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The Mathematical Association of America
1529 Eighteenth Street, NW
Washington, DC 20036

FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

Rochester Reinstates Ph.D. Program

Department agrees to overhaul its undergraduate teaching

The University of Rochester, which announced the closure of its Ph.D. program in mathematics last fall (FOCUS, February 1996) has decided to reverse that decision. It has announced a comprehensive proposal developed jointly by the administration and key faculty in the mathematics department, with input from other departments.

As part of the rescue package, the mathematics faculty has agreed to a sweeping review of the courses it offers to undergraduates not majoring in mathematics, and of the department's linkages with the research specialties of faculty in other departments. Discontent with the department's non-majors undergraduate teaching was said to be a factor in the original decision to drastically reduce the size of the department and end the Ph.D. program.

The department will also develop a new Ph.D. program in mathematics.

The new plan is enabled in part by resources provided by the Department of Physics and Astronomy, which will contribute through future joint appointments with mathematics.

President Thomas H. Jackson said that the new arrangement meets both the financial and instructional quality goals outlined in the "Renaissance Plan" for the college, announced last November.

"I am happy to say that the Renaissance Plan led to a series of unprecedented conversations

See *Rochester* on page 3

Mathematics Student Takes Top Prize in Westinghouse Science Competition

Jacob Lurie, an eighteen-year-old mathematics student at Montgomery Blair High School in the Washington, D.C. area, claimed the top prize in the annual Westinghouse Science Talent Search



this spring. The Westinghouse search is generally regarded as the nation's most prestigious science competition. This year was the fifty-fifth in its history.

It is relatively rare for a mathematician to win the top prize. Lurie, who this fall starts his collegiate education at Harvard where he intends to study mathematical logic, took as the theme for his competition entry John Conway's surreal numbers.

Lurie is no stranger to the professional mathematics community, nor is his Westinghouse success the first time he has found himself the center of media attention. He was the youngest member of the six-person U.S. team who scored a perfect forty-two points in the thirty-fifth International Mathematical Olympiad in Hong Kong in 1994.

By any standards, Lurie is an early developer. At age three he was adding numbers in his head. He finished calculus in the eighth grade. He was just sixteen at the time of his IMO success.

In addition to the honor and the recognition, Lurie's Westinghouse triumph brings him a \$40,000 scholarship to ease his passage through Harvard.

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Editorial

How Others See Us



Angus Campbell was the chair of the Mechanical Engineering Department at Big State University. A widely read man, he regularly attended seminars in English, history, biology, psychology, anthropology, astronomy, economics, practically every subject you can think of—with one exception: mathematics.

When he had first arrived at Big State fifteen years earlier, he had gone to the mathematics seminars as well. But after a few years he finally gave up. Nothing those folks said seemed to have any relevance for him. And what is more, he could never understand enough to come away with the sense that he had learned anything whatsoever.

But then, one day, he received a notice from the Mathematics Department announcing a talk on "The Mathematical Theory of Gears."

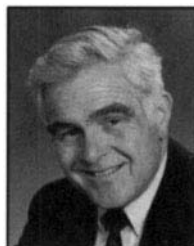
"At last," he thought, "a mathematics talk that interests me."

And so, when the day came he went along. Sitting in the front row of the seminar room in eager anticipation, he watched as the speaker took out his notes. The speaker cleared his throat and began.

"The theory of gears with a real number of teeth is well known. So today..."

The above opinions are those of the FOCUS editor and do not necessarily represent the official view of the MAA.

New MAA Board of Governors Members



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Rochester from page 1

between math faculty and the administration, and between math faculty and their colleagues in other departments," Jackson said. "That, in turn, led to the Department of Physics and Astronomy's offer to promote linkages by joint appointments, and a new dedication on the part of the mathematics faculty to strengthen undergraduate instruction and their ties to other departments, in concert with all of our other efforts."

"The mathematics department fully supports this plan," commented Joseph Neisendorfer, department chair. "It provides both an opportunity and a challenge to the mathematics department. We are enthusiastic about the prospect of introducing some significant innovations which promise to diversify and enhance the undergraduate experience in mathematics. I am grateful that the administration has provided us with the opportunity to do this within the context of a graduate program of high quality."

"This is an important development for the University," added mathematics professor Douglas Ravenel. "I am glad to see it is renewing its commitment to mathematics, a subject lying at the heart of modern science. Excellence in math at all levels is a vital asset for any research university."

The new proposal includes the following key developments:

- Faculty in the Department of Physics and Astronomy have agreed to two future joint appointments with the Department of Mathematics. This effectively provides funding for one additional position to the mathematics department, as well as promoting tangible linkages between these fields.
- Mathematics faculty have offered to develop a plan for a smaller, high quality Ph.D. program, which they can operate with a reduced number of faculty. (The Renaissance Plan had called for the number of tenure-track mathematics faculty to decline from twenty-one to ten, with the ultimate addition of four to five non-tenure track faculty to teach undergraduate mathematics courses for non-math majors. Under the new proposal, the mathematics departmental size would be set at an ultimate target of fifteen tenure-track faculty members and there would be no hiring of non-tenure track faculty for instructional purposes.) The new Ph.D. program is to be developed during the next six months and will be available to doctoral students in the fall of 1997.
- Mathematics faculty have agreed to form a committee to work with other depart-

ments on improving the teaching of undergraduate mathematics, especially calculus, for non-math majors.

- The mathematics department has elected a new chair, Douglas Ravenel, who is charged with implementing the instructional program and the renewed linkages with other departments.

Commenting on the plan, President Jackson said, "This is a solution that fully meets the goals of the Renaissance Plan—the bottom line, as before, is that we will increase the quality of our programs within our overall budget targets—and, obviously, it is a happier solution for the mathematics faculty.

"It will add luster to our undergraduate program and work to enhance intellectual cooperation across disciplines while implementing a Ph.D. program of distinction. I am pleased that their active cooperation—and that of the Physics and Astronomy Department—now enables us to move forward in this direction."

He added that Charles E. Phelps, university provost, and Richard N. Aslin, vice provost and dean of the college, have also endorsed the new proposal, as has the Executive Committee of the university's board.



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More Melissa Letters

In my editorial in the April 1995 FOCUS, I told the story of my then sixteen-year-old daughter Melissa, whose extremely high intelligence was scholastically hindered by a learning disability. With a measured cognitive ability in the 99.9 percentile, at the high school she was earning low grades, and a professional diagnosis of her learning disability notwithstanding, she was regarded by most of her teachers as simply a lazy, not-too-bright student. My wife and I removed her from the school and enrolled her at the selective four-year college where I work, whereupon she immediately ran up a 4.0 GPA.

Following my editorial, letters poured in from FOCUS readers all across the nation, telling of similar tales of woe, and in the October FOCUS I printed a number of them.

Letters continued to come in, and as I travel around to MAA section meetings around the country, members tell me of cases they know of. Here, for one last time, is another selection of letters on the issue.

—Keith Devlin

Dear Dr. Devlin,

I read your editorial in the April 1995 FOCUS with interest. We, too, have a child who was identified during his pre-college days as "learning disabled." In some ways our stories have similarities, but there are significant differences as well. I am a professor of mathematics, albeit not at a prestigious institution, nor am I president of a national mathematical association. We live in a small Ohio town which has a pretty average high school. Our son Tom is not mathematically gifted, but he does have average intelligence and shows some unusual, even brilliant, insights at times. Other parents may have taken more seriously the school's repeated admonition that he did not belong in college preparatory classes. However, we all persevered and he happily has his bachelor's degree in speech communications.

It is Tom's high school experience in a geometry class which I recalled as I read your story. Tom's writing was large and awkward. In English class he compensated by typing his work, but math teachers had a challenge reading what he wrote, I'll readily admit. His IEP indicated that teachers were to be sure he had sufficient room and time in which to do his work. The geometry tests unfortunately had limited space for proofs and the teacher made no concession to requests for more space. I remember well one test where Tom's proof took up the space of the entire next ques-

tion which he therefore failed to answer and for which he lost all credit. What appalled me even more than his teacher's lack of cooperation with respect to spacing for the tests, however, was his insistence that if the proof was not the one in the "answer book," it was wrong. Our creative son and his similarly inclined classmates were repeatedly penalized for proofs that were not exactly as the author had stated them, even if they were logically correct!

There is no doubt that similar scenarios are repeated many times over in this country. Because of my encouragement, Tom believes that he is good at mathematics and did not let the D's and C's he received in that class dampen his enthusiasm for the subject. Few other parents would be able to evaluate such reasoning, and the judgment of the teacher is what would stand instead. You are not alone in your observation and concern. Although there are certainly some excellent, knowledgeable, and cooperative high school teachers, we still have a good deal of work to do to prevent more of these tragedies.

Thanks for sharing your experience.

Sincerely,

*Delene Perley
Wooster, Ohio*

Dear Dr. Devlin,

I completed a twenty-four-year high school math teaching career two years ago and had the good fortune to be allowed to teach in an exceptional school fifteen of those years. I had several Melissas in my classes.

One Melissa closely resembled yours. Julianne wasn't quite as mathematically precocious, but in her world of geology and civil engineering, she had few equals. Her father was assistant head of the construction team for Chicago's celebrated Deep Tunnel project which gathers and stores excess runoff rainwater and later pumps it into the waterways. Julianne worked summers on Deep Tunnel as an engineering assistant, gofer, and assistant on tours of visiting engineering dignitaries down in the hole. Once, in an emergency, she led a tour for a group of Japanese civil engineers. Hair tucked in a hard hat and clad in hip boots and the usual construction coat, no one suspected a "mere" sixteen-year-old school girl was in charge (answering technical questions, etc.). Back above ground, she took off the hat and shook out her hair. Before the coat was off, the excited murmurs and applause began. The mayor even heard of this exploit.

Back in school, in my honors level third-year algebra-trigonometry class, Julianne just couldn't quite keep up. She had time to do only half the homework problems. Her class participation was a teacher and student's dream, always on track and often revealing everyone's unspoken difficulty. She pleaded for more time on tests. By now I knew my customer, and by coincidence, we both had lunch scheduled the very next period. So Julianne and I slipped into a neighboring physics lab where we sat while she finished her exams and I finished peanut butter sandwiches. Her scores were exemplary. A few colleagues complained, but the school principal supported me completely. Students who knew also thanked me. What more could a teacher want? Julianne had the wit to write an award-winning science fair research report and also use it for an honors level English class research report. Her idea; no one else ever discovered that ploy. *What handicap?*

In his letter (October 1995 FOCUS, p. 4), Dave Connor makes a very cogent obser-

vation; I fear it won't go away. To a growing extent mathematics, like intelligence, is becoming operationally defined in terms of the national and international exams administered in schools and colleges, ACT, SAT, AP, AHSME, and the many state tests devised with the cooperation of NCTM and its state affiliates to measure school and teacher accountability. Test results are taken as measure of educational progress, which directly affect budgets and teacher salaries. School systems demand "teaching for the test." One very real reason why other nations excel in international comparisons is the fact they hide all but the brightest when such tests are administered. In the USA, a participating school is very likely to treat such a test as just more interruption and administer it to everyone in the building, special education on up. We reveal our educational bumps and bruises; everyone else hides theirs.... I wonder at the fate of a Melissa in Japan. I'd wager they would deny having any.

Candor like yours is exceptionally rare, Dr. Devlin, and your courage is admirable. Don't stop.

Sincerely,

Larry Freeman
Chicago, Illinois

Dear Dr. Devlin,

I have been following the case of Melissa and the resulting letters in FOCUS (October 1995, pp. 2, 4-5) with more than a passing interest. You see I was a high school mathematics teacher for twenty-four years and am now a professional mathematics educator involved directly in teacher education. I am well aware of the frustrations involved in attempting to change the status quo.

In defense of the secondary teachers, not only are they a product of a post-secondary education that we provide, but they often work under tremendous pressures that support the teaching of mathematics in ways that are more procedural than conceptual. A chief culprit here is the proliferation of standardized testing in American schools. It is all too easy for some school administrators to equate a strong mathematics program with high scores on standardized tests. Unfortunately, as Rom-

berg and Wilson (1992) have demonstrated, the ten most commonly used standardized tests do not align well with school mathematics curricula that are conceptually based.

In his letter, Dr. Green wrote, "...I, too, am a mathematician and do not wish to appear too pushy in solving this problem." As a mathematics educator who is not a research mathematician, I urge mathematicians such as Dr. Green and yourself to become more "pushy!" Without such a push from the research mathematics community, I hold little hope for the prospect of a widespread move away from school mathematics as a sequence of rote procedures and toward school mathematics as a means of making sense of things.

Sincerely,

Thomas G. Edwards
Assistant Professor of Mathematics
Education
Wayne State University
Detroit, Michigan

Dear Keith,

I need to address an issue which has appeared almost incidentally in FOCUS over a few issues. It has to do with the perspective of the high school mathematics teacher. There has been no specific article dealing with this topic, but references have been made which have left me a bit uneasy.

When the U.S. International Mathematical Olympiad team won first place in Hong Kong in 1994, a statement was made that one could not infer the existence of excellent secondary instruction as a contributing factor. This was an accurate statement. However, one logically could not disclaim it either. We should remain agnostics in this regard.

Your editorial about Melissa was touching and thoughtful. Undoubtedly you were correct in many of your analyses of the problem. The teacher involved certainly could have been incorrect in her procedures. However, such statements as "On top of that, Melissa's father is a professional mathematician....How could a high school mathematics teacher get it so wrong?...do nothing to solve the problem." High school math teachers some-

times are engaged by parents who feel that their child is misunderstood or unrealized. Such occurrences take place when you teach prior to the college level.

Roger Pinkham, in his letter, stated, "I spend an enormous amount of time directly and indirectly ironing out the wrinkles put in their minds by some poorly prepared high school teacher." No doubt there are such teachers and I appreciate Roger's patience in rectifying the situation. At the same time, FOCUS needs to recognize the excellence which exists in secondary math instruction.

When one of the math teachers in my department left our high school to teach at the college level, he was inundated by students who responded to his teaching. His competence and skills of communication were appreciated by his students.

The Mathematics Department of the University of Arizona has had a program in place whereby they use high school teachers to teach their beginning math courses. They have been pleased with the results indicating that high school math teachers exhibit strong pedagogical skills. Many of these skills are consonant with the recommendations of David S. Moore in his FOCUS article "The Craft of Teaching."

A September 1995 issue of *U.S. News and World Report* considered the best colleges and universities in the nation. It listed Dartmouth College as the best teaching school. Dr. John Rassias, a brilliant language instructor at Dartmouth, is widely recognized for his teaching techniques. However, in a conversation with this writer, he indicated that teaching at the pre-college level is more challenging and demanding than teaching at the university level. It may very well be that the best teaching is occurring not at Dartmouth or Saint Mary's, but at the pre-college level.

It is not important where the best teaching is taking place, but that we all teach well. Ken Ross stated as much: "I believe that we are all in this together and that we need to work together to maintain momentum and establish better mathematics education for all."

Philip D. Evanstock
Mathematics Chair
Trevor G. Browne High School
Phoenix, Arizona

Dear Professor Devlin,

I read your editorial about your daughter's experience in high school mathematics. You ask, "What if there are hundreds and thousands" of students having similar experiences. As far as the experience of being taught that "mathematics was about the mastery of dull, mindless, algorithmic procedures," I believe that is today the universal experience of American high school students. (Of course there are exceptions, but I don't believe they can add up to even 5% of the whole.) I don't entirely understand how that is accomplished in the geometry course. But to see that it is being done in the algebra courses, one need only read some widely used high school text. Each new section is preceded or followed by a statement of that section's objectives, which are almost all algorithmic in nature. There often are some objectives that refer to "thought" or "understanding," but they are few and non-operational; they are not needed for doing almost all of the homework exercises and they are not tested for in the class tests.

I returned to college teaching eight years ago, after a long time in a government lab. I teach at Temple University, which is something like a state university serving the Philadelphia area primarily. The students are mostly of working class or lower middle class background and they vary widely in ability; admission standards are not high. When I started teaching them I was rather happy with them. I found them conscientious and hardworking, if often mathematically weak. (Each class also contained quite bright students.) It took me several years to realize what they were working hard at. It simply did not occur to me, for years, that they were filtering out all my exposition of ideas and explanations of reasoning and trying their best to learn what they thought the courses were about: certain procedures for solving certain problems. Their effort went into memorizing mathematical words and activities.

I finally formulated a question which I started asking high school teachers I am acquainted with:

Is the following a correct description? In high school, students are taught that for English class you have to think, because you have to make up and write compositions. And in social studies you have to

Dan Kalman Appointed MAA Associate Executive Director

The MAA is pleased to announce that Professor Dan Kalman has been appointed Associate Executive Director for the MAA's Member Services and Programs Department. He has received a leave of absence, beginning in July, from American University where he is assistant professor of mathematics.

Kalman has served as associate editor of *Mathematics Magazine*, program chair and second vice chair of the MAA's Southern California Section, and as a member of various national committees. He is a prolific author and has written articles for MAA journals, including three for *Math Horizons*. In 1994 Kalman was awarded the prestigious George Pólya Award for the article "Six Ways to Sum a Series," published in the *College Mathematics Journal*.

Professor Kalman received his Ph.D. and M.A. from the University of Wisconsin, Madison, and his B.S. from Harvey Mudd College. Prior to joining the faculty at American University, he served as an applied mathematician at The Aerospace Corporation in southern California. Kalman also taught mathematics at Lawrence University, the University of Wisconsin, Green Bay, and Augustana College, South Dakota.

think some, because you have to discuss issues—though you can mostly repeat arguments the teacher discussed. But in math class you're not supposed to think. You're supposed to memorize the procedures for solving different problems, and try to recognize the words that tell you which procedure to use for which problem.

Up to now, the only answer I've gotten is "yes."

Melissa was unfortunate in being involved with the school's bureaucracy (the special education director), and fortunate in having you to rescue her. But as far as I can see all students who don't have an individual outstanding teacher, and who don't go to a special school like Bronx High School of Science, are being taught not to think in math class. Those to whom abstract thought is more onerous than pleasurable simply accept that. Those who have previously come to enjoy thinking don't simply stop thinking—though they may simply be turned off from mathematics. I get bright students in the "core" math course who have been avoiding math in college; when they are finally forced to take some, they do think about it and sometimes ask, "Why is that so?"

How did this style of teaching math come about? One factor that may have helped some is an educational theory I heard about

when I took most of a year off from my research work to teach at a branch of the University of Maryland. I got into conversations with one professor of education, and, coincidentally, with a young assistant professor of psychology. The latter was a student of Skinner's, I believe, and he spent a lot of time trying to convince me that one must not speak of "mental states" or "thought" or "understanding." The professor of education's specialty was math ed; and he told me the current view was that educational objectives should be completely "objective," i.e., behavioral. One should not say, "This lesson's purpose is to bring the student to understand..." rather, "This lesson's purpose is to make the student able to do the following...."

Of course a much bigger factor may be that it makes it easier to pass students who have learned very little.

Incidentally, "mastery of... mindless... procedures" is not itself a mindless process. Like memorizing a long list of unrelated words, it may need real mental effort. And training people to do it may perhaps prepare them for their future (low-level) careers.

Sincerely,

Seymour Haber
Merion, Pennsylvania

Who Teaches the Teachers?

Jack Price

A colleague in the mathematics department mumbled to me the other day that the new students were worse prepared than ever. He wanted to know, "What are those teachers doing out there?" I'm certain that his comments are not unique. (As a matter of fact, I don't believe that they are entirely true. Our high schools are graduating more better-prepared students who go to college.) My less-than-helpful answer was, "Who prepared their teachers?"

As with many universities, our mathematics department draws many students from the high school classrooms of teachers we have prepared. The *Professional Standards for Teaching Mathematics* is testimony to the idea that what students learn is intimately connected to how they are taught. If some teachers are not doing well, is it because they are simply emulating what they have learned from us? It is encouraging to see that the mathemat-

ics community as a whole is beginning to understand the importance of teaching and teacher education. The Association for Mathematics Teacher Educators was formed specifically to improve mathematics teacher education. The Mathematics and Education Reform Network, the Mathematical Sciences Education Board, the American Mathematical Society, and the Mathematical Association of America have all recognized that mathematics teaching at all levels must be improved. The recent *Recognition and Rewards* booklet produced by the Joint Policy Board for Mathematics promotes teaching as an important aspect of the retention, tenure, and promotion policies of colleges and universities. In



addition, many universities have established faculty development centers that stress good teaching as well as alternatives to full-time lecturing.

The bottom line is this: We expect the teachers we prepare to prepare in turn excellent mathematics students. Therefore we must make certain that the teaching we in the colleges and universities show them in our mathematics and mathematics education classes is a model of what we want them to do. So what is part of the answer to why teachers aren't better prepared? Perhaps, in the words of the great philosopher Pogo, "We have met the enemy and he is us."

This was reprinted from the January 1996 issue of the NCTM News Bulletin.

Jack Price is president of the National Council of Teachers of Mathematics. The e-mail address for NCTM is infocentral@nctm.org.

Workshop for Women Graduate Students and Postdoctoral Mathematicians

Over the past eight years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent Ph.D.s (referred to as "postdocs" below) in conjunction with major mathematics meetings.

Supported by the Office of Naval Research and the AWM, the next workshop in the series will be held in conjunction with the annual Joint Mathematics Meetings (January 8–11, 1997) in San Diego, California, on Saturday, January 11, with an introductory dinner on Thursday, January 9.

We invite each participating graduate student to present a poster on her thesis problem and each postdoc to present a talk on her research. The AWM will offer funding for travel and two days' subsistence for up to twenty participants. Participants will have the opportunity to present and discuss their research and to meet with other women mathematicians at all stages

of their careers. The workshop will also include a panel discussion on issues of career development and a luncheon. An introductory dinner and discussion period will be held on the Thursday evening prior to the workshop. All mathematicians (female and male) are invited to attend the Saturday program even though funding is provided only for twenty women graduate students and postdocs. Departments are urged to help graduate students and postdocs obtain some institutional support to attend the workshop and the associated meetings.

We also seek volunteers to lead discussion groups and to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office.

To be eligible for funding, graduate students must have begun work on a thesis problem. "Postdoc" refers to any mathematician who has received her Ph.D. within

approximately the last five years, whether or not she currently holds a postdoctoral or other academic position. All non-U.S. citizens must have a current U.S. address. All applications should include a curriculum vitae, a concise description of research, and a title of the proposed talk/poster. All applications should also include at least one letter of recommendation; in particular, graduate students should include a letter of recommendation from their thesis advisors. Nominations by other mathematicians (along with the information described above) are also welcome.

Send five complete copies of the application materials (including the cover letter) to Workshop Selection Committee, AWM, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461; (301) 405-7892; e-mail: awm@math.umd.edu. The application deadline is September 1. Applications via e-mail or fax are not acceptable.

Vivienne Malone-Mayes, Pathfinder

Etta Z. Falconer and Lee Lorch

Vivienne Malone-Mayes was born in Waco, Texas, February 10, 1932, and died there on June 9, 1995. She leaves a daughter, Patsy Mayes-Wheeler of Dallas, Texas, and other family members.

An excellent student all her life, Vivienne graduated from a segregated Waco high school at sixteen years of age. She earned a B.A. in 1952 and an M.A. in 1954, both from Fisk University in Nashville, Tennessee. At Fisk, she had courses from Dr. Evelyn Boyd Granville, one of the first two African American women to receive the Ph.D. in mathematics. She returned to Waco to serve as chair of the Mathematics Department at Paul Quinn College (1954–61). Seeking as always to expand her knowledge, she applied to take some courses at Waco's Baylor University, only to be rejected explicitly on grounds of race (1961). The University of Texas at Austin, already required by federal law to desegregate, admitted her. Overcoming major, consistent obstacles of both subtle and blatant race and gender discrimination, in 1966 she became the fifth African American woman to receive the Ph.D. in mathematics (the second Black and the first Black woman to receive the Ph.D. in mathematics from the University of Texas). She later observed that "it took a faith in scholarship almost beyond measure to endure the stress of earning a Ph.D. degree as a black, female graduate student." Her thesis, supervised by Dr. Don Edmonson, was titled *A structure problem in asymptotic analysis*. Part of this work was published in the *Proceedings of the American Mathematical Society*, vol. 22 (1969) under a different title. Later her research interests shifted to summability theory in which she published jointly with Dr. B. E. Rhoades.

She became in 1966 the first Black faculty member at Baylor University, the institution which had rejected her as a student only five years previously. There she spent the rest of her teaching career, retiring because of ill health in 1994.

Throughout the years, she maintained a high level of activity in mathematical, community, and religious organizations.



She was the first Black elected to the Executive Committee of the AWM and served on the Board of Directors of the National Association of Mathematicians (oriented toward the Black community in the mathematical world). She was a member of the AMS, the NCTM, and the MAA, and was elected a director-at-large for the Texas Section of the MAA. In addition, she served as director of the High School Lecture Program for the Texas MAA.

Her last attendance at the Joint Mathematics Meetings was in 1993 in San Antonio. This was a particularly joyous reunion. It brought Vivienne together with Gloria Hewitt, the two of us, and, above all, with Evelyn Boyd Granville whom she had not seen in many years but whose inspiration she never forgot.

She was in the struggle to make the path smoother for those who followed. She made her presence in the national mathematics community felt and respected. In

the organizations specifically devoted to the problems of minorities and women, there she was too. With skill, integrity, steadfastness, and love, she fought racism and sexism her entire life, never yielding to the pressures or problems which beset her path. She leaves a lasting influence. In her premature death we have all lost. Inspired by her life, we are bereaved at the loss of a loving and beloved friend.

Memorials can be sent to the Vivienne Lucille Malone-Mayes Scholarship Fund, c/o LaNelle McNamara, 501 Franklin Ave., Suite 501, Waco, TX 76701.

A longer version of this memorial appeared in the November–December 1995 issue of the AWM Newsletter.

Etta Z. Falconer and Lee Lorch met Vivienne Malone-Mayes at Fisk University. Etta Falconer teaches at Spelman College in Atlanta, Georgia and is associate provost for science. Her e-mail address is efalcone@etta.uac.edu. Lee Lorch is professor emeritus at York University in North York, Ontario, Canada. His e-mail address is lorch@mathstat.yorku.ca.

MAA President Ross Appoints Task Force on Publishing Education Material

MAA President Ken Ross has announced the formation of a task force to stimulate the submission to MAA publications of excellent expository material on collegiate mathematics teaching and learning. The intention is to create a working relationship between the experts on education in the MAA and the editors of the various MAA publications which will lead to the increase of submissions of quality material on education. Motivation for establishing the task force came from the demise of *UME Trends* at the start of this year.

The task force has been charged to develop—jointly with the editors of the three MAA journals, *FOCUS*, *MAA Online*, and *MAA Notes*—mutually acceptable procedures for accomplishing its goals. This will include determining how best to inform prospective authors what kinds of articles journal editors would like to receive. The task force may also provide any assistance editors might request in processing and reviewing such material.

The task force, which former *UME Trends* Editor Ed Dubinsky has agreed to chair, is to complete its work by the end of 1997. Other members include the chair of the Coordinating Council on Education, the chair of the Coordinating Council on Publications, and the editor of each of the *Monthly*, *Mathematics Magazine*, the *College Mathematics Journal*, *FOCUS*, *MAA Online*, and the *MAA Notes* series.

A Russian Teacher in America

Andrei Toom

Part One of Two

This article originally appeared in the June 1993 issue of the Journal of Mathematical Behavior and then in the Fall 1993 issue of American Educator. It appears here in slightly different form, presented in two installments. The second installment will appear in the next issue of FOCUS.

I am a Russian mathematician and teacher. For nearly twenty years I did research and taught students at Moscow University. Now I have moved to the United States, as have many other Russians. This article is about some of my experiences of teaching both in Russia and America.

The Evil Empire

Americans' ideas about Russia are as contradictory as Russia itself. For many years Soviet Russia was perceived as "The Evil Empire." On the other hand there was a Sputnik movement in America which claimed that the Russian educational system was much better than the American one. Obviously these images did not fit together. A lot of effort is needed to give the real picture. I am just going to make a few comments to explain my background.

Communist rule in Russia emerged from the collapse of the obsolete Tzarist autocracy, under which most people were deprived of education. Early Communists enthusiastically sang the "International" which claimed, "Who was nothing will become everything." Nobody ever knew what it meant exactly, but many were excited. Many Russian revolutionaries sincerely believed that it was their mission to redress all the social injustices immediately, but ignorance crippled all their efforts. A telling example is described in the novel *Chapayev* by the Russian writer Furmanov. The hero Chapayev, a Red Army commander, insists on giving an official certificate of competence in medicine to a poorly educated man, naively thinking that having such a certificate really makes one a doctor.

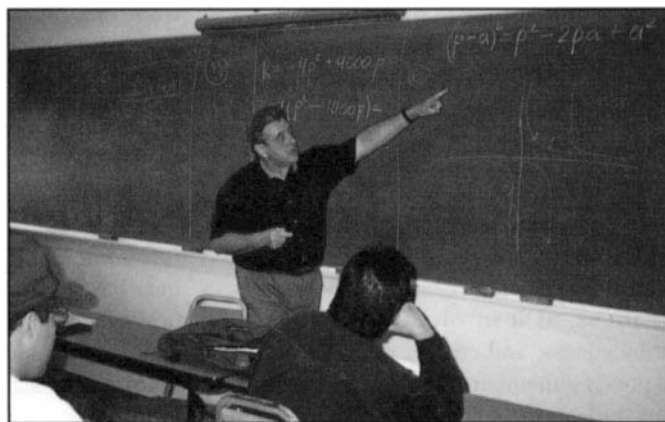
Communists made promises that looked

very democratic, particularly that children of "proletarians" would be given unlimited educational opportunities. Children of manual workers and poor peasants really were given privileges to enter all kinds of schools, and professors who gave them bad grades might be accused of anti-revolutionary activity. Only a generation later, Russia had thousands of hastily coached engineers and scientists of proletarian descent. One of these "proletarian scientists," an academician named Lysenko, gave fantastic agricultural promises that he never kept. However, Lysenko impressed Soviet rulers from Stalin to Khrushchev because they also were pseudo-educated. A major branch of biology, namely genetics, was declared a "bourgeois pseudo-science" because Lysenko was against it.

The ambitions of pseudo-educated "proletarian scientists," their haughtiness toward bourgeois science, their pretensions of superiority because of having had poor parents and being led by "the world's truest teaching" (that is, Marxism) caused a lot of industrial and ecological disasters. However, Communists never admitted the true causes of these disasters; all of them were attributed to some "enemy" sabotage. A number of alleged "enemies" were arrested and reportedly confessed. Masses of people, although declared "educated" by that time, believed these reports. But disasters continued, and to explain them away the authorities needed more and more "enemies." Meanwhile Russia became the world leader in wasted resources and polluted environments. Chernobyl is just one example.

I was eleven when Stalin died. For many years all Soviet people, especially youngsters, had been indoctrinated that they should never doubt the Communist tenets. All media had been filled with verbose praises to Stalin who was called "the greatest genius of all times and all peoples."

However, much of Russian and foreign literature was available, including American authors. Foreign authors were published under the pretext that they



Andrei Toom at the blackboard.

"criticized bourgeois society." Mark Twain, Jack London, Ernest Seton, O. Henry, Edgar Allan Poe, Paul de Kruif, Ernest Hemingway, and Ray Bradbury were among my favorite authors.

I vividly remember reading a book about a scientist who proved that insects have no reason; they only have instinct. What he actually proved was that the behavior of insects was effective only in situations usual for them. When the experimenter artificially arranged unusual situations, the insects did the same standard movements although they evidently could not be of any use in that new situation, because it was different from those to which the insects had become accommodated through evolution. I was impressed. I understood that propaganda tried to turn us into some kind of insects. I thought then and think now that it is a most important duty of a teacher of humans to teach them to be humans, that is, to behave reasonably in unusual situations. When I taught in Russia, I was thanked most explicitly for this. But I met a lot of resistance from some of my American undergraduate students, especially when I tried to give them something unexpected. On tests, they wanted to do practically the same as what they had done before—only with different numerical data. This is why I decided to write this article.

Productive Thinking

I always believed that really good education is the most valuable contribution that intellectuals of a country can make toward its democratization. Remember that the great French Revolution was prepared by the Age of Enlightenment. It was evident that the worst features of Soviet rule were connected with the power of the pseudo-

educated who got their certificates for being “proletarians,” but cared only for their careers. Understandably Soviet authorities always were suspicious about independent thought and real intellectuals.

In return, good teaching, intended to develop real competence of students, always had a flavor of resistance to Soviet authorities, as it involved realism, open-mindedness, and critical thinking. When a good mathematics teacher tried to move his students to think independently, he was aware that his real influence went far beyond mathematics: he tried and succeeded to keep alive the critical spirit. Learning recipes without thinking was associated with the Communist tyranny; learning to solve nontrivial problems was associated with independence and criticism. For this reason, for example, George Pólya’s writings on teaching were perceived in Russia as books on open-mindedness and critical thinking rather than just on the teaching of mathematics. We knew that Pólya was not alone. He referred to other scientists, for example to Max Wertheimer’s notion of “productive thinking.”

In the years of Khrushchev’s liberalism, some new foreign books also became available in Russia. Russian thinkers read very attentively all the foreign authors they could find. Many valuable ideas came from Americans: authoritarian personality (Theodor Adorno); group pressure (Solomon Asch); obedience to authority (Stanley Milgram). Eric Berne’s *Games People Play* moved us to see which dirty games our rulers played with us. Thomas Kuhn’s book about scientific revolutions was about ideological revolutions for us. Milton Rokeach’s idea of open and closed minds opened our minds. John Holt’s criticism of American schools made us understand that our schools deserved much harsher criticism.

My parents belonged to artistic circles, and pressure of censure was a constant theme of conversations. If trimming a tree went too far, they would say with regret, “Look how we have edited this tree!” Exact sciences provided the greatest available degree of independence from authorities, and my parents spoke with envy about mathematicians who could afford to say the exact truth and even be paid for it rather than punished. They could not guide my

study of sciences, but they expected intellectual efforts of me, and it was important.

Later my school teacher of mathematics, Alexander Shershevsky, helped me a lot. He strived to become a mathematician, but could not obtain a research position because in his student years he had gotten into some political trouble. (The trouble must have been minor, otherwise we would never have seen him again.) I was especially impressed by his responsible attitude to his mission. He urged me to attend informal classes in mathematics at Moscow University. The main business of these classes was solving nonstandard problems. Students were free to drop in and out. Using this I changed several groups until I found a teacher, Alexander Olevsky, who I liked most. Every year students at Moscow University arranged a competition for high school students in solving problems. Each problem was new and unlike others and demanded a nontrivial idea and a rigorous proof to solve. There were five problems and five hours to solve them. Typically everyone who solved at least one problem was rewarded. In this way I got several prizes. This convinced me that I could succeed as a mathematician. When I moved from high school to the mathematics department of Moscow University, solving problems naturally led me to research.

Everyone Should Be a Teacher

From my first year in the university I took it for granted that a competent mathematician should participate in the teaching of mathematics because I had excellent examples to follow. The famous Kolmogorov organized a mathematical college affiliated with Moscow University, and I taught there. Academician Gelfand organized a School by Correspondence, and I instructed its teachers. In the computer club, I headed the teaching program. Aleksandrov, Arnold, Boltyansky, Dobrushin, Dynkin, Efimov, Kirillov, Postnikov, Sinai, Tzetlin, Uspensky, the Yaglom brothers, and other first-class mathematicians were willing to lecture and to communicate with students. A lot of new and original problems from all branches of mathematics and at various levels of difficulty were invented for all kinds of students from young children to graduate students and young professionals. Now I was among those who invented

problems. When I advised Ph.D. and other students, I gave them problems that interested me, and we solved them together. The main pressure that students put upon teachers was to tell them something new.

Whenever the purpose of learning was real competence, it had nothing to do with good standing with the authorities, who were feared and despised by intellectuals. Grades were just a nuisance like any extraneous control. For example, when I taught in the college organized by Kolmogorov, I simply gave an A to every student because all of them deserved A according to average Russian standards and I wanted to save them the trouble of dealing with the authorities. But they knew perfectly well that we expected much more of them than of the average students and they worked very hard.

Every advanced school where independent and creative thought was cultivated became a breeding ground for political dissent. The mathematics department of Moscow University was no exception. From time to time there were political clashes there and I took part in them. This caused me problems with the Soviet authorities and eventually led to my emigration.

Emigration

In 1989, quite by chance, I was allowed to accept an invitation to Italy. Once there, I decided not to go back. I would accept all the invitations I had to other universities. From Rome I went to Rutgers University, then to other American universities. Finally I got a regular position at Incarnate Word College, where I am now, but it would be premature to write about my experiences here.

It is a common opinion that the United States of America supports democracy. Democracy always was connected in my mind with good education for all people, and I knew that American thinkers also believed in this connection. Thus when I came to this country, I expected to have rich opportunities to teach students to think critically, independently, and creatively, and to solve nonstandard problems without hindrance from authorities.

My first experience in teaching in this country did not contradict this expectation. It was proposed that I give a course called “Analysis of Algorithms” to gradu-

ate students of the computer science department of Boston University. The textbook *Introduction to Algorithms* by Cormen, Leiserson, and Rivest was excellent. The department applied to me a wise rule—to give full freedom to the lecturer—and I used it to the benefit of my students as I understood it. In one semester I covered most of that rich book. I believe that the mathematical introduction was especially useful: I filled many gaps in my students' former education. My nineteen students came from all over the globe, and most of them collaborated with each other in an excellent way. After every lecture, they came to one room, discussed the problems that I gave them, and solved them together. Some problems I gave them were from the book, some were invented by me. I tried to miss no opportunity to make my students think and they accepted it. Also there was no problem with grades. The department gave me carte blanche and I used it benevolently: almost all of my students learned a great deal and I rewarded

them with good grades.

But in the next year when I came to a huge state university and started to teach the so-called business calculus ("Calculus II for Business and Economics") to undergraduates, I got into an absolutely new situation. All my ideas about teaching students to think became completely out of place. Never before had I seen so many young people in one place who were so reluctant to meet challenges and to solve original problems. All they wanted were high grades and they wanted to get them with a conveyor belt regularity. Suppose that a worker at a conveyor belt gets inspired by some interesting idea and tries to implement it into his work. You can guess that he will get into trouble. This is what happened to me when I started to teach American undergraduates. I will describe my experience in the next article in this series.

Andrei Toom is an associate professor at Incarnate Word College in San Antonio, Texas.

Cryptography and Mathematics: A Dynamic Partnership

Allegheny College, Meadville, PA

July 8–12, 1996

The speaker will be Dr. Richard Shaker. Fees are \$150 for the registration and \$130 for room and board (Sunday evening, July 7, through Friday lunch, July 12). For further information, contact George Bradley, Dept. of Math and Computer Science, Duquesne University, Pittsburgh, PA 15282; (412) 396-5115; e-mail: bradley@duq3.cc.duq.edu.

Science Linkages in the Community

AAAS Workshops

These workshops are directed at educators in schools, colleges, community-based organizations, and churches. Each workshop is a day and a half. The registration fee for each is \$125 for the entire workshop or \$15 to attend the networking reception held on the first day. The registration fee includes meals and many useful publications and giveaways. For more information, please contact Patricia A. Thompson, project assistant at the SLIC Institute; (800) 351-7542.

AAAS Intouch with Preschool Science Workshop is designed for individuals interested in adding hands-on science activities to their preschool programs.

Radisson Hotel Metrodome
Minneapolis, MN
June 13–14 and

AAAS Headquarters
Washington, DC
October 3–4

AAAS Teaching Science to Students with Disabilities Workshop is designed for teachers and community leaders who work with disabled youth.

AAAS Headquarters
Washington, DC
June 5–6

Audience Asserts Discriminatory Grading Persists

Dave Boliver, Pat Kenschaft, Fran Rosamond

A skit staged during the Joint Mathematics Meetings portraying gender discrimination is all too common in real life, according to its audience members.

Meant to open mathematicians' eyes to the perception of gender discrimination, the skit, put on by the Committee on the Participation of Women, had a male and female answering test questions essentially the same way, yet the woman received a lower grade. When the male offered to go with her to the professor, she declined, saying that his grade would likely be lowered while hers would never be raised. Eventually, the female drops out of the doctoral program when she is told no one on the senior faculty will become a female's dissertation advisor.

The house audience was instructed to discuss the skit in groups and report back. Members, including undergraduates, graduates, and faculty, reported and corroborated similar events in their recent experiences.

Most complaints from the audience were of male professors favoring males, while at least one was of a female professor favoring males with higher grades for the same work and one of a female professor favoring females with higher grades for the same work. We, the leaders of the program, noted that much of the undesirable behavior portrayed in this and other skits may be attributable to general insensitivity, social ineptness, loyalty to friends, or thoughtless cultural patterns. "Micro-inequities" smack of moral turpitude and should not be overlooked. As one method of fighting this type of micro-inequity, we suggest that if both students agree to have their papers copied, the incident can be reopened after the students are graduated and "safe." Pairs of papers can be saved and accumulated by a department chair after the perpetrator has been warned.

Dave Boliver teaches at the University of Central Oklahoma. Pat Kenschaft teaches at Montclair State College (e-mail: kenschaft@apollo.montclair.edu). Frances Rosamond teaches at National University.

MAA Contributed Papers in San Diego

The Mathematical Association of America and the American Mathematical Society will hold their annual joint meetings from Wednesday, January 8, 1997 through Saturday, January 11, 1997 in San Diego, California. The complete meetings program will appear in the October 1996 issues of FOCUS and the AMS *Notices*. This preliminary announcement is designed to alert participants about the MAA's contributed papers sessions and their deadlines.

Please note that the days scheduled for these sessions remain tentative. The organizers listed below solicit contributed papers pertinent to their sessions; proposals should be directed to the organizer whose name is followed by an asterisk (*). For additional instructions, see Submission Procedures below.

Sessions generally must limit presentations to ten minutes, but selected participants may extend their contributions up to twenty minutes. Each session room contains an overhead projector and screen; blackboards will not be available. You may request one additional overhead projector, a 35mm slide projector, or a 1/2-inch or 3/4-inch VHS VCR with one color monitor. Persons needing additional equipment should contact, as soon as possible, but prior to October 24, 1996, Donovan H. Van Osdol, Department of Mathematics, University of New Hampshire, Durham, NH 03824; e-mail: dvanosdo@maa.org.

The Uses of History in the Teaching of Mathematics

Saturday morning and Saturday afternoon

Florence Fasanelli,* Mathematical Association of America, 1529 Eighteenth Street, N.W., Washington DC 20036-1385; (800) 741-9415; fax: (202) 265-2384; e-mail: ffasanel@maa.org

Victor J. Katz, University of the District of Columbia, and V. Frederick Rickey, Bowling Green State University

An NSF-supported MAA Institute on the History of Mathematics and Its Use in Teaching has dealt, for two summers, with the history of mathematics, how it can be

used in the classroom, and how to teach history of mathematics courses. To continue the theme of this institute, this session invites contributions from individuals who have taught history of mathematics in innovative ways or who have used history in their classes to support current changes in curricula, pedagogy, and the mathematical preparation of teachers.

Teaching the Practice of Statistics at All Levels

Friday morning and Saturday morning

K. L. D. Gunawardena,* University of Wisconsin, Oshkosh, Department of Mathematics, Oshkosh WI 54901-8631; (414) 424-1056; fax: (414) 424-7317; e-mail: gunaward@vaxa.cis.uwosh.edu

Anne D. Sevin, Framingham State College, and Chitra Gunawardena, University of Wisconsin Centers-Fox Valley

This session will present papers related to teaching the practice of statistics at all levels, especially in courses beyond the introductory course. For this session, the organizers invite papers which focus on teaching statistics to mathematics majors, use of technology in statistics courses, and innovative teaching techniques. Submission of proposals via e-mail is preferred by the organizers.

Interdisciplinary Courses—Integrating Mathematics and Other Disciplines

Saturday afternoon

Agnes M. Rash,* St. Joseph's University, 5600 City Ave., Dept. of Math and Comp. Science, Philadelphia, PA 19131-1395; (610) 660-1562; fax: (215) 473-0001; e-mail: arash@sju.edu

Sandra Fillebrown, St. Joseph's University

The mathematical community is being challenged to make mathematics more relevant to students in other disciplines and to make explicit the ways in which mathematics can be of use in other fields of study. Integration of mathematical knowledge with other disciplines is one way to enhance learning. This session invites papers on experiences in teaching courses that fully integrate mathematics with another discipline. Of particular interest would be papers on courses team-taught with members of other departments. Papers detailing course syllabi, readings,

assignments, and projects would be welcome.

Environmental Mathematics — Getting it into the Curriculum

Thursday afternoon and Friday afternoon

Ben Fusaro,* Florida State University, Dept. of Mathematics, Box 3027, Tallahassee, FL 32306; (904) 644-9717; fax: (904) 644-4053; e-mail: fusaro@math.fsu.edu

Patricia Kenschaft, Montclair State University

We invite presentations that apply mathematics to the environment. We seek papers that can serve as the basis for classroom modules, and precalculus modeling is especially welcome. Our goal is to develop materials that will appeal to the environmental awareness of our students and convince them that mathematics is effective in solving problems that they, and society at large, believe are important. (Sponsored by the Committee on Mathematics and the Environment.)

Needed Connections: Preparation of Teachers K-12

Friday morning and Saturday afternoon

M. M. Lindquist,* Columbus College, Dept. of Math, 14 Seventh St., Columbus, GA 31901-5465; (706) 568-2255; fax: (706) 323-6531; e-mail: lindquist_mary@cc.csg.peachnet.edu

C. Patrick Collier, University of Wisconsin-Oshkosh, and Albert D. Otto, Illinois State University

There are many types of connections needed to prepare students to become mathematics teachers: connections among many stakeholders—the schools, the mathematics and education departments, and the community as they plan and implement programs; connections within mathematical topics, between mathematics and other disciplines, and with applications; connections between initial preparation, induction, and continued professional development. Papers should address programs that are taking a new look at connections.

Innovations in Teaching Linear Algebra

Wednesday and Friday afternoons and Thursday evening

David C. Lay,* University of Maryland,

Department of Mathematics, College Park, MD 20742; (301) 405-5136; e-mail: lay@math.umd.edu

Steven J. Leon, University of Massachusetts, Dartmouth

This session will focus on (1) geometric visualization in linear algebra; (2) use of technology in the course; and (3) instructional strategies. Papers may treat more than one of these areas, if appropriate. Talks on visualization should show how to introduce, motivate, or develop a topic (or topics) using transparencies, physical models or other visual aids, or computer/supercalculator activities. Instructional strategies should be innovative and successful methods for organizing or presenting the course.

Establishing and Maintaining Undergraduate Research Programs in Mathematics

Wednesday morning and Friday morning

Emelie Kenney,* Siena College, Department of Mathematics, Loudonville, NY 12211-1462; (518) 783-2440; e-mail: kenney@siena.edu

Joseph Gallian, University of Minnesota-Duluth

In recent years, there has been a growing interest in undergraduate research in mathematics. We seek papers that address successes and difficulties in establishing, maintaining, funding, and assessing undergraduate research programs of all kinds, especially academic year programs. Descriptions and analyses of any efforts that support and encourage the involvement of students in mathematics research, including informal programs, mentoring individual students, conferences and meetings involving students, REU programs, and non-REU formal programs are welcome.

Innovations in Teaching Abstract Algebra

Wednesday morning and Friday afternoon

Al Hibbard,* Central College, Dept. of Math/Computer Science, Pella, IA 50219-1902; (515) 628-5133; fax: (515) 628-5316; e-mail: hibbarda@ac.central.edu

Ellen Maycock Parker, DePauw University, Krystina Leganza, Ball State University

The purpose of this session is to provide a

forum for sharing innovations in teaching abstract algebra. Although any talks fitting this description are encouraged, those which address one or more of the following categories are particularly solicited: use of models or visualization; use of computer software; and successful pedagogical techniques. Where appropriate, each presenter is encouraged to provide the context, tools, method, and effect of the innovation being discussed.

Innovations in Courses Before Calculus: Implementing the Crossroads Standards

Thursday afternoon and Saturday afternoon

Ray E. Collings,* Dekalb College, Central Campus, Dept. of Math, 555 N. Indian Cr., Clarkston, GA 30021-2396; (404) 299-4162; fax: (404) 298-3836; e-mail: rcolling@dekalb.dc.peachnet

Janet Ray, Seattle Central Community College

In 1995 the American Mathematical Association of Two-Year Colleges (AMATYC) released its "Crossroads" standards. Papers should present standards-based course content, methods, and student performance resulting from faculty efforts consistent with Crossroads philosophy. (Co-sponsored by AMATYC and the MAA Committee on Two-Year Colleges.)

Development Programs That Work

Thursday afternoon and Saturday afternoon

Mercedes McGowen,* William Rainey Harper College, Math—1200 W. Algonquin Road, Palatine, IL 60067-7398; (847) 925-6526; fax: (847) 925-6049; e-mail: mmcgowen@harper.cc.il.us

Jacqueline B. Giles-Giron, Houston Community College

In many colleges and universities, developmental algebra courses constitute a significant portion of the course offerings. Substantial revisions in precalculus and calculus courses, coupled with the recently published AMATYC Standards, have spurred efforts to rethink the developmental mathematics curriculum as well. We invite papers describing significant changes in content and/or pedagogy in the teaching of developmental mathematics

courses. Project directors who have implemented reform developmental algebra courses are encouraged to share key aspects of their programs and results to date. Submission of proposals via electronic mail is preferred by the organizers.

Research in Undergraduate Mathematics Education

Wednesday morning and Friday morning

M. Kathleen Heid,* Pennsylvania State University, 171 Chambers Building, University Park, PA 16802-3205; (814) 865-2430; fax: (814) 863-7602; e-mail: IK8@psu.edu

David M. Mathews, Central Michigan University

We solicit research papers which address questions concerning the teaching and learning of undergraduate mathematics. Both theoretical and empirical investigations utilizing qualitative or quantitative methodologies are welcome. To the greatest extent possible, reports should be situated in and advance understandings about the teaching and/or learning of mathematics, and should be set within appropriate theoretical frameworks. We are especially interested in reports on completed studies. (Sponsored by the AMS-MAA Committee on Research in Undergraduate Mathematics Education (CRUME).)

The Use of Hand-held Technology in the Teaching and Learning of Mathematics

Thursday morning and Saturday afternoon

Marcelle Bessman,* Jacksonville University, Department of Mathematics, Jacksonville, FL 32211; (904) 745-7300; fax: (904) 745-7573; e-mail: mbessma@junix.ju.edu

V. J. Rammamurthy, Northern Florida State University, Bert K. Waits, Ohio State University

Computers and graphing calculators can be used as tools for exploration of mathematical concepts and constructs as well as for "discovery of mathematical truths." Through integrated use of this technology the classroom becomes a laboratory for instruction and learning. For this session the organizers invite papers which focus on uses of hand-held technology in the mathematics classroom. (Sponsored by the MAA Committee on Computers in Math-

ematics Education.)

Assessment for Better Learning: Assessing Teaching and Learning in a Climate of Change

Thursday morning and Saturday afternoon

Bonnie Gold,* Wabash College, Department of Mathematics, Crawfordsville, IN 47933; (317) 361-6306; e-mail: goldb@wabash.edu

Annalisa Crannell, Franklin & Marshall College, Ahmed Zayed, University of Central Florida

As we experiment with new ways of teaching, we need to find new and more effective ways to assess how well our students are learning, and, correspondingly, how well we are doing as teachers. This session will discuss methods of evaluation which go beyond traditional examinations and evaluation forms. Especially welcome are papers which directly use this assessment to improve teaching and student learning. (Sponsored by the Committee on Teaching Undergraduate Mathematics.)

New Directions in Student Assessment

Wednesday afternoon and Thursday afternoon

Richard Vandervelde,* Hope College, Department of Mathematics, Holland, MI 49422-9000; (616) 395-7123; e-mail: vandervelde@hope.cit.hope.edu

Jay M. Jahangiri, Kent State University

Many students develop math anxiety as a result of the old-fashioned exams which are "do or die" situations. Assessing students' performances with respect to critical thinking, mathematical communication skills, and the use of technology demands assessment techniques dramatically different from those many institutions and instructors have traditionally relied on. We invite contributed talks from persons regarding new (and old) innovative evaluation techniques which are effective in this new environment.

How Mathematics Departments and Upper Level Administrators Work Effectively

Wednesday morning and Friday afternoon

Lida K. Barrett,* United States Military Academy, Mathematical Sciences Dept., West Point, NY 10996-1786; (914) 938-2559; fax: (914) 938-2409; e-mail:

barrett@euler.math.usma.edu

Calvin C. Moore, University of California at Berkeley, and Morton Lowengrub, Indiana University

Reform activities in mathematics departments have led to changes in curriculum, in equipment needs, sometimes in staffing, and hopefully in how and what mathematics students learn. How do administrators see these changes? What are their roles and responsibilities in relation to these changes? What are a department's responsibilities in informing the administration? Presentations are sought from mathematician-administrators and from chairs or faculty who have been successful in their efforts with administrators.

SUBMISSION PROCEDURES FOR CONTRIBUTED PAPER PROPOSALS

After you have selected a session to which you wish to contribute a paper, forward the following directly to the organizer, indicated above with an asterisk (*):

- the name(s) and address(es) of the author(s); and
- a one-page summary of your paper.

The summary should enable the organizer(s) to evaluate the appropriateness of your paper for the selected session. Consequently, you should include as much detailed information as possible within the one-page limitation.

Your summary must reach the designated organizer by Friday, September 5, 1996.

Organizers will acknowledge receipt of all paper summaries. If an organizer accepts your paper, you will receive information on how to submit electronically an abstract for your paper. All abstracts must be submitted by Thursday, October 2, 1996. Abstracts received after the deadline will not be published in the booklet of abstracts which will be available in the meetings registration area during the conference in San Diego.

EMPLOYMENT OPPORTUNITIES

Rates for FOCUS Employment Advertisements are **\$95.00 per column inch (one inch minimum)**, billed to the nearest 1/2 inch.

All advertisements are set with a one-line headline, centered, boldface, consisting of the institution name, unless additional headline information is provided.

All invoices include a tear sheet. Advertising Copy Deadlines: The first of the month, two months prior to publication. FOCUS is published in February, April, June, August, October, and December.

Advertisers should contact: Joseph Watson, The Mathematical Association of America, 1529 18th St., NW, Washington, DC 20036; (202) 387-5200; fax: (202) 265-2384; e-mail: jwatson@maa.org

Butler County Community College

Butler County Community College invites applications for a full-time tenure-track position teaching mathematics, beginning August 1996. Applicants must have a Master of Science or Master of Arts degree with a minimum of 24 graduate/dual level credit hours in mathematics. Experience teaching mathematics at the college level is desirable. Salary is commensurate with experience.

Teaching duties range from developmental mathematics to elementary differential equations. Other duties include participation in college committees, curriculum development, and student advising.

Located on 323 acres of rolling hills, under tall oak trees, Butler County Community College, chartered in 1965, is the first community college in Western Pennsylvania. Fully accredited by the Middle States Association of Colleges and Schools, Butler County Community College provides many occupational programs as well as transfer programs.

Submit resume, transcripts, and three letters of reference by June 17, 1996, to Dr. R. M. Sanderson, Box 1203, Butler, PA 16003-1203. Butler County Community College is an EEO/AA employer.

Univ. of Papua New Guinea

Lecturers in applied maths and computer science. Rewarding, challenging posts for versatile educators. Ph.D. or near. Start 7/96 (preferred) or 1/97. Details: Prof. Arganbright, Maths, UPNG, Box 320, University PO, NCD, Papua, New Guinea. E-mail: 100353.163@compuserve.com.

Calendar

National MAA Meetings

August 10–12, 1996 Annual Joint Summer Meetings, University of Washington–Seattle, Seattle, WA. Board of Governors Meeting August 9, 1996

January 8–11, 1997 Eightieth Annual Meeting, San Diego, CA. Board of Governors Meeting January 7, 1997

January 7–10, 1998 Eighty-first Annual Meeting, Baltimore, MD. Board of Governors Meeting January 6, 1998

Sectional MAA Meetings

EASTERN PA & DELAWARE - November 1996, Delaware State College, Dover, DE

INDIANA - October 26, 1996, Rose-Hulman Institute of Technology, Terre Haute, IN

- Spring 1997 Franklin College, Franklin, IN

LOUISIANA-MISSISSIPPI - Feb 28-March 1, 1997 Millsaps College, Jackson, MS

MD-DC-VA - November 1–2, 1996, Hood College, Frederick, MD

METRO. NEW YORK - May 3, 1997 Mercy College, Dobbs Ferry, NY

MISSOURI - Spring 1997 Missouri Western State College, St. Joseph, MO

- Spring 1998 Southwest Missouri State University, Springfield, MO

NEBRASKA–SOUTHEAST SOUTH DAKOTA - April 18–19, 1997, Wayne State College, Wayne, NE

NEW JERSEY - November 6, 1996, Lucent Technologies, Murray Hill, NJ

- April 1997, Middlesex County College

NORTH CENTRAL - October 18–19, 1996, University of Minnesota, Duluth, MN

NORTHEASTERN - June 7-8, 1996, Hampshire College, Amherst, MA

- November 22-23, 1996, Univ. of Massachusetts-Boston, Boston, MA

NORTHERN CALIFORNIA - February 22, 1997, University of San Francisco, San Francisco, CA

OHIO - October 25-26, 1996, Denison University, Granville, OH

OKLAHOMA–ARKANSAS - April 4–5, 1997, University of Central Oklahoma, Edmond, OK

SEAWAY - November 8-9, 1996, SUNY College at Geneseo, Geneseo, NY

SOUTHEASTERN - March 13–15, 1997, Georgia Institute of Technology/Spellman College, Atlanta, GA

SOUTHWESTERN - Spring 1997 Texas

Lutheran College, Seguin, TX

- Spring 1998 Southern Methodist University, Dallas, TX

TEXAS - Spring 1997 Texas Lutheran College, Sequin, TX

WISCONSIN - April 11–12, 1997, University of Wisconsin-River Falls, River Falls, WI

Other Meetings

June 22–26, 1996 Art and Mathematics Conference (AM96), SUNY–Albany, NY. Speakers include John Horton Conway, Martin Golubitsky, and Benoit Mandelbrot. For information, contact Nat Friedman, Dept. of Math and Statistics, SUNY, Albany, NY 12222; (518) 442-4621; fax: (518) 442-4731; e-mail: artmath@math.albany.edu.

July 29–August 2, 1996 PCALC Course, precalculus and calculus topics using the TI-82 and CBL with an introduction to the TI-92, LaSalle University, Philadelphia, PA. Contact Charles Hofmann; (215) 951-1136; fax: (215) 951-1805; e-mail: hofmann@lasalle.edu.

August 5–9, 1996 CAS–CAL Course, calculus enhanced with computer symbolic algebra using the TI-92 and CBL, Montgomery County Community College, Blue Bell, PA. Contact Roseanne Hofmann; (215) 641-6405; e-mail: rhofman@admin.mc3.edu.

Technology College Short Course Program

The Technology College Short Course Program, organized by Bert Waits and Frank Demana from Ohio State University, is offering week-long courses at several colleges in twenty-two states this summer. Each short course participant will learn hands-on how to use the new TI-92 hand-held symbolic algebra computer and/or the TI-83 or TI-85 graphing calculator to enhance the teaching and learning of college and university mathematics. Mathematics reform materials consistent with the calculus reform movement, MAA recommendations, and the AMATYC Standards will be the focus of appropriate short courses. Applications, problem solving, pedagogy, implementation issues, and testing issues will be featured in all short courses. The Calculator-Based Laboratory (CBL) system will be used to collect data and connect mathematics with science. Offered are the following courses.

- **DEV** Mathematics in the foundation using the TI-83 and CBL (includes pre-algebra, beginning algebra, intermediate algebra, and data analysis)
- **ALGT** College algebra, trigonometry, and data analysis using the TI-83 and CBL
- **PCALC-CALC** Precalculus and calculus using the TI-83 or TI-85 and CBL
- **CAS-CALC** Calculus enhanced with computer algebra using the TI-92

To get information on dates and locations, contact Ed Laughbaum, Ohio State University, Department of Math, Room 342 Math Tower, 231 W 18th Ave., Columbus, OH 43210; (614) 292-7223; fax: (614) 292-0694; e-mail: elaughba@math.ohio-state.edu.

The new TI-83

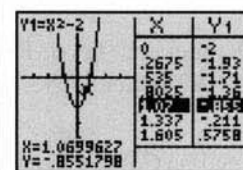
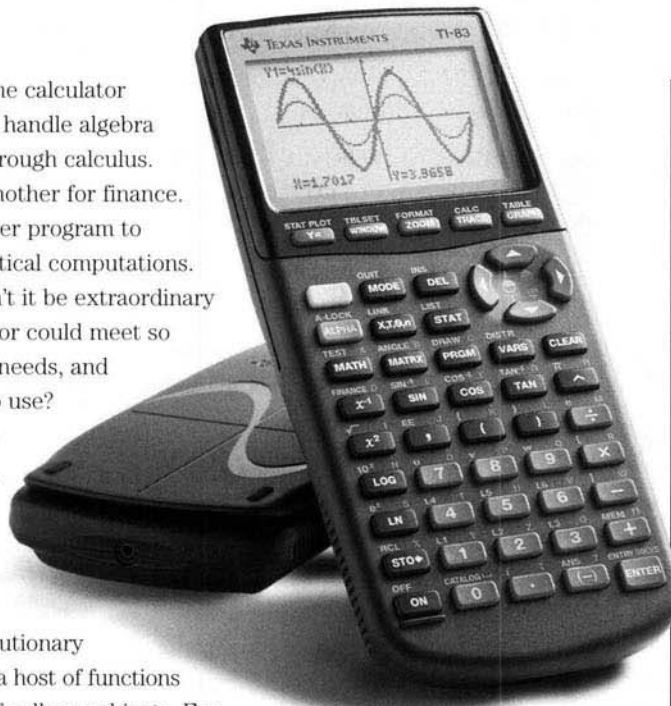
The singular **solution** for a **multi-function** world.

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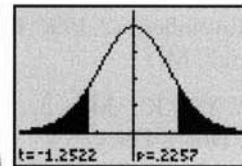
One calculator
to handle algebra
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And a computer program to perform statistical computations. Whoa. Wouldn't it be extraordinary if one calculator could meet so many diverse needs, and still be easy to use? Well, now one does just that. Presenting the TI-83 Graphing Calculator.

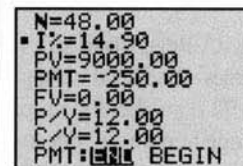
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Math. Graph-Table split screen allows you to trace the graph and scroll the table simultaneously.



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