: _____

Your Phone Number: _____

Your Postal Address: _____

Your Email Address: _____

Please respond to the following questions as completely and concisely as possible (attach another sheet if necessary).

1. What are your nominee's exceptional professional achievements and contributions or service to her/his field?
2. What impact has your nominee had on local, regional, national and/or international communities?
3. What other attributes has your nominee demonstrated that qualify her/him to be honored by Teachers College with a Distinguished Alumni Award?
4. Is there anything else about your nominee that you would like the committee to consider?

Please submit/send complete nomination form information, along with your nominee's current résumé or curriculum vitae (if available), **no later than September 1, 2012**, to:

Office of Alumni Relations, 525 W. 120th St., Box 306, New York, NY 10027.

You can email your form to tcalumni@tc.edu or fax it to (212) 678-3723. For additional information, please call Teachers College Alumni Relations Office or visit its website at: www.tc.edu/alumni/DAANominationForm

Class Notes

ARTS AND HUMANITIES

HISTORY AND EDUCATION

Michael JohaneK (Ed.D. '95) and **Kate Rousmaniere** (Ph.D. '92) met in San Luis Potosí, Mexico, for the International Standing Conference for the History of Education (ISCHE) and found a common connection: Both are graduates of TC's History and Education program. Rousmaniere, Professor and Chair of the Department of Educational Leadership at Miami University, Ohio, is President of ISCHE, and JohaneK, a Senior Fellow at the Graduate School of Education, University of Pennsylvania, presented at the conference. JohaneK also directs the Mid-Career Doctoral Program in Educational Leadership and codirects the Inter-American Educational Leadership Network.

MUSIC AND MUSIC EDUCATION

Alexander Marrero (M.A. '10) is the Program Manager and Executive Director of the Orange County Youth Symphony, based in Harrison, New York.

TEACHING OF ENGLISH

Erin Counihan (M.A. '97) just completed her first year at Washington College as the Secondary Education Field Experience Coordinator. She works with all students at the college who are interested in teaching middle and high school, teaching them, placing them in local schools and observing their progress.

Deborah Jones' (M.E. '98) collection of short stories, *Tales of Wonder from the Garden State*, is an award-winning finalist in USA Book News' Best Books Awards 2011.

Johanna Tramantano (M.A. '01)

is now serving as Assistant Principal, Supervision of English, at the Riverdale Kingsbridge Academy in the Bronx, NY.

BEHAVIORAL SCIENCES

PHYSICAL EDUCATION

David Pargman (M.A. '59, Ph.D. '66) is a consultant, lecturer and author of *Boomerise: Exercising as You Age* (October 2011, Fitness Info Tech). His book focuses on basic fit-

ness concepts and the exposure of myths and fallacies about exercise for those over 60. The book helps older individuals establish safe and sensible wellness programs according to their personal needs.

COUNSELING & CLINICAL PSYCHOLOGY

PSYCHOLOGICAL COUNSELING

Pinar Ozbek (Ed.M. '09) was elected to the Board of the Turk-

Nutritionist and media personality **Ellie Krieger**, left (M.A. '94), at a book talk event, with **Isobel Contento**, Mary Swartz Professor of Nutrition Education.



ish Psychological Association's Istanbul Chapter.

CURRICULUM & TEACHING

EARLY CHILDHOOD EDUCATION

Corabel Y. Diel (M.A. '87) is now director of her own school in Cagayan de Oro City, Philippines. She would like to reconnect with others who lived in Whittier Hall during 1986-1987.

EDUCATIONAL ADMINISTRATION

Dr. John Barrengos (Ed.D. '00) is in his fifth year leading the Independent Day School, an elementary and middle school in central Connecticut. Under his leadership, IDS has increased enrollment, initiated a Design Thinking program, refurbished its campus and grown its reserves and endowment.

Joel S. Bloom (Ed.D. '78) has been named President of the New Jersey Institute of Technology, after more than 20 years of service at the institution. He will head the 9,500-student university in Newark through June 2014, after serving as Interim President following the resignation of the former president, Robert A. Altenkirch.

A statement from the university said Bloom, 64, is "ideally suited to take on this leadership role" during the university's upcoming \$150 million "NJ Next" fundraising campaign, calling him "passionate about the university and its students as their education in the sciences, engineering, technology, design and management transforms their future and that of their families."

Peter J. Foley (Ed.D. '83) is Associate Professor of Education, Nakhonratchasima College Graduate School, and Managing Director of the website SCLThailand.org.



Tom Chandler (Ph.D. '09) and Heejung An (Ed.D. '04) with their son, Jay, at the "TC Sweethearts" Valentine's Day event for couples who met at the College.

John Dodd Marshall (M.E. '07) is the new Head at the Holland Hall School in Tulsa, OK.

Theresa J. Pollifrone-Sinatra (M.E. '73), Superintendent of Metuchen Public Schools, was selected as the 2012 New Jersey Association of School Administrators (NJASA) Central Regional Superintendent of the Year. Under Pollifrone-Sinatra's leadership the district has seen a rebirth in the delivery of instruction for all students. She set the stage for new professional standards for teachers by establishing a five-year curricular review process and led the district to national recognition as a pioneer in the area of inclusive education for students with disabilities and in establishing anti-bullying practices.

HEALTH AND BEHAVIOR STUDIES

INTELLECTUAL DISABILITY/AUTISM

Laurie Yankowitz (Ed.D. '10) was recently promoted to Vice President of Individual and Family Support Services at HeartShare Human Services of New York. The role affords her new opportunities to contribute, including conducting research on staff knowledge of autism and introducing the use of tablets and apps to children and adults with autism.

NURSING EDUCATION

PROFESSIONAL ROLE

Elise Lev (Ed.D. '86), Associate Professor at Rutgers Newark, conceived and spearheaded development of a joint project with the Rutgers University College of Nursing and the Faculty of Nursing Science

LEARNING BY TEACHING

Dan Schwartz likes to recall a graduate student at Stanford who wanted to offer teenagers in his native India an alternative to the one history textbook available to them. “He got five teachers, each with a very different perspective, to give a lecture based on the same chapter,” says Schwartz, a professor in the Stanford University School of Education. “He put the lectures online, and the students in his test group were able to choose the lecture they wanted to hear.”

Schwartz tells this story to illustrate the power of technology to expand choice in the classroom. Ever since the mid-1980s, when, as a teacher in an Alaskan village school, he encountered the Apple II and saw its possibilities for educational instruction, Schwartz has been riveted by one question: What is the best way to teach?

One answer, he believes, is to empower students to teach others—even, or sometimes especially, virtual others. To that end, he has developed a series of software programs called Teachable Agents. A Teachable Agent called Betty, for example, will wait for the student to impart knowledge to her. The student might ask Betty to tell him what happens when, say, algae are added to a fish pond. During much sophisticated give-and-take between human and computer, the student creates a “concept map” in Betty’s “brain.” By periodically asking Betty what she now knows, the student ultimately teaches her that bacteria increase with an increase in algae, which decreases the oxygen that fish need to live.

Another Teachable Agent, called Milo, generates more than one interpretation of the data that the student gives him. Information about a rectangle, for example, whose length times width equals 8 will prompt Milo to produce a 1 x 8 rectangle, a 2 x 4 rectangle or a parallelogram with an area of 8.

Do these pedagogical video games really work? To test the effectiveness of Teachable Agents, Schwartz and his colleagues designed an experiment in which half of the students-turned-



Daniel Schwartz

**Daniel Schwartz
(TC '88, '92)
has created software
that puts students
in the driver's seat**

BY BARBARA FINKELSTEIN

teachers in a test group used conventional science kits and Teachable Agents to conduct their classes. The other half used only the science kits. Schwartz found that students who had the advantage of both learning materials acquired greater understanding of scientific concepts. Moreover, when Teachable Agents were removed from the classroom, the students were able to apply what they learned about causal relations to the next unit in the science curriculum.

While Teachable Agents are effective for all students, they have been particularly effective with low-achieving students. Schwartz believes that the technology makes up for learning experiences that the students didn't have when they were younger.

Schwartz has found similar results in studies of a game called Stats Invaders, which he developed with a Stanford colleague, Dylan Arena. In the game, which is modeled after the arcade classic Space Invaders, aliens drop from the sky according to one of two probability distributions. In

addition to shooting down the aliens, players must determine which of the two displayed distributions is generating the alien attack. Schwartz and Arena found that students who played Stats Invaders were better prepared for a classroom lecture on probability distribution than those who did not play the game.

“This is a nice example of using technology to do what technology can do well,” Schwartz says. “Technology can give you a set of experiences that will prepare you to understand a more formal treatment that you get from a textbook or a class.”

Schwartz himself got much the same kind of preparation from Teachers College, where he was the first recipient of TC's Ben D. Wood Fellowship. A single father at the time, he credits the support for helping him to raise his son.

“The faculty I found at TC were profound and inspiring,” Schwartz says. “John Black, my adviser, provided a model and gave me the freedom, gentle steering and support to find my own interests. Herb Ginsburg opened the very precise world of children learning mathematics. Robbie McClintock showed how to see the ideas *du jour* within the sweeping themes and changing conditions of cultural history.”

Schwartz also was inspired by his fellow students. “I can still remember my intellectual conversational partners 20 years later. We provided each other cognitive and emotional sustenance, nourishing big ideas out of rich experience.”

Perhaps technology's ultimate value, as Schwartz sees it, is that it can identify the choices that students make as they learn. “How do students deal with failure?” he asks. “Do they try to resolve contradictions, or do they slide over them? Technology is helping us teach and understand 21st-century skills, which aren't so much about facts and procedures but about making good choices when you need to learn and adapt.”

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Alumni from TC's Art and Art Education Program at a gathering at Macy Gallery on the eve of the annual conference of the National Art Education Association, held this year in New York City.

in Léogâne, Haiti (FSIL), part of the Episcopal University of Haiti. Participants in the program will complete a certificate in Nursing Education before beginning a master's degree in Community Health Nursing.

KINESIOLOGY

Sharon Phillips (Ph.D. '10) suffered a double tragedy this past summer when she lost her brother Chris, 27, and her mother Susan, 64, in two separate cardiac-related events within days of one another. Soon after, she started the Christopher and Susan Phillips Foundation, which, among other philanthropic efforts, will help provide scholarships to future nursing students. Phillips writes, "I just need something positive to come from this loss. I want their optimistic natures and helping ways to live on." Chris was an EMT and was studying to be a nurse. His mother worked as a pharmacy technician for more than two decades and was married to her husband, Frank, for 38 years. To learn more about Chris and

Susan or to support Sharon's work, please visit www.christopherandsusanphillipsfoundation.org.

MATH, SCIENCE AND TECHNOLOGY

COMMUNICATION AND EDUCATION

Robert Vassalotti (M.A. '02) is Co-chair of the Middle States 2012 Self-Study for Re-accreditation and Co-chair of the President's Council on Sustainability at Fashion Institute of Technology (www.fitnyc.edu/sustainability).

MATHEMATICS EDUCATION

Jeremiah Sumter, Jr. (M.A. '04) is currently finishing his third year of course work for a doctorate in Educational Policy and Leadership at Hofstra University.

SCIENCE EDUCATION

Tom Holt (M.A. '80) received a Ph.D. in Organic Chemistry from the University of Illinois.

ORGANIZATION AND LEADERSHIP

ADULT EDUCATION GUIDED INTENSIVE STUDY

Jody Spiro (Ed.D. '89) will lead the Wallace Foundation's \$75-million Principal Pipeline initiative, designed to help school districts build a corps of effective principals and to determine whether that effort improves student achievement across the district, especially in the highest-needs schools. Spiro began working as a Senior Program Officer in Education at the foundation in 2002 and became Interim Director of Education last August, when Wallace launched the Principal Pipeline project in six urban districts: Charlotte-Mecklenburg in North Carolina; Denver; Gwinnett County (near Atlanta) in Georgia; Hillsborough County (near Tampa) in Florida; New York City; and Prince George's County (near Washington, D.C.) in

EMPIRICALLY SPEAKING

“In education, people often fight holy wars that are unnecessary,” says Josh Reibel. “For example, a while back the battle was all about learner-centered versus didactic teaching. Today it’s pretty clear that good instruction blends both.”

Fifteen years ago, Reibel, now President and Chief Operating Officer of Wireless Generation, a Brooklyn-based educational software developer, was pretty firmly identified with the learner-centered side of things. After majoring in philosophy as a Harvard undergraduate, he taught in humanities at Dalton, a private school in Manhattan. He more or less discovered technology as a teaching tool when Dalton, with help from TC faculty member Robbie McClintock, brought in networked computers that linked to cultural institutions around the city, empowering students to pursue rich academic experiences.

Following that project, which was written up in *Time*, Reibel joined McClintock on 120th Street to earn graduate degrees at TC (he was a recipient of the College’s prestigious Ben D. Wood Fellowship) and to expand TC’s Institute for Learning Technology. He worked on a \$24 million effort to bring computers to nearly 100 public schools and led an effort funded by the National Science Foundation to develop a more design-focused curriculum for undergraduate engineering students.

“The field was emphasizing a lot of math problem-solving, and it was losing people with creative sensibilities,” he recalls.

But careers in technology, like the field itself, can evolve in unforeseen ways. After leaving TC, Reibel worked on an online commercial start-up for Kaplan, Inc., the for-profit education company, a foray that sensitized him to the realities of the market. And at Wireless, where data-gathering is always essential, he has become even more of an empiricist. The company is known for its expanding array of digital tools that enable classroom teachers to probe student



Josh Reibel

As President and COO of Wireless Generation, Josh Reibel has learned to follow the data

BY JOE LEVINE

understanding of different topics and use the findings to tailor instruction. (One of Wireless Generation’s early successes, mCLASS Math, was developed in conjunction with TC faculty member Herbert Ginsburg.) The company’s handheld tools for early grades have been followed by products and services to help educators throughout K-12 improve classroom instruction, whether class by class or at the district level.

All of which makes for a focus on what is, rather than what should be.

“At Wireless Generation we always ask, ‘So what?’ and ‘Now what?’” Reibel says. “Our tools figure out what story the data are telling us and what we should do about it. Teachers are hungry for more and better ways to use data but often don’t have time to

delve. They deserve the kind of professional training and analytical tools that are offered in a host of other industries, and that are needed to analyze large patterns in increasingly complex data systems. If a tool can’t identify those patterns for them, that tool won’t result in change.”

Judging by the testimonials from various state and county education systems, Wireless’s products pass that test. For example, in Fayetteville, Arkansas, students assessed with the company’s mCLASS tool over multiple years now enter fourth grade at a higher academic level than did students in previous years. In addition, the number of students reading at benchmark in grades K-5 has increased and the number of struggling readers has decreased. The Oklahoma Department of Education attests that, thanks to its work with Wireless, teaching and learning practices across all of its Reading First Schools have significantly improved. And in Clayton County, Georgia, which has structured its elementary-school literacy program around mCLASS, learning outcomes have improved steadily over the past several years.

Reibel believes these successes prefigure much bigger technology-driven gains in the near future. He predicts that as the field overcomes such issues as the lack of a common language for pooling data from digital tools, researchers will be able to develop more empirically based curricula that lead to mastery of core concepts. He also believes that schools will increasingly be able to identify students at risk for failure or dropping out.

“Over the last decade, national education policy has helped drive us toward more specific understanding of individual learning needs, pinpointing student progress,” he says. “Now we’re moving to the next phase of that innovation, in which we will use data to make systemic improvements and see real change.”

Which sounds pretty learner-centered, after all.

tc

Maryland. Following her promotion to director of the Education division, the foundation changed its name to Education Leadership.

The foundation said Spiro has contributed significantly to its efforts in school leadership “by forging strong partnerships between states and districts; through her work with the New York City Leadership Academy and the National School Administration Manager Innovation Project; and through her leadership of the Leading Change Learning Community, Wallace’s most systematic effort to date to help grantees sustain programs and practices that improved school leadership.”

HIGHER EDUCATION

Mildred Garcia (Ed.D. '87) has been appointed President of California State University, Fullerton. She is the first Latina president in the Cali-

fornia State University system. She also sits on President Obama’s Advisory Commission on Educational Excellence of Hispanic Americans, advising the President and the Education Secretary on matters pertaining to the educational attainment of Hispanic students.

INQUIRY IN EDUCATION ADMINISTRATION PRACTICE

Ann Marie Krejcarek (Ed.D. '06) has been selected as President of Schools of the Sacred Heart San Francisco. She has 15 years of leadership experience at Saint Andrew’s, an Episcopal school with nearly 1,300 students. Over the past 11 years as Headmaster and Assistant Head of School, Ann Marie proactively led the development and support of excellent teachers, modifications to curriculum and strategic planning. During her tenure, Saint Andrew’s expanded into

lower grade levels and dramatically upgraded its facilities.

FAMILY AND COMMUNITY EDUCATION

Mildred Brenner-Pollner (Ed.D. '76) is President of Cinema Verite Int’l Inc. In 1993 she was sent by the U.S. government as a consultant to Russian Educational Television, in Siberia, where she produced educational programming. Pollner says that one of her most profound experiences was interacting with the Russian people in closed cities, especially as one of the first American women to travel there. She has been invited worldwide by a number of governments and companies to lecture, teach and provide consulting services—work that has taken her to the former Soviet Union, China, Poland, South and Central America, Cuba, Europe and the Middle East.



Lisa Miller, Associate Professor of Psychology and Education, speaks at “Living in a Traumatic World,” the College’s inaugural TC Roundtable in Psychology, held in December.

PUTTING THE WORLD AT THEIR FINGERTIPS

When Karen Luxton Gourgey looks back on her career, she invariably recalls a talk given at TC during the late 1970s by John Gill, a British scientist who pioneered the development of computer-generated tactile maps to help blind or visually impaired people orient themselves in subways, buildings or cities.

Just as sighted people do, those without sight navigate best when they can form their own cognitive impressions of a given space or route, a process they accomplish with their hands. But in the late 1970s the tactile maps in use in the United States were handmade paper or fabric artifacts. The imprecisions and variations in their topography were subject to frequent misinterpretation. In contrast, the maps Gill was talking about in his lecture were designed by computers and “printed” using technology that rendered the topography according to exact specifications.

“After the lecture, when I put my hand on one of the maps, I couldn’t believe something this textured had come out of a computer,” says Gourgey, who has been blind since childhood. “I knew then that we needed computer-generated tactile maps in this country, too.”

While still working on her Ed.D. in special education, Gourgey got involved with Baruch College’s Computer Center for Visually Impaired People (CCVIP), which she now directs. Over the years she has not only championed the development of tactile maps and other embossed schematic surfaces, but more broadly sought to “crash the print barrier” with every available technology, from electronic Braille displays to speech systems in which a synthesizer does the speaking and a screen reader tells it what to say.

“Karen is a groundbreaker who is very well known internationally for all that she has done to make tactile maps and other technologies part of the conversation,” says Joe Cioffi, founder and CEO of ClickandGo Wayfinding Maps, a company that has created tactile maps for Teachers College and other institutions.



Karen Gourgey

Karen Gourgey (Ed.D., '83) champions the use of tactile maps and other tools that help people who are blind or visually impaired

BY BARBARA FINKELSTEIN

As a longtime advocate of assistive technologies, Gourgey has seen a lot of changes in working and social conditions for blind and visually impaired people. She’s also come to understand that each advance can create new challenges. For example, prior to coming to CCVIP, Gourgey learned FORTRAN, a programming language that entailed the use of 80-column punched cards. “You didn’t dare drop those cards, or it would play havoc with your step-by-step computer commands,” she says. Yet despite its unwieldiness, the card system was congenial to blind users, in part because the punch-card setup could be connected to a computer and used to print out Braille.

Subsequently, graphical user interface (GUI) replaced text commands and punch cards, and computer users suddenly had to interact with pixels, the complex visual data structures that make up graphical icons. Soon computer information could be accessed only through the click of a mouse rather than via text commands. Assistive technology developers had to create a new generation of software, such as Active Accessibility, which can translate GUI information to a screen reader with text-to-speech or Braille output.

“If that sounds complicated, it was,” says Gourgey. “In fact, we have been dealing with the GUI challenge for more than 25 years.”

Even more formidable than the ongoing changes has been assistive technology’s climbing price tag. Today Jaws, the Windows-based screen-reading software, costs about \$1,200. “That’s a lot of money for a population with a more than 70 percent unemployment rate,” Gourgey says. To address that issue, she has overseen the expansion of CCVIP’s vocational track, which offers training in the use of Microsoft Word, Excel, PowerPoint, Internet navigation and Microsoft Access, a relational database management system.

In addition, to secure funding for →

GOURGEY, CONTINUED

qualified students of all ages, Gourgey works with the New York State Commission for the Blind and Visually Handicapped. For students without Commission sponsorship, fees are structured on a sliding scale. "Ideally, we would offer everybody who wants to take advantage of our services in the Division of Continuing and Professional Studies here at Baruch some kind of scholarship," Gourgey says. To that end, she is exploring the possibility of corporate underwriting, especially for the bimonthly workshops run out of the CCVIP demonstration center, where people can try out different assistive technologies.

One upside of the budget constraints at local and state levels, Gourgey says, is that advocates for blind and visually impaired people are taking an innovative approach to finding funding sources. A resource room teacher from Long Island, for example, enlisted the backing of a Lions Club to support local students who want to take CCVIP's vocational track.

"Learning to be competent computer users allows visually impaired individuals to crash the print barriers within their own lives," Gourgey says. "Learning to get around with independence and efficiency in a city such as New York allows people to crash barriers to mobility and physical freedom. The combination is truly emancipating, and I'm very happy that CCVIP continues to work to promote both." **tc**

IF AT FIRST YOU DON'T SUCCEED...

... you may be
the better for it,
argues
Manu Kapur

BY SUZANNE GUILLETTE



Failure may be the dirtiest of all words in K-12 education, but it's enjoying a new vogue in Singapore, a perennial world leader in international comparisons of student achievement.

There, in an exercise calculated to result in what TC alumnus Manu Kapur terms "productive failure," a diverse group of students in grades 7 through 10 are being asked to solve challenging and novel math problems at levels their teachers haven't yet covered.

The idea behind this experiment is that learning results from attempting to solve challenges that go beyond one's current level of skill and experience. Kapur has added a twist by asking groups of students to problem-solve together. The teenagers pool their "intuitive and formal resources" to generate solutions to problems that target concepts such as average speed, standard deviation, and ratio and proportion.

"Students often learn best when they learn from each other by working together, and technology is an ideal collaborative medium," says Kapur, who is both a researcher in the Learning Sciences Lab and an

Associate Professor in the Curriculum, Teaching and Learning Academic Group of Singapore's National Institute of Education.

Kapur grew up in India and spent five years teaching mathematics at the junior-college level in Singapore before completing a doctoral degree in Instructional Media and Technology at TC in 2006. He first explored the notion of productive failure in his TC dissertation, writing about students from Indian high schools who worked in an online chat interface to solve complex problems in Newtonian kinematics.

Kapur's current research in Singapore extends his work from online chat to a face-to-face modality. Students are challenged to generate ideas and solutions to complex, novel problems, and then their teachers conduct lessons that compare those ideas with canonical concepts and solutions. This iterative process helps students and teachers alike identify precisely where and how student thinking is either falling short or, in some cases, proving to be ingenious. A large number of teachers have reported that the method has deepened their own understanding of mathematical concepts as well.

Kapur has received multiple grants, both in Singapore and abroad, to test his ideas and has inspired colleagues in Australia, Germany and India to conduct similar experiments. He has also been invited to give a keynote address in Sydney, Australia, at the 2012 International Conference of the Learning Sciences, the flagship conference in the field.

One of the most exciting outcomes of Kapur's current work is that students who don't perform well on high-stakes academic tests learn as well from productive-failure lessons as do their higher-scoring peers. "This surprises teachers because it runs counter to everything the system is based on," Kapur says. "But to me, it's yet another sign that standardized tests can fail to reflect the skills and intelligence of students whose minds don't work in traditional ways." **tc**

SORTING OUT WHO'S WHO

In today's highly competitive knowledge economy, education credentials are in many ways the coin of the realm. Nowhere is this truer than in the college admissions process. Yet the fates of students and institutions alike have been tied to paper-based transcripts, with nonstandardized formats that too often fail to make essential academic performance data transparent.

"While we take for granted many services in our online lives, transcripts and related data have not been unlocked to help students explore which colleges are most likely to take an interest in them and cue colleges about which high schools are likely to best prepare students for their programs," says Matthew Pittinsky (Ph.D. '08, Sociology in Education). "Paper-based transcript exchange consumes much-needed resources at both sending and receiving institutions."

Parchment Inc., a Scottsdale, Arizona, company led by Pittinsky, markets two online services to address these issues. Docufide.com, a web-based, password-protected transcript exchange network, allows participating high schools, higher-education institutions and employers to securely share electronic transcripts. Parchment.com is the company's free, web-based service that helps transcript owners (students) to establish a secure credential account and to put their data to work in the college admissions process—for example, by identifying institutions where they are most likely to be accepted and to thrive.

"The whole notion of credentials should be more about the substance of what you have learned than the status of the institution where you learned it," says Pittinsky, who is perhaps best known for Blackboard Inc., the pioneering e-learning company he cofounded in 1997. "As long as credential data are fragmented and paper-based, their power to reflect that kind of substance is limited. Docufide.com and Parchment.com enable us to aggregate data and mine the most essential information."



Matthew Pittinsky

Matthew Pittinsky and Parchment Inc. are revolutionizing the analysis of academic credentials

BY PATRICIA LAMIELL

Docufide.com was launched in 2003 by Docufide Inc. Pittinsky joined the company as CEO in January 2011 and subsequently rebranded it as Parchment. The Docufide electronic transcript database now includes information from about one-third of all U.S. high schools, and its transcript volume has doubled each year for the past four years, reaching 1.6 million in 2011. Colleges and universities use the electronic transcript data from Docufide not only to make admissions decisions, but also to help in the placement of students in first-year courses and to figure out what kinds of prior academic experiences predispose students to succeed at their institutions. For example, over time, a college can track how students who took advanced calculus at a particular high school fared in its own civil engineering program. The high school can access that same information, enabling it to adjust its curriculum if necessary and to counsel students as early as freshman or sophomore year about which courses to take and what grades would be

required to get into that college's civil engineering program. Pittinsky calls such a feedback loop between high schools and colleges "the Holy Grail of longitudinal data systems."

While Docufide.com is an institution-oriented service, Parchment.com, launched last year, helps applicants. Parchment.com enables applicants to go online and compare their own profiles to those of successful students at schools and programs they are considering. The site helps students find colleges that are good matches for them and predict how successful they might be there. Pittinsky believes Docufide.com and Parchment.com together make the college admissions process more transparent and efficient.

Parchment Inc. faces some challenges. Its business model is predicated, to some extent, on enabling institutions and individuals to mine statistical information. But as Pittinsky notes, the company's statistical analyses are only as good as the information that high schools and colleges provide. In addition, colleges have come more recently than high schools to the use of electronic transcripts. Many colleges are still unfamiliar with the notion of an electronic transcript intermediary, and even when they are interested in using one, they may only just now be developing practices that leverage transcript data beyond the admissions process.

However, a growing number of higher-education institutions are moving away from using standardized entrance exam scores to evaluate applicants, precisely because, in their view, these tests don't give a clear picture of an applicant's real potential. Instead, many are basing decisions on materials that can't be reduced to statistics, such as essays, interviews and letters of recommendation, and this makes deep mining of nonstandardized data on transcripts and applications all the more important, Pittinsky says. "Transcripts tend to be more valued as standardized-score use goes down."

Pittinsky is an experienced data →

PITTINSKY, CONTINUED

analyst as well as a successful entrepreneur and businessperson, but education is his first love. His mother taught school on Long Island for 30 years, and his father was a college administrator. "Education is in my blood," he says. "It's what motivates me."

Pittinsky earned his bachelor's degree in education policy from American University, where he studied to be a middle-school social studies teacher. He received his master's degree in education from Harvard and then came to Teachers College, where his dissertation research was about how students' in-class friendships, as perceived by teachers, influence teachers' academic expectations. Also at Teachers College, Pittinsky worked with the Gottesman Libraries' EdLab unit to create a prototype for the Networked Education Database (NED), a network of Internet-enabled school information systems similar in concept to Docufide.

In 2008, after graduating from TC, Pittinsky left the full-time management of Blackboard Inc., which had gone public in 2005, to return to academia as a faculty member in the Sociology Department at Arizona State University. He remained Chairman of Blackboard's Board of Directors until 2011, when the company was sold to Providence Equity for \$1.7 billion and taken private.

What's up next for Parchment? Pittinsky hopes private businesses eventually will use the company's technology to improve employee recruitment and hiring. Businesses could benefit from the operational efficiency and analytic applications of credentials data, he says. "Companies from Walmart to IBM are looking to credentials as a proxy for what we know, how well we know it and who we are, in a sense," he says. "Knowing that an applicant took higher-level math is valuable information." **tc**

PUTTING KIDS ON THE CASE

To engage young people in learning, Jack McGourty poses real-world problems ranging from designing a robot to running a business

BY BARBARA FINKELSTEIN

From his earliest days teaching Columbia first-year students basic engineering and product design, Jack McGourty has employed a method that rests on three key components:

- Teach the theory
- Create experiments that can be done in the classroom
- Work on a problem out in the real world

"It's a fail-proof model," says McGourty, Director of Community and Global Entrepreneurship at the Columbia Business School, where he teaches graduate courses in entrepreneurship, venture creation and technology management. "I use it in the classroom and behind an administrator's desk."

In his former role as Vice Dean of Columbia's Fu Foundation School of Engineering and Applied Science, McGourty adapted that model to the Harlem Schools Partnership, a joint effort between the engineering school and Teachers College to improve the teaching of science, technology, engineering and math (the so-called STEM subjects) at a group of public schools in Harlem and Upper Manhattan.

McGourty began laying the groundwork for the engineering school's participation in that partnership in 2006, when he established the Center for Technology, Innovation and Community Engagement (CTICE). In 2009 he joined forces with TC's Office of School and Community Partnerships, headed by Associate Vice President Nancy Streim, to win backing for the effort from the GE Foundation. Since then, doctoral students from TC and Columbia Engineering have been getting kids of all ages excited about robotics, green audits, cyber safety and a host of other STEM-related topics.

"We have all sat in math and science classrooms where we were taught to find one right answer," says McGourty, who received his M.S. in Clinical Psychology from Teachers College in 2002 and completed a Post-Doctoral Re-specialization Program in Clinical Psychology at the College that same year. "This kind of thinking works for computing two plus two, but it won't solve open-ended problems like how to create energy-efficient buildings or even how to design a video game."

In focusing on real-world problem solving, McGourty, who also holds a Ph.D. in Applied Psychology from Stevens Institute of Technology, often emphasizes the connection between the STEM subjects and running a business. Through CTICE, for example, he established the Columbia-Harlem Small Business Development Center (SBDC), a federally-funded project that links students to local businesses and supports job creation in the community. He also introduced a 15-credit



Jack McGourty

“I’M A BIG BELIEVER THAT IF WE CAN GET STUDENTS TO USE THEIR STEM SKILLS WITH ENTREPRENEURIAL PASSION, WE’LL SEE GLOBAL CHALLENGES SOLVED.”

—JACK MCGOURTY,
DIRECTOR OF COMMUNITY
AND GLOBAL ENTREPRENEURSHIP,
COLUMBIA BUSINESS SCHOOL

interdisciplinary undergraduate minor in entrepreneurship that combines the development of engineering skills with a commitment to community service.

McGourty won corporate sponsorship for these CTICE programs in part through his own adroit entrepreneurship, but also because of his genuine belief that through such efforts, teachers and students can change the way they think and make life everywhere a little better.

Many students are showcasing work they began in one of McGourty’s community-based programs. Victoria Nneji, a sophomore at the engineering school, founded Digital STEM, a grant-funded project that teaches elementary- and middle-school students how to refurbish used computers. Andrea Sreshta and Anna Stork, 2011 graduates of Columbia’s Graduate School of Architecture, Planning and Preservation who went through the CTICE entrepreneurship program, developed

a solar lantern that they are now selling through their company, LuminAID Lab, as a disaster relief light source to people in Haiti, Ghana and Nigeria.

Currently, McGourty is the driving force behind In-V-Ent-Ed™, a new program to educate aspiring entrepreneurs across the globe. He is forging partnerships with corporations, governments, NGOs and academic institutions to support regional innovation and economic development. This year he will be teaching hundreds of high school students in China, India, Turkey and the United Arab Emirates about entrepreneurship and innovation.

“I’m a big believer that if we can get students to use their STEM skills with entrepreneurial passion, we’ll see global challenges solved, such as buildings using energy more efficiently,” McGourty says. “And we’ll see young people use data to solve big public health issues.” **tc**

(DE)VICE SQUAD LEADER



Nabeel Ahmad

Nabeel Ahmad (Ed.D., '09, Instructional Technology and Media) believes everyone has something to learn from mobile apps

BY SIDDHARTHA MITTER

When Nabeel Ahmad runs into a snag writing code for a mobile application, he does what many programmers do: He submits his problem to the crowd.

"I copy-paste the error, and I go to a site like Stack Overflow, where there are people having similar problems," says Ahmad, who earned his doctorate from TC in 2009 and now returns every year as an adjunct professor. "It's problem-based learning. You don't necessarily care who is helping you; it's just the nature of getting some help."

Other tools work the same way, Ahmad says—for example, the mobile apps that museums increasingly use to help visitors get the most out of their exhibits, or the apps that teach users a language in small but effective doses, for instance by selecting and helping them through news articles on topics that interest them.

COURTESY NABEEL AHMAD

In his day job as a learning developer at IBM, Ahmad, an Oklahoma native with a background in business and computer science, creates and deploys similar learning tools that the corporation's 450,000 employees can access on phones and tablets. His work on IBM's mobile-learning strategy stems from his TC doctoral dissertation in Instructional Technology and Media.

"The main thing I looked at was what people use their phones for in a workplace setting," Ahmad says. "Do they want access to learning material, and if so, what type of material?"

At IBM, he found, most intensive mobile users were "client-facing" sellers and consultants on the move. They didn't have time for 60-minute training courses. Rather, "they're looking for just-in-time information: something they can pull up at the time of need that will help them with the client. It's not necessarily the first time they're viewing this information, but they need it for quick recall."

Problem-based learning is common among computer programmers, but it's far from standard practice in schools. Of course, an IBM consultant making client calls has needs that differ from those of an adult language learner, a college student, or a child in elementary school. But Ahmad says that the increasingly ubiquitous tools of smartphones, handheld devices and social networking platforms offer new learning opportunities in every context.

"There are core underlying similarities from a design standpoint, from a curriculum standpoint," he says. "No matter the setting, you have to get certain things right." For instance, museum apps that are overly visual or text-heavy tend to backfire because they distract the visitor from the actual exhibition. Better apps, he adds, make more use of audio, which complements the visual input the visitor is receiving.

At TC, Ahmad teaches a class on mobile-phone learning (with fellow TC grad Dominic Mentor), a spin-off course on handheld devices, and another titled "Social Media & Learning" (with Tariq Ahmad).

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—NABEEL AHMAD,
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INSTRUCTIONAL TECHNOLOGY AND MEDIA

The latter is designed to appeal to students in every TC department, with potential applications that run the gamut from creating physical-education instructional videos to conducting remote, group-based therapy in real time. Ahmad guides students from the social learning and social development theories of Albert Bandura and Lev Vygotsky to the use of these theories in different learning contexts. In one lesson, a student demonstrated how an iPad app called Inkling can be used to make reading textbooks more social. (Users can see others' notes while reading chapters, highlight sections they find useful, and follow other users, thereby creating a social learning network.) In another lesson, the class used the language-learning app Voxy to demonstrate the power of situated learning (learning that takes place in the same context in

which it is to be applied).

"We learned the word for 'green' in Mandarin," Ahmad says. "Then we contextualized our learning by taking a picture of something green nearby—in this case, my sweater. Then the app spoke the word 'green' to us and showed us the character and transliteration."

Ahmad imports an impressive cast of guest speakers to his classroom, including scientists from IBM Learning, experts in international media development from Columbia's School of International and Public Affairs, officials from the New York City Department of Education and entrepreneurs from technology start-ups.

Ahmad is quick to note that, as much as Facebook, Twitter and other social media tools have become part of our lives, schools often expressly ban the devices that facilitate their use. "I don't blame them," he says of educators leery of the distractions caused by smartphones and other gadgetry in the classroom. But, he says, such bans prevent a lot of potential learning.

He believes social tools are edging their way toward the classroom. He cites the platform Piazza, which lets students and teachers interact and collaborate, and TeacherTube, where teachers and learners share instructional videos. Apps are also sprouting up that students can use outside of school, for instance on field trips.

Ahmad says that mobile tech evangelists are a growing force in education policy at both the federal and local levels. One, Lisa Nielsen of the New York City Department of Education, who maintains a popular personal blog on education innovation, has spoken in his class.

Ahmad is optimistic that the field of education is catching up with innovative ways that people are learning in different settings. He finds his TC students eager to know what is happening in the business world, where neat-sounding innovations are put to the test. "Ideas are cheap, in a way," he says. "It's the execution that matters." **tc**

Alice Wilder LEARNING ANYTIME, ANYWHERE

Alice Wilder is an award-winning developer of educational children's media who talks and listens to kids and represents their voices throughout production.



ALICE WILDER (ED.D., EDUCATIONAL PSYCHOLOGY, '98) PRODUCED NICK JR.'S *BLUES CLUES*, AND SHE WAS CO-CREATOR OF PBS Kids' *Super Why!*, an interactive preschool literacy series. She also produced *Cha-Ching Money Smart Kids*, an animated children's financial literacy "edutainment" show, for Cartoon Network Asia and hopes to get it distributed in the United States soon. Her latest project is *Speakaboos*, a home and classroom resource of online stories and activities to develop a love of reading among children ages 2-7. **ON THE POWER OF "E":** "Media in all its various platforms—TV, Internet, tablets—allows kids to learn anytime, anywhere," says Wilder, a former President of TC's Alumni Council. "It has made educators think about the teacher as a mentor—a potential resource rather than an all-knowing sage on the stage. We will always need the human touch, but technology allows educators to reach potentially millions of kids a week. That's crazy! That's powerful!" **ON PERSONALIZING LEARNING:** "Because different learners learn in different ways, technology has the flexibility to reach students where they are and use techniques that work for them. If you are a visual learner, video can make concepts concrete that are otherwise abstract. Information is more accessible than ever. Therefore, research skills, problem solving, creative thinking and innovation are some of the 21st-century skills that need to be nurtured and developed." **ON THE TMI FACTOR:** "Going forward, the big challenge is going to be distribution. There are over 500,000 mobile apps in the Apple store, and over 70,000 of those are tagged as educational. Sixty hours of video are uploaded to YouTube every minute. How do you get people's attention? People can only learn from content we are all developing if somebody's actually consuming it." **ON SPEAKABOOS:** "*Speakaboos* is an online library for digital books. There's a high level of both entertainment and education, with an intentional focus on reading comprehension, as opposed to pure entertainment." **ON 120TH STREET:** "TC was a perfect home for me. TC gave me both the theoretical knowledge and the applied knowledge and experience to bridge the gap between theory and practice." **tc**



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SPRING has arrived at TC and with it a slew of activity—in particular, Academic Festival, this year themed (like this magazine) “Rewiring the Learning Landscape.” To view videos of the many talks and presentations at the Festival, visit www.tc.edu/festival.