

International Review

University research split 'disastrous'¹

Sean Coughlan

A university chief is warning of "disastrous" consequences if the government draws a dividing line between institutions that teach and those that carry out research.

While attention has focused on student fees, the forthcoming review of higher education will also address the funding and function of universities. And vice-chancellors have expressed deep reservations over reports that some universities will be devoted to teaching, and will no longer be able to support research or award PhDs.

In particular, there are concerns among some "new" universities that they will be excluded from research. Such an outcome would be "fairly disastrous" for new universities seeking to attract academic staff and more able students, says TIM BOATSWAIN, pro vice chancellor at the University of Luton. "If a lecturer was starting his or her career, would they want to accept a place at a university where they could only teach and could not carry out research?"

Damaging

It would also be "seriously damaging" to the recruitment of students, he says, discouraging applications from more able students. The effect would be a polarisation of institutions and the creation of a "second division" of universities, he says.

These universities, without researching academics, run the risk of becoming unprestigious local teaching institutions which fail to develop the full potential of students. And this would undermine the international reputation of the higher education system in the United Kingdom. "What distinguishes higher education from further education is the obligation to carry out research," he says.

Cost saving

"It is difficult to see what advantage there could be from stopping universities carry out research. It would be very disappointing." He also argues that teaching and research are interwoven - and that teaching benefits from academic research.

¹ The BBC, March 13, 2003. See <http://news.bbc.co.uk/1/low/education/2654553.stm>

It has been suggested that as a cost-saving measure that research funds could be concentrated in a smaller number of institutions. And it is assumed that this would benefit the traditional, longest-established institutions.

But less-glamorous universities fear that losing PhD programmes and research projects would mean a loss of status and make it even harder to attract students. And there are concerns that for hard-pressed new universities, it could mean an unwelcome blurring of the boundary between higher and further education.

Ethnomathematics²

Dirk Olin

Mathematics is one academic subject that would seem to reside in a world of universality, protected from competing opinions by the objectivity of its laws. But the real universal law is that everything is relative, even in math. The release last month of a new math curriculum for New York City schools by Mayor MICHAEL R. BLOOMBERG has elicited something just short of vituperation.

Back-to-basics advocates denounce as "fuzzy math" its inclusion of so-called constructivist teaching techniques. Critics complain that those approaches encourage self-discovery and collaborative problem-solving at the expense of proved practices like memorization, repetition and mastery of algorithm.

It's all the latest in a century of American math wars. The previous generation can remember the struggle over "new math" during the 1950's and 60's. ("Hooray for new math/New-hoo-hoo math!" TOM LEHRER sang. "It won't do you a bit of good to review math./It's so simple./So very simple./That only a child can do it!") Battles flared even earlier in the century over "progressive" agendas for math education of the type pushed by JOHN DEWEY.

How tame those struggles seem, however, when compared to the rising vanguard of self-described ethnomathematicians. For some, the new discipline just means studying the anthropology of various measurement methods; they merely want to supplement the accepted canon -- from PYTHAGORAS to EUCLID to NEWTON -- with mind-expanding explorations of mathematical ideas from other cultures. For others, however, ethnomathematics is an effort to supplant the tyranny of Western mathematical standards.

The Postulates

Ethnomathematics has a few parents, but most observers trace its formal birth to a speech given by the Brazilian mathematician UBIRATAN D'AMBROSIO in the mid-1980's.

² Dirk Olin is national editor at The American Lawyer. From the *New York Times* [Magazine], February 23, 2003. See <http://www.nytimes.com/2003/02/23/magazine/23CRASH.html?ex=1047100912&ei=1&e>

Now an emeritus professor of math at the State University of Campinas outside Sao Paulo, he explained his thinking a couple of years ago to *The Chronicle of Higher Education*: "Mathematics is absolutely integrated with Western civilization, which conquered and dominated the entire world. The only possibility of building up a planetary civilization depends on restoring the dignity of the losers." ROBERT N. PROCTOR, who teaches the history of science at Pennsylvania State University, says he wants to counter the notion "that the West is the be all and end all" when it comes to mathematical studies. "After all," he adds, "all math is ethnomath -- not just African kinship numerics or Peruvian bead counting, but also the C.I.A.'s number-crunching cryptology and Reaganomics."

To redress their pedagogical grievances, these ethnomathematicians want math curricula that place greater emphasis on the systems of previous civilizations and certain traditional cultures. Studies of state civilizations might focus on Chinese or Arabic math concepts. One study, for example, has shown how the Chinese Chu Shih-chieh triangle anticipated by more than three centuries the highly similar arrangement of numerals by Pascal that holds sway in many Western teachings of probability theory.

In her seminal books "Ethnomathematics" and "Mathematics Elsewhere," MARCIA ASCHER, emerita professor of mathematics at Ithaca College, chronicles the astonishingly complex data-storage systems embedded in quipu, bundles of cotton cord knotted by Incans according to a sophisticated base-10 numeration system. At a more quotidian level, RON EGLASH of Rensselaer Polytechnic Institute has written and taught extensively about the nuances of fractals, or repeating patterns, that can be found in certain African craft work. (EGLASH stresses a distinction between simple-minded multicultural math -- "which merely replaces Dick and Jane counting marbles with Tatuk and Esteban counting coconuts" -- and what he calls the "deep design themes" that represent mature, developed mathematical systems too often ignored in the study of many societies.)

What Its Critics Fear

Some of this is just fine, says DAVID KLEIN, a professor of mathematics with California State University at Northridge. Klein (a self-described liberal who insists on separating his academic critique from any connection to a conservative political agenda) says the danger lies in allowing such precepts to crowd out fundamentals on which modernity is based. He argues that the statistically lower achievements of some female and minority math students have resulted in an overreaction that doesn't serve their interests. "The practical effect," Klein says, "has been watered-down math books that overemphasize inductive reasoning (like continuing visual patterns), because this is supposed to be good for women and minorities, and de-emphasizing deductive reasoning and mathematical proofs, which is the heart of mathematics, because that supposedly favors white males.

"But mathematics is a worldwide monoculture. Look at the chalkboards in math departments at universities all around the world - in Africa, Asia, Europe, Latin America.

You will see the same symbols everywhere you go on this planet, except perhaps in colleges of education where fads reign supreme." KLEIN says he does spend some class time discussing the math of Mayans, Egyptians and other early civilizations. "But ancient techniques and early discoveries in math will not take students very far who want to do something in the modern world with mathematics," he says.

Will It Pass?

Some proponents argue that whatever the freestanding authenticity of the cross-discipline, it is useful as a carrot to attract indifferent students. PHILIP STRAFFIN, who has been teaching the popular "Cultural Approaches to Mathematics" at Beloit College for about 10 years, says that the lectures lure a mix of teachers in training and art students: "Every time we give this course, there are twice as many students who want to take it as we have room for." As long as such developments complement and enhance rather than take time from and substitute for other mathematics learning. JUDITH GRABINER, who teaches at Pitzer College, says they are a plus. "I don't want people teaching students that MOHAMMED IBN MUSA AL-KHWARIZMI gave a systematic treatment of quadratic equations in the 10th century instead of learning how to solve quadratic equations," she says. "But that's a false choice. Putting the *math in its cultural context helps teach the mathematics* and makes it more meaningful to students, since it has a human context." - Indeed, those who think this threatens to spawn a brave new world of mathematical correctness might search their memories to recall if they didn't have a fourth- or fifth-grade teacher who brought an abacus to class. ---

Calculating Cultural Impact

From 'Ethnomathematics: A Multicultural View of Mathematical Ideas,' by MARCIA ASCHER.

For mathematics, however, there has been a long philosophical debate on the reality of the objects it studies. Is a square something that has external reality or is it something only in our minds? - The relationship between the length of the hypotenuse and lengths of the sides of a right triangle is an eternal truth, but that does not mean that any other culture need share the categories triangle, right triangle, hypotenuse. - A critical issue is that, as it stands, much of mathematics education depends upon assumptions of Western culture and carries with it Western values. Those with other traditions are, as a result, often turned away by the subject or unsuccessful in learning it. And, for them, the process of learning mathematics, particularly when unsuccessful -- but even when successful - can be personally debilitating as it detracts from and conflicts with their own cultural traditions. - [In] the United States, the concern has been stimulated by the realization that our educational approaches have yet to come to grips with the fact that we ourselves are a multicultural society."

The War on Schools³

Bob Herbert

There's something surreal about the fact that the United States of America, the richest, most powerful nation in history, can't provide a basic public school education for all of its children.

Actually, that's wrong. Strike the word "can't." The correct word is more damning, more reflective of the motives of the people in power. The correct word is "won't."

Without giving the costs much thought, we'll spend hundreds of billions of dollars on an oil-powered misadventure in the Middle East. But we won't scrape together the money for sufficient textbooks and teachers, or even, in some cases, to keep the doors open at public schools in struggling districts from Boston on the East Coast to Portland on the West.

In Oregon, which is one of many states facing an extreme budget crisis, teachers have agreed to work two weeks without pay, thus averting plans to shorten the school year by nearly five weeks. A funding crisis in Texas, where the state share of school financing has reached a 50-year low and is expected to go lower, has local officials preparing for cuts in everything from extracurricular activities and elective subjects (like journalism) to teachers, counselors and nurses.

"Districts across the state have been in a cost-cutting mode for a number of years," said KAREN SOEHNGE of the *Texas Association of School Administrators*. "When you continue that cutting over a lengthy period of time, you're cutting to the bone. We're concerned because in Texas we have increased standards for student learning. So we have increasing expectations and diminishing resources, two irreconcilable forces."

Similar stories can be heard in state after state. In New York, more than 1,000 students, teachers, administrators and activists traveled to Albany on Tuesday to march against proposed state budget cuts that are so severe they mock the very idea of the sound, basic education the state is obliged by law to provide.

Among the banners and signs waved by the students was a placard that showed an American flag and said: "Public Education - An American Dream. A Dream That No One Wants to Pay For."

The superintendent of the Buffalo school system, MARION CANEDO, was among those who traveled to Albany. When she talks about the cuts she's had to make and the cuts

³ From the *New York Times*, Thursday, March 6, 2003. See <http://www.nytimes.com/2003/03/06/opinion/06HERB.html?ex=1047969655&ei=1&en>

currently being considered, her voice has the tone of someone who has just witnessed a chain-reaction auto wreck. "It's the worst thing I've ever seen, and I've been in the district 35 years," she said. "I mean we're looking at crazy things, like a four-day week, no kindergarten, no pre-kindergarten, no sports."

If Gov. GEORGE PATAKI's proposed cuts are enacted, the Buffalo schools will be in a \$65 million budget hole, with no viable solutions in sight. "I've done everything I could think of," Ms. CANEDO said. "I've closed schools. I've suspended service at schools. It's been horrible."

There is no way to overstate the gulf between the need for funding and the reality of funding in urban school districts. And that gulf is widening, not narrowing.

Ms. CANEDO gave one example of the many extraordinary needs. "I have students who come here as maybe sophomores speaking no English whatsoever," she said. "We have to make sure they pass the English Regents or they're not going to have a high school diploma. Our job, our core mission, is to educate, not to warehouse. So we need to give that student extra English all year long."

Education is the food that nourishes the nation's soul. When public officials refuse to provide adequate school resources for the young, it's the same as parents refusing to feed their children. It's unconscionable. It's criminal.

The public school picture across the country is wildly uneven. There are many superb school districts. But there are so many places like Buffalo (including big and small cities and rural areas), where the schools are deliberately starved of the resources they need, and those districts are the shame of a great nation. When it comes to education financing, the divisions among federal, state and local government entities are mostly artificial. It's everyone's obligation to educate the next generation of Americans.

It's an insane society that can contemplate devastating and then rebuilding Iraq, but can't bring itself to provide schooling for all of its young people here at home.

Mathematics Education and "Scientific" Research⁴

W. Gary Martin

These days "scientific research" is the talk of the town (or at least Washington, D.C.) in education. *No Child Left Behind* and other federal programs mandate an emphasis on "evidence-based" instructional methods and curricula.

⁴ From the <http://mathematicallysane.com/home.asp> website. See <http://mathematicallysane.com/evidence/scientific.asp#top> Provided by W. Gary Martin, associate professor at Auburn University.

We certainly agree that it is important to have evidence for the effectiveness of the methods used. In fact, there exists a large body of evidence supporting the "reform" approach to mathematics education; check out the *Evidence* section of the *Mathematically Sane* web site - <http://mathematicallysane.com/evidence.asp>. Methods and materials aligned with this new vision of mathematics education really work.

The reform curricula - <http://mathematicallysane.com/evidence.asp> - (a.k.a. "NSF curricula", since they were funded by the *National Science Foundation*) were designed to embody the new vision for mathematics. And they are posting impressive gains in student outcomes. Refereed journal articles, upholding the highest standards in research, have documented these positive effects at all levels:

- at the elementary school level (see the ARC Tri-State study - <http://mathematicallysane.com/evidence/arc.asp> - and the Massachusetts study - <http://mathematicallysane.com/evidence/mass.asp>)
- at the middle school level (see the Middle School study - <http://mathematicallysane.com/evidence/impactmiddle.asp>), and
- at the high school level (see Core-Plus study - <http://mathematicallysane.com/evidence/cmp.asp>).

A new book (*Standards-Based School Mathematics Curricula: What Are They? What Do Students Learn?* - <http://mathematicallysane.com/evidence/sbsmc.asp>) carefully lays out much of the evidence supporting these curricula. Also, urban school districts that set out to systemically reform their mathematics instruction, generally using these new curricula, unanimously got significantly positive results... on whatever tests were mandated by the districts (see USI study - <http://mathematicallysane.com/evidence/usi.asp>).

Indeed, none of the traditional skills-based curricula have undergone the rigorous testing that the reform curricula have. And even if such testing were done, the results are all but certain. These traditional instructional methods caused the low achievement which first motivated the reform movement more than three decades ago. Moreover, we continue to see solid gains in mathematics nationwide on the National Assessment of Educational Progress (see NAEP results - <http://mathematicallysane.com/evidence/naep.asp>), the long-term NAEP - <http://mathematicallysane.com/evidence/naeptrends.asp> - which measures basic skills (see Long-term NAEP), and the SAT (see SAT Gap - <http://mathematicallysane.com/evidence/satgap.asp>). While we're not yet where we want to be, we are certainly headed in the right direction.

While some propose that we return to the "good old days," the evidence exists that those Good Old Days Never Were - <http://mathematicallysane.com/analysis/goodolddays.asp>. It is time that we move forward. Thus, in answer to those suggesting that mathematics teaching be based on evidence, we say BRING IT ON! Because the evidence clearly supports the new vision of mathematics education.

Study: Teachers should emphasize math concepts⁵

WASHINGTON (AP) - American teachers must do more to help students understand the concepts of math, not just the mechanics of how to solve an algebra or geometry problem, an international review of 8th-grade classes suggests.

The four-year study analyzed videos of teaching techniques in seven countries, including six that score higher than the United States in math achievement: Japan, Hong Kong, the Czech Republic, Switzerland, the Netherlands and Australia. Researchers cautioned Wednesday they cannot draw direct links between the teaching techniques and the countries' levels of success, particularly because so many factors affect learning. They also said the study did not aim to pinpoint features of good teaching, although more review is planned that could help produce specific tips for U.S. teachers.

The authors said U.S. teachers spend less time than counterparts in higher-achieving countries on explaining math's underpinnings. "They're more focused on getting the answers, and less focused on giving students the opportunities to really engage in serious mathematical work," said JAMES STIGLER, chief executive officer of *LessonLab*, which conducted the study for the Department of Education. "Finding ways to engage students in conceptual thinking -- it doesn't fit within our cultural script of how you teach a math class," he said.

How those specific skills are developed "may be the real key," said University of Delaware professor JAMES HIEBERT, another leader of the math video study. Even when they present problems that link ideas to formulas, U.S. teachers often end up in step-by-step mode. "We have to worry about whether students are understanding what they're being asked to do," he said. For example: "Why is that skill working? Why do you divide now? Why do you take the square root here? Why am I finding the lengths of the these two diagonals?"

The study underscores there is no single correct way to teach math, officials said. "It shows there are many paths to excellence in teaching," said WILLIAM FRASCELLA, an education leader of the *National Science Foundation*, a partner in the study. "Unfortunately, it appears from initial results that the United States is not able to use any one of these paths in a consistent and sustained manner."

The Education Department plans to make available public copies of videotape examples in compact disc form. Results of the science-video portion of the Trends in International Mathematics and Science Study will be released later.

⁵ From *CNN.com/Education*, Wednesday, March 26, 2003.
See <http://www.cnn.com/2003/EDUCATION/03/26/math.countries.ap/index.html>

Tests 'misused' by politicians, say heads Heads warn against "misrepresented" test results⁶

Test results are being misused by governments around the world, warn head teachers attending an international meeting of school leaders. Head teachers meeting in Ottawa in Canada, under the auspices of the *International Confederation of Principals*, said that political pressures on test results could distort education systems.

Many tests appear to be more about responding to public pressure than about providing timely, relevant and meaningful information.

NOLA HAMBELTON, *International Confederation of Principals*⁷

And this over-emphasis on tests and league tables could become an obstacle to the efforts of pupils and their teachers. "Principals are not opposed to testing, but they are increasingly concerned about how the tests and the results are being misused and misinterpreted," said NOLA HAMBELTON, a school principal from New Zealand and president of the *International Confederation of Principals*.

"Based on the experiences from several different countries, many of the tests our members have had to administer appear to be more about responding to public pressure and lobby groups than about providing timely, relevant and meaningful information to parents, students and teachers."

'Pointless'

League tables were also criticised by head teachers. "Ranking schools is a pointless but popular exercise, especially with the media, that does very little to help parents understand the various and several reasons that influence student achievement," said HUGH FRASER, a school principal from Winnipeg. "Whole school boards are now 'teaching to the test' and having their teachers coach students in taking the test, rather than teaching them the regular curriculum," said Mr FRASER. A head teachers' union from the United Kingdom, the *National Association of Head Teachers*, was among the organisations represented.

And SUE SAYLES, head of Riccall Community School in York, said that "national testing is an issue facing school leaders around the world. - Coming from a country where the curriculum is driven by testing, it is important that we share with colleagues the dangers of governments going down this route." "Teaching to the test and narrowing of the curriculum are not beneficial to students".

⁶ From the *BBC*, Monday, February 17, 2003.

See <http://news.bbc.co.uk/1/hi/education/2771725.stm>

⁷ Sidebar

Educator's drills improve kids' skills⁸

Midori Matsuzawa

As soon as the sixth-year primary school boy said, "Ready, go," his classmates began calculating division problems at an amazing speed. The boy held a stopwatch as his classmates raced through worksheets filled with 100 questions. When the first student finished, the boy read the time aloud: 1.09 minutes.

This was a scene from video footage taken during a calculation practice session in May last year at *Yamaguchi Primary School* in Asagocho, Hyogo Prefecture, where HIDEO KAGEYAMA taught until last month.

KAGEYAMA showed his students' performance as part of a demonstration of his methods during a recent symposium held in Ginza, Tokyo. He has become one of the nation's most famous teachers for helping improve academic performance through fundamental skills training.

Audience members exclaimed in amazement at the students' performances, as those in attendance had struggled with similar division questions before watching the video. The questions were not simple ones like dividing 25 by 5, but more complex ones such as dividing 33 by 9 or 71 by 9. In the former question, for example, students must subtract 27 from 33 to find a remainder, a process KAGEYAMA described as a major hurdle for children.

"Most of my students can finish within two minutes," the 45-year-old KAGEYAMA said, adding that those finish earlier then do additional exercises on the back of their worksheets for the remaining time. "They never lose concentration during the five-minute practice session."

The March 29 symposium featured demonstrations by three of today's leading educators. It was organized by ENJIN (*Encourage Japan Intelligent Network*) 01 Bunka Senryaku Kaigi, a group of about 150 people from business, cultural and academic fields that aims to promote cultural development.

For more than 10 years, KAGEYAMA has emphasized intensive, repetitive, daily practice in reading aloud, writing kanji and doing calculations to help his students build a firm academic basis.

His trademark item is the "100-box calculation chart" that he uses to improve addition, subtraction and multiplication skills. Boxes in the first column and first line of the chart each contain the numbers 0 to 9 in random order. Using these figures, students fill in the

⁸ From the *Daily Yomiuri* [Japan] 2003. See: www.yomiuri.co.jp/newse/20

100 boxes by performing a specific mathematical operation. Finishing within two minutes shows development in solid calculation abilities, according to the teacher.

Keeping time is not intended to encourage competition, but to help build self-confidence because students can improve their times through repeated practice, KAGEYAMA emphasized. "You have to produce a warm classroom atmosphere to enable slower students to feel comfortable even when faster students complete their work. Otherwise, it'd just end producing students who hate math," he added.

KAGEYAMA said primary school children always feel that they may not be able to do what is asked of them and therefore easily develop complexes. "Teachers should repeatedly tell them, 'You can do that if you try,'" he said. He added that such encouragement should be backed by materials that clearly show improvement, pointing to the 100-box calculation charts as an example.

KAGEYAMA also referred to his kanji-writing system, by which he teaches a full year's worth of kanji in the first month of the school year, so that students can review them repeatedly over the course of the remaining period.

Implementing the "Kageyama method" has enabled the school to send an increasing number of students to the nation's prestigious universities-- unusual for a rural public institution.

Increasing interest in his method may be traced to growing concerns over declining scholastic abilities among children. These concerns have increased with the official start last year of the revised primary and middle school curriculums that reduce not only class hours but also the materials studied. In light of these growing concerns, the Education, Science and Technology Ministry has moved to focus on basic scholastic abilities - a move seen as abandoning the policy of "cram-free" education.

One of KAGEYAMA's books, *Honto no Gakuryoku o Tsukeru Hon* (The Book to Help Children Acquire Real Scholastic Ability) has become a best-seller, while compilations of his worksheets are also enjoying brisk sales.

Kageyama's holistic approach

However, some observers have criticized KAGEYAMA by describing his intensive training method as knowledge-based education. In response to such criticism, the teacher said mastering his system is not an end goal, but "can save time for higher-level studies."

"Hands-on studies are interesting, but they require a lot of time for preparation," he said, adding that he tries to finish calculations and other exercises for which answers can be easily found as soon as possible. "Frankly, I emphasize calculation practices, but in fact,

by practicing these skills intensively, I try to spend less time on them."

KAGEYAMA has insisted there are three steps for children to improve their scholastic abilities. In the first stage, children should be exposed to *healthy learning environment* conditions, while the second and third stages emphasize *repeating basic skills training* and *developmental studies*, respectively.

"It'd be impossible to let children do the 100-box calculation chart if they stay up late watching television and skip breakfast," KAGEYAMA said. Children should be encouraged to build sound living habits - as schoolteachers have traditionally encouraged - before going on to training in basic scholastic skills, he added.

In addition, KAGEYAMA has asked the parents of students at *Yamaguchi Primary School* to improve meals served at home, based on scientific research that proves a link between students' scholastic scores and the *variety of food* they eat at each meal. The study was done by MASAYOSHI HIROSE, a Tokyo schoolteacher and researcher, and KAGEYAMA has distributed its results to parents every year since he came across it in 1994.

KAGEYAMA said a recent study conducted by a nutritionist proved that the students at his school ate healthier, *more balanced breakfasts* than students at neighboring schools. Basically, most breakfasts consisted of rice and miso soup, in addition to one or two accompanying dishes.

"Despite our local community's sluggish economy, the mothers make every effort to guarantee better meals," KAGEYAMA said. "The performances on the 100-box calculation charts can't be assessed without considering this fact. The mothers' efforts have really supported our school and our academic practices."

On April 1, KAGEYAMA took up a new job as principal of *Tsuchido Primary School* in Onomichi, Hiroshima Prefecture, a post for which he was selected out of about 60 candidates. The prefectural board of education last year organized a public screening for the position after the institution was designated as a pilot school by the ministry to examine a new type of school management. The principal is given more authority in personnel affairs and curriculum programming, and the school does not observe district boundaries for admission purposes, opening itself to children living anywhere in the city.

KAGEYAMA said he decided to apply for the post as he had achieved everything he had wanted to as a classroom teacher. He is well aware that the public will keep an eye on him, waiting expectantly for what his new challenge will bring about in the field of education.

A tough maths problem⁹

Glen Owen

A fall in the number of maths teachers means schools are using unqualified staff

Amid the Flurry of statistics about staff shortages in schools, one fact shines out: the number of maths teachers has halved in a generation. Twenty years ago there were more than 40,000 qualified maths teachers in English secondary schools; now there are barely 20,000.

As a result, the days when most pupils could expect to absorb the subject from a teacher steeped in algebra and trigonometry have gone. Now the subject is often taught by PE teachers and unqualified assistants. A survey by the *Open University* found that nearly one in four maths teachers in secondary schools has no relevant qualifications for the job.

At *Senacre Technology College* in Maidstone, SHEILA STOREY, the head teacher, has adopted this approach. She has placed GEMMA SIMMONS, a 22-year-old unqualified teacher with an A level in maths, in charge of classloads of budding mathematicians.

"I do not think my lack of qualifications has hindered me," says SIMMONS, who has been teaching at the school since September 2001, and takes groups of up to 24 pupils aged between 11 and 16. "In fact, the pupils relate better to me than they do to some of the other teachers. I have had a lot of support from the school and the local authority. For most of the first year I had a qualified teacher working with me."

Waves of maths teachers are reaching retirement, with few replacements arriving from university. Salaries in the City for good maths graduates can start at £35,000 and rise quickly to six figures. Teaching, which offers less tangible rewards, finds it hard to compete - a situation that is predicted to become even worse with the advent of higher university fees.

Schools are increasingly forced to find other ways. Senacre, for instance, is helping to fund SIMMONS through a maths degree with the *Open University*. "I am doing it in my spare time," SIMMONS says. "The school's help means that I can gain my degree without all the debts associated with university."

⁹ From *The TimesOnline* [UK], Thursday, February 6, 2002. See <http://www.timesonline.co.uk/printFriendly/0,,1-50-567229,00.html>

STOREY says that government inspectors have applauded her approach. "It has worked well," she says. "We have developed a strong system of support. At least once a week we have experts coming in to talk to GEMMA about issues such as peer mediation and lesson planning."

"I don't think that her lack of qualifications is getting in the way of her dealings with the children. The inspectors told us that we are doing a remarkable job with our unqualified teachers, and that in many respects they are performing better than our qualified staff."

STOREY says that such an approach is particularly logical at schools such as hers where a high proportion of the children have special needs and therefore do not need to be taught to a high academic level.

Such initiatives are essential if the spiral of decline is to be avoided in the subject. The demise of the tweedy old maths teacher who encourages his or her pupils to develop a fascination for numbers has had a knock-on effect. Last year the number of pupils taking A-level maths fell by 12 per cent, while applications to read the subject at university dropped by 20 per cent. Admissions tutors fear that some departments might have to close as a result. Fewer graduates in the subject will lead to an even smaller pool of candidates for teaching posts in the future, and the spiral will continue.

SUE JOHNSTON-WILDER, from the *Open University's centre for mathematics education*, says that the Government would need to recruit 50 per cent of all maths graduates every year to rebuild the teaching stock.

She said that the Government should consider adopting the *French system*, where trainees with degrees in other subjects spend a year learning how to teach school maths as part of a two-year postgraduate teaching qualification.

An inquiry into the state of post-14 teaching of maths, headed by Professor ADRIAN SMITH, the principal of *Queen Mary*, University of London, is examining the proposal as one of several options. The key to the report, which is expected by June, will be the place which maths is expected to take in the curriculum. Should it be drilled into all pupils by a battery of trained maths teachers? Or should it - as many university lecturers argue - only be the pursuit of an elite minority, promulgated by a small, well-paid core of trained teachers?

The latter argument led to a toughening of the syllabus when AS-level maths was introduced in 2000. The result - a tripling of the failure rate in the subject - has contributed to the dearth of good applicants to university courses.

If this approach holds sway, then the need for more qualified specialists will be reduced, and the trend for "converting" untrained staff into maths teachers will accelerate.

Year-old math center aids teachers' transition to Everyday Mathematics¹⁰

Steve Koppes

The numbers are adding up quickly for *Everyday Mathematics*, a kindergarten through sixth-grade curriculum first developed at the University in the 1980s by MAX BELL, Professor Emeritus in Education and the Physical Sciences Division.

Everyday Mathematics is being taught to 2.5 million school children throughout the United States. That number will increase by approximately 900,000 over the next few years, as New York and Chicago adopt the curriculum for their elementary public schools.

Helping teachers implement the new curriculum and studying its impact on student performance in the two cities are priorities for the University's year-old *Center for Elementary Mathematics and Science Education*.

"We're interested in math education for all American children," said ANDY ISAACS, Center Co-Director. "If we do research and figure out what works and what doesn't work, that will inform future generations of math education reformers."

In January, New York City officials announced the adoption of *Everyday Mathematics* for all of the city's K-5 public schools over the next two years. Then in March, the Chicago Public Schools system announced it would integrate the curriculum into about 200 of its elementary schools over the next several years.

"Right now we're actively engaged as a matchmaker, trying to get a research project off the ground in New York and Chicago to evaluate the adoptions of Everyday Math in those two cities," ISAACS said. "We don't want to be formally involved because that would bias the research. But we're using the center's resources to try to identify people who would be interested in the research and help develop the proposal."

The different approaches to the curriculum's implementation in New York and Chicago make them appealing for a comparison study, ISAACS said.

"New York is mandating it across a thousand schools all at once. Chicago is taking a much more gradual approach," he said.

The elements of *Everyday Mathematics* include problem solving in everyday situations, linking past experiences to new concepts, and solving problems using multiple strategies. The curriculum was designed to be integrated into schools one grade at a time.

¹⁰ From the University of Chicago Chronicle, Thursday, April 17, 2003, Volume 22, Number 14. See <http://chronicle.uchicago.edu/030417/mathcenter.shtml>

"There are routines built in that kids get used to," said JAMES MCBRIDE, the center's other Co-Director. But in New York, schools will implement the curriculum into grades K-5 at the same time. Older students will come to the material lacking the background that the curriculum was designed to build on.

"It's going to be an overwhelming thing, even for a very good teacher and very good students," MCBRIDE said. "We want very much to work with New York teachers and supervisors, and we are planning to make ourselves available to help them."

The center was established in the Physical Sciences Division last May with \$ 750,000 in royalties generated from *Everyday Mathematics*. The commercialization of the curriculum began in 1988, when the University's Office of Technology and Intellectual Property (then known as *Arch Development Corporation*) launched and helped fund the Everyday Learning company.

The Tribune Company acquired Everyday Learning in 1995. Today it is a division of McGraw-Hill.

"Our biggest success historically and on a continuing basis has been the commercialization of the mathematics curriculum," said ALAN THOMAS, the University's Director of Technology Commercialization.

Although the *Center for Elementary Mathematics and Science Education Center* is relatively new, its work in elementary education research and development has long been associated with the University and its School Mathematics Project.

Everyday Mathematics was developed under the UCSMP umbrella beginning in the mid-1980s. For the past five years, a *National Science Foundation grant* has supported the project's efforts to help schools implement the *Everyday Mathematics curriculum*. The NSF has renewed the grant for an additional year and a half.

The NSF also funded a tri-state student achievement study for which MCBRIDE served as chief statistician. The study, conducted by researchers affiliated with the Alternatives for Rebuilding Curricula Center in Lexington, Mass., encompassed 50,000 students in more than 750 schools in Massachusetts, Illinois and Washington.

MCBRIDE and his colleagues examined the impact of *Everyday Mathematics* and two other reform curricula that were developed with NSF support. The researchers combined survey data with data from state-mandated tests in the three states. Matching students by ethnicity and family income, the researchers compared the achievement of students studying the three reform curricula with students not using any of them.

The results showed that students in the NSF-funded curricula consistently outperformed the comparison students.

"Use of these curricula results in higher test scores," the study report said.

From the TIMSS-Forum listserve

You might be interested in the numerous resources related to the TIMSS studies. To see these publications, click on <http://nces.ed.gov/timss/> :

1. Then click on "Reports and Products."
2. Then click on "All Years" for Release Date
3. The click on "All for Study and Study Components"
4. Then click on "Submit"
5. Then click on "Send"

Or, go directly to http://nces.ed.gov/timss/Search_Results.asp

You should then have access to an array of reports and articles.

From the MathematicallySane website

Dear friends of <www.MathematicallySane.com>: We have added two new resources to the web site:

- *Singapore* has been dubbed by some to have all the answers for mathematics education. Yet they are now using a Standards-based text developed in the U.S.! See <<http://MathematicallySane.com/singapore.asp>>
- "Responding to *Calls for Change* in High School Mathematics" outlines how mathematics reform in high school, in particular the *Core-Plus curriculum*, prepares students for college.
- The home page contains links to a number of additional items that were posted earlier this month. Look for the red "NEW" logo.

Thanks to everyone who attended the session on www.MathematicallySane.com at NCTM's annual meeting in San Antonio. We received excellent feedback that we will use to improve the site in the coming months.

Since the annual meeting, we have added over 100 new members, and traffic to the site has increased by over 30%. Please help us to continue to get the word out! Encourage a friend or colleague to join: <<http://MathematicallySane.com/join.asp>>.

Send your comments about the site, and suggestions for new content and other improvement: <<http://MathematicallySane.com/contact.asp>>.

Will Abel Prize for Maths Rival the Nobels?"

Stephen Battersby

On Tuesday afternoon at the University of Oslo, KING HARALD V of Norway presented the very first *Abel Prize* in Mathematics to JEAN-PIERRE SERRE of the *Collège de France* in Paris. The *Abel Prize* is intended to finally fill the gap left by ALFRED NOBEL, who chose to ignore maths when he established the *Nobel prizes*.

"I think the absence of a *Nobel prize* has lessened the perception of maths among the general public," says JOHN BALL of the University of Oxford, a member of the prize committee. There are already several international maths prizes, including the prestigious *Fields Medal*, which is often said to have the same cachet as a Nobel. But the *Fields Medal* has not caught the public imagination in the same way. Perhaps because it is only awarded every four years, or because the cash involved is only CAN\$ 15,000 (\$11,000), meagre compared with the money that goes with a Nobel.

The *Abel Prize*, on the other hand, will be awarded every year, and SERRE is walking off with a handy \$816,000. "It will enhance the visibility of mathematics and heighten the esteem in which mathematics is held," explained ROLF JELTSCH, president of the *European Mathematical Society*, when the creation of the prize was first announced last year.

But the *Abel committee* will have its work cut out if this new prize is to rival the Nobels in popular appeal, because mathematics is a notoriously difficult topic to sell.

There is no question that SERRE is a great mathematician. He was the youngest ever recipient of the *Fields Medal* back in 1954. His work has profoundly affected many areas of modern maths, including topology, number theory and algebraic geometry. For example, he developed tools to work out how many ways one can map high-dimensional spheres onto one another, a fundamental problem in topology. And his research was crucial in ANDREW WILES's proof of Fermat's last theorem.

But summaries of advances in pure mathematics, such as those given above, are inevitably superficial - SERRE's work is not only extraordinarily broad, it is exceedingly deep. If the prize is intended to raise the profile of maths with the general public, would it make more sense to bias the award towards work that can be more readily explained? BALL, himself an applied mathematician, doesn't think so. "It will only be given because of the importance of the work. SERRE was a wonderful choice."

¹ From the New Scientist, June 7, 2003, Volume 178, Number 2398, p. 12. See <http://archive.newscientist.com/secure/article/article.jsp?rp=1&id=mg17823981.200>.

It may be that for the purpose of raising the profile of the subject, the maths doesn't matter. The new prize does have two other advantages that might make all the difference.

The name of the award, which commemorates the life and work of 19th-century Norwegian mathematician NIELS HENRIK ABEL, is reminiscent of the original prizes. And perhaps most importantly, it is presented in true Nobel style by the king of Norway.

The 2002/3 Wolf Foundation Prize in Mathematics

The Prize Committee for Mathematics has unanimously decided that the 2002/3 *Wolf Prize* be jointly awarded to:

MIKIO SATO; Research Institute for Mathematical Sciences; Kyoto University, Kyoto, Japan

for his creation of 'algebraic analysis', including hyperfunction and microfunction theory, holonomic quantum field theory, and a unified theory of soliton equations.

and

JOHN T. TATE; Department of Mathematics; University of Texas, Austin, Texas, USA

for his creation of fundamental concepts in algebraic number theory.

Raising Public Awareness in Mathematics

A new site dealing with Raising Public Awareness in Mathematics at:

<http://www.cpm.informatics.bangor.ac.uk/index.html>

(Centre for the Popularisation of Mathematics; University of Wales, Bangor)

Tagungen

Tagungsberichte

Fünftes Forum zur Begabtenförderung in Mathematik

Grußwort der Vorsitzenden der GDM Prof. Dr. Kristina Reiss

Kristina Reiss¹

Sehr geehrte Damen und Herren,

im Namen der Gesellschaft für Didaktik der Mathematik möchte ich Ihnen die herzlichsten Grüße überbringen. Wie Sie wissen, ist die Gesellschaft für Didaktik der Mathematik die Vertretung der im Wissenschaftsbereich tätigen Mathematikdidaktiker und Didaktikerinnen und als solche mit allen Facetten des Mathematikunterrichts befasst. Dazu gehört es insbesondere, allen Schülerinnen und Schülern ihrer Begabung gemäß Möglichkeiten des Mathematiklernens zu eröffnen. Chancengleichheit ist das Stichwort, das ich in diesem Zusammenhang näher betrachten möchte.

Vielleicht haben Sie im letzten Heft von *GeoWissen* zum Thema "Begabung" die Geschichte von HELENE gelesen, einem hochbegabten Mädchen mit einem Intelligenzquotienten von über 130, das im Alter von fünf Jahren von Kasachstan in die Bundesrepublik gekommen war. Zu Hause wurde nur russisch gesprochen und dennoch konnte HELENE beim Schuleintritt mühelos dem deutschen Unterricht folgen. Genauso wie andere hochbegabte Kinder litt sie eher an Unterforderung als an Überforderung, konnte dann aber nach Tests und Beratung durch einen Schulpsychologen das zweite Schuljahr überspringen. "Mein Start in die Schule war ein Fehlstart" wird die heute 13-jährige zitiert. Dabei hat HELENE durchaus Glück gehabt, dass ihre Begabung relativ frühzeitig erkannt wurde und ihr dadurch ein Stück Chancengleichheit gegeben werden konnte. Unter Chancengleichheit versteht man, dass Kinder einen Unterricht erhalten, der ihren individuellen Voraussetzungen gerecht wird. Hier hatte HELENE, wie die kürzlich veröffentlichten Ergebnisse der PISA-Studie zeigen, durch ihre nicht in Deutschland geborenen Eltern einen klaren Risikofaktor.

¹ Das Grußwort der Vorsitzenden der GDM hat Herr Prof. Dr. Rudolf Sträßer (Luleå) anlässlich des 5. Forums zur Begabtenförderung in Mathematik, das im April an der Universität Stuttgart stattfand, verlesen. Dafür auch an dieser Stelle noch einmal herzlichen Dank!