IN THIS ISSUE:

IN FOCUS: Donna Ross
CRMSE Welcomes Karen Foehl
Provost Martin Recognizes Nadine Bezuk
Susan Nickerson 2008 Outstanding Mathematics Educator
Recently Funded Projects
Recent Publications
Professional Accomplishments

Development of the CRMSE Logo
Kathleen Fisher, Scientist and Educator
History of Semantics Networking
In Memoriam: Nicholas Branca
Alumni Receive Awards
Conference Presentations
IN FOCUS

Donna Ross

**What do elementary education and molecular biology have in common?**

Think. Think hard. Elementary-age children are in fact bunches and bunches of molecules...but is there something else? Universities in the United States do award undergraduate majors in both elementary education and molecular biology, but consider the percentage of individuals in the country who earn degrees in both. Are you finding it difficult to imagine a person who might do such a thing? CRMSE is fortunate to count one of that rare breed of double major among its ranks.

Donna Ross, an associate professor and science educator in the School of Teacher Education, came to SDSU in 1998, fresh from completing her doctorate in science education from the University of Washington. In 1994 she earned a Master of Science Degree in Marine Ecology (her thesis research is on epibenthic algal mats in salt marshes) from San Diego State University, and in 1988 her double major in elementary education and biology from Lewis and Clark University. Donna Ross is also extraordinary in that she taught migrant education for 13 years, in the summers between her seven years of teaching elementary school and continuing through her summers in graduate school. Migrant education provides schooling to children of migrant workers during the period of time the crops are ready to harvest.

Donna’s work blends commitments to children from under served populations, a love of science, a recognition that international programs support more knowledgeable and reflective teachers, and expertise in sharing with teachers and prospective teachers. These commitments influence decisions in her personal life, as for example, she lives in the same diverse community in which she supports students’ learning. There is a saying that “If you’re going to talk the talk, you’ve got to walk the walk.” Donna’s talk and her walk are, in fact, inseparable.

**Partnerships Involving the Scientific Community in Elementary Science (PISCES)**

One example of her dedication to science education is Donna’s work on the PISCES Project. Donna serves as a co-PI on the NSF-funded project (http://pisces.sdsu.edu). The project places science graduate students in elementary classes to support quality science instruction and learning. At its peak, the project supported about 25 graduate students with full fellowships. Graduate students are in each participating teacher’s classroom for at least 16 weeks, two to three times per week, and so the support is extensive. To date, graduate students have provided support in more than 150 classrooms. The project PIs analyzed standardized test scores and found statistically significant differences when compared with a control group, showing that having the expertise of the graduate student, support, and an extra set of hands in the classroom made a positive difference in students’ learning. In addition, in future years when the graduate students were no longer in the classroom, the teachers felt knowledgeable enough to continue teaching science. When test scores were analyzed the following year (without the graduate students’ direct participation), the scores were still significantly higher than the control group. The results suggest that even when the graduate students have left teachers’ classrooms, teachers are continuing to teach science on a regular basis and that they are doing it in such a way as to support students’ learning.

Although the project was designed to provide clear benefits for teachers and students, Donna recognized another benefit. The science graduate students really began to understand how important science outreach is for scientists. Donna noted, “They start to understand the situation in our public schools where we are having a crisis with so little science being taught in the elementary schools. They develop both the understanding, but also a real passion for, continuing some form of outreach.”

**Elementary and Secondary Students**

Donna’s work includes learning opportunities for elementary and more recently, secondary students. She tries to get into low income, high diversity schools at least one day each week. She notes that she does that because “It keeps me grounded in strategies that work, it keeps me humble about the things I suggest teachers do and it lets me see what is effective; and it is also just very satisfying. I think that [having faculty members] stay current about what is going on in schools is really important.” Currently, Donna not only visits schools, she is a co-teacher for a biology course at a newly opened charter school, Health Sciences High & Middle College (HSHMC). Taking
on this responsibility is a continuing testament to Donna's commitment to science, teaching, learning, and students from diverse backgrounds.

**International Student Teaching Experiences**

Another project that Donna has established and implemented, with very little funding, was an international collaboration between SDSU and Colegio Americano de Torreon (in Mexico). For two consecutive years, Donna took six to seven credential students to Mexico to complete an 8-week student teaching experience in the Colegio Americano de Torreon, an international preK–12 school in Torreon, Mexico. In this bilingual school, instruction was provided in English and Spanish, and 99% of the children were learning English as a second language. The multiple—and single—subject credential students taught in English (as required by California credentialing) but also lived in Mexican homes to increase the connection with the local Mexican culture. Because there are very few English speakers in the city of Torreon, the SDSU credential students, who spoke little to no Spanish, had the experience of trying to navigate in a country in which very few spoke their language—a situation not unlike one many of their future students will encounter.

Donna created this program as a way to help credential students develop the teaching skills and cultural sensitivities to better reach all children in their future classrooms. She strongly believes that having an immersion experience in a new culture, especially one in which a different language is spoken, can change credential students' world views forever. This program provides a rich and personal experience through which SDSU students broaden their world views, recognizing that there are many equally appropriate ways of doing things. Students have opportunities to experience the feelings of a minority and to be immersed in a culture different from their own. These experiences can help prospective teachers understand the emotions and challenges that many of the students in their future classrooms will face on a daily basis. Most novice teachers in San Diego are placed in schools in which the percentage of children who are English learners is high, with the largest percentage speaking Spanish as a first language. The CSU system has a bilingual—teacher preparation program, but the number of Spanish-speaking students qualified to enter the program from SDSU is small. Donna created this international student teaching program to provide an international, bilingual experience for our monolingual credential students, while simultaneously allowing them to complete their student teaching requirements.

**BAHIA and Secondary Students Teaching Teachers**

Donna also worked with a local nonprofit organization on the CPEC-funded BAHIA project designed to take urban high school students to Baja to conduct marine ecology research for five weeks each summer. In this project, Donna identified a subgroup of students whom she has followed and mentored. Many are completing their first or second year of college and she has come to recognize that while universities are doing a good job of recruiting lower income, diverse students, they do less well at supporting them once they attend those universities. Seeing how difficult the transition has been and how much the students struggle has been interesting from a professional standpoint and difficult from a personal standpoint, but she has found the project itself rewarding.

**And there's more...**

Added to her record of international connections is a recent trip to Ecuador with CRMSE's Director Ricardo Nemirovsky and CRMSE member Chris Rasmussen to share aspects of their work that are fundamental to students' learning. Donna's interests are wide and her curiosity and willingness to support the community is unending. It is rare for her to learn of a project in which she has no interest, and it is even more rare for her to decline a lead in some component of each project in which she invests herself. Projects may be relatively
small (helping students to write a grant to plant trees at their school site and then helping to plant the trees when they finally arrived), of moderate scale (co-directing a science education master’s program), or large (see PISCES, BAHIA, and Torreon above), but they all have the common theme of engaging learners in understanding the social and scientific landscape of their communities.

CRMSE is delighted to acknowledge the work of Donna Ross and her ongoing support of the local community.

CRMSE Welcomes Karen Foehl, Office Manager

Please be sure to give a warm welcome to CRMSE’s new Office Manager, Karen Foehl, who recently moved from Cleveland, Ohio to San Diego with her 14-year old daughter, Hannah. Karen began working as the CRMSE Office Manager in January 2008, following the retirement of Judith Leggett.

Karen’s more-than-twenty years of experience include positions as office manager of family businesses, treasurer and assistant treasurer in the public school sector, and executive and administrative assistant in a corporate environment (banking/international CPA headquarters). She also served for two years as school secretary for her daughter’s elementary school. Karen’s interests are the outdoors, dance, and involvement at her church.

Provost Marlin Recognizes Nadine Bezuk, Professor of Mathematics Education

Nadine Bezuk

Reprinted from Monday, April 14, 2008 SDSUniverse, People Section

One of the most daunting educational problems confronted by our nation is improving K–12 mathematics education. The application of Nadine Bezuk’s research to schools has demonstrated success in terms of increasing student learning of mathematics.

Nearly 10 years ago, Professor Bezuk and several San Diego State colleagues set out to enrich the mathematics understanding and achievement of San Diego students by building professional development programs for K–12 teachers.

Today, Professor Bezuk is QUALCOMM Professor of Mathematics Education in the School of Teacher Education at SDSU and directs the Improving Student Achievement in Mathematics (ISAM) program. Through this QUALCOMM-funded program, SDSU has formed partnerships with eight San Diego County school districts, resulting in specialized training for 2,260 teachers who, in turn, have reached more than 200,000 students.

Professor Bezuk also codirects the Professional Development Collaborative, through which another 350 San Diego-area teachers have completed the two-year Mathematics Specialist Certificate, often a preliminary step to a master’s degree.

She is a faculty member in the Mathematics and Science Education Ph.D. (MSED) program, administered jointly by SDSU and the University of California, San Diego. In 2007, the program was ranked seventh in the country by the American Mathematical Society and second according to the Faculty Scholarly Productivity Index of best doctoral programs by Academic Analytics.

Through grants from the National Science Foundation and the California Department of Education, as well as QUALCOMM, Professor Bezuk has received more than $11.5 million for research in mathematics education.

In 2005, she received the Alumni Association Award (Monty) for Outstanding Faculty Contributions to San Diego State.

A national leader in her field, Professor Bezuk is a founding member of the Association of Mathematics Teacher Educators (AMTE) and has held several posts with that group, including her current service of nearly 10 years as executive director. She also founded the California AMTE, of which she is president.

She has presented at hundreds of conferences and consulted for dozens of school districts and educational publishers. The textbook she coauthored, “Learning Mathematics in Elementary and Middle School,” is currently in its 4th edition.
By Dr. Janet Bowers, reprinted with permission from the author

THE GREATER SAN DIEGO AREA MATH COUNCIL is a Volunteer group of San Diego County Educators, Stewards, who are committed to the advancement of mathematics appreciation and competency for all students in San Diego County, and beyond. This year, they have named Susan Nickerson the year’s Outstanding Mathematics Educator at the Post-secondary Level. The purpose of this award is to “honor teachers who inspire students of all backgrounds and abilities to higher achievement in mathematics.” Dr. Nickerson was honored at a GSDMC Banquet on Thursday, May 22.

Dr. Nickerson’s nomination was supported by letters of recommendation from her current and former students, colleagues, and the chair of the Department of Mathematics and Statistics, Dr. Samuel Shen. The judges indicated that the letters all illustrated the inspiring impact that Dr. Nickerson has had on her students’ interest in mathematics education and their understanding of the content as well. For example, one former undergraduate described how she was a “role model” for maintaining high standards in math class while supporting and caring for her students at the same time. A graduate student noted that “Dr. Nickerson has been the most influential force in my developing an understanding of the whole enterprise of mathematics education, from putting broad theory into practice, to being open to and making sense of student thinking, to accounting for issues of equity in the classroom. Even after working closely together for the past three years, I continue to learn from her in every interaction.”

One of the hallmarks of Dr. Nickerson’s work is her focus on putting theory into practice. She has consistently served as the liaison between the San Diego Unified School District (SDUSD) and the University. For example, she served as PI on a million-dollar grant from the California Postsecondary Education Commission to help scores of local teachers gain mathematical competence and improve their teaching practice in order to become certified under the “No Child Left Behind” Act. She has also served as director for the SDSU-SDUSD tutoring program since 2002. This program pays technically-capable college student tutors to work with mathematics teachers in one or two local public secondary schools. The goals of the program are to support San Diego Unified School District (SDUSD) mathematics teachers and SDUSD students and to provide experiences that encourage college students to consider high school mathematics teaching as a career. In recognition of the program’s success, the Department of Mathematics and Statistics was given the 2007 Recognition Award from The Partnerships in Education Program sponsored by the San Diego Unified School District’s Successful Partnerships program.

About CRMSE...

The Center for Research in Mathematics & Science Education (CRMSE) is an interdisciplinary community of scholars who seek to advance mathematics and science education at local, state, and national levels by providing leadership in research, materials and program development, and evaluation. Its members include faculty from the departments of mathematics and statistics, biology, physics and psychology in the College of Sciences, and from the School of Teacher Education and the Department of Policy Studies in the College of Education. For more information, please visit our website at: http://crmse.sdsu.edu
Fred Goldberg, *Developing a Large Enrollment Physical Science Curriculum, 2008–2010, funded by the National Science Foundation Course, Curriculum and Laboratory Improvement Program.*

The project goal is to develop an inquiry-based physical science curriculum for large enrollment, general education settings. The work will build on two other successful curricula, Physics and Everyday Thinking (PET) and Physical Science and Everyday Thinking (PSET) to address needs that are unmet in general-education physical science curricula for use in large-enrollment (90+ student) courses: (1) the lack of inquiry-based curricula, (2) lack of curricula that are coherent and focus on the fundamental content themes of physical science in an integrated way, and (3) unanswered calls for explicit instruction on the nature of science and learning. Project co-PIs are Ed Price (CSU San Marcos), Steve Robinson (Tennessee Technological University), Rebecca Kruse (University of Pennsylvania) and Danielle Harlow (UC Santa Barbara).


Undergraduate engineering, science and mathematics majors in the United States begin their university mathematics training with several calculus courses, but then move on to such courses as differential equations and linear algebra. Mathematics majors and minors may also study real analysis or abstract algebra. Students often find the transition from taking calculus courses to taking more formal, proof-based mathematics courses particularly challenging, and often a stumbling block to further academic success. Sophomore and junior level courses such as differential equations, linear algebra, geometry, and courses introducing set theory and logic constitute a core collection of courses that have the potential to facilitate this transition. The main goals of this project are to make contributions to theory and methodology in terms of the continuum between informal and formal mathematical reasoning. In particular, we develop theoretical means for interpreting the transition to formal, proof-based mathematics courses. We do so by using four different perspectives on the nature of the individual and collective growth of knowledge. The methodological products will include strategies for data collection and data analysis that allow for insights into student learning within and between each of the four different theoretical perspectives. The mathematical context for this work will primarily be linear algebra, with insights drawn from our prior work in differential equations, geometry, and set theory.

Steve Reed and Bob Hoffman (PIs), *funded by the National Science Foundation through the Pittsburgh Science of Learning Center.*

Steve Reed and Bob Hoffman are working with Albert Corbett at Carnegie Mellon University to link worked examples from the Animation Tutor (SDSU) to evaluation and feedback from by the Algebra Cognitive Tutor (CMU). We will compare three different versions of worked examples for constructing equations for finance and mixture problems: (1) a standard solution presented as a verbal explanation, (2) a static visual solution based on icons, and (3) an interactive visual solution in which manipulable icons are dynamically linked to equations.
Professional Accomplishments

Note: CRMSE members in black text. Current and former graduate students in orange text.

Andee Aceves was recognized as one of five San Diego County Teachers of the Year and one of five California Teachers of the Year. Ms. Aceves is a third grade teacher and a graduate of the College of Education’s Master of Arts program in K–8 Mathematics Education.

and http://www.cde.ca.gov/nr/ne/yr07/yr07rel145.asp

Olga Amaral, Joanne Lobato, and Alberto Rodriguez were promoted to full professor. Congratulations!

Fred Goldberg was on sabbatical during Fall 2007. He remained at SDSU to work on analyzing video data collected during the previous five years on his NSF-funded projects and prepare articles for publication.

Fred Goldberg continues to be on the editorial board of Physics Review Special Topics—Physics Education Research. This online journal is the only journal in the United States that focuses exclusively on research in physics education.

Vicki Jacobs was honored as the Most Influential Faculty Member for the School of Teacher Education. She has earned this award three times.

Amy Liu was recognized as the Outstanding Graduate Student for the School of Teacher Education. Ms. Liu earned her graduate degree in K-8 Mathematics Education in Spring 2008.

Randy Philipp led a working group of an NCTM Research Agenda Conference that met for a week in June 2008. He is serving as a Working Group Leader for the Teacher Preparation and Professional Development Subgroup.

Randy Philipp is currently serving on the following advisory boards:

Advisory Board Member, Cisco Learning K–5 Mathematics Specialist Academy. Funded to design a national certification program for K-5 Mathematics Specialists, Sid Rachlin, Director, Began February 2008.


Advisory Board Member, Mathematics Teachers’ On-the Job Learning: A Synthesis of Conceptual Frameworks, National Science Foundation Project, Directed by Catherine Lewis, Mills College, Helen Doerr, Syracuse University, and Lynn Goldsmith, Education Development Center, Inc., 2007–present.

Advisory Board Member, Synthesizing Video Data on Students’ Mathematical Reasoning, National Science Foundation Project, Carolyn Maher, Rutgers University, 2007–2008.
Publications: 2007–Present

Note: CRMSE members in red text. Current and former graduate students in orange text.


Continued, page 9
Publications – 2007–Present, continued from page 8


Professional Accomplishments continued from page 7


Gregorio Ponce was promoted to Associate Professor and is serving as Division Chair at the Imperial Valley Campus. Congratulations!

Chris Rasmussen served as Guest Editor for Issue 26 of the Journal of Mathematical Behavior.

Chris Rasmussen received the 2007–08 Most Outstanding Faculty Member Award from the department of Mathematics and Statistics.

Development of the CRMSE Logo

The upward shape and the orange color might suggest, we hoped, a more inclusive and less Western-centric world view.

Because CRMSE encompasses math and science, we wanted the logo to be seen not as a mathematical pattern but as a natural object. For this reason, we decided to base the logo on an actual photograph. To this end we worked with clay to shape an object to be photographed. We illuminated the clay object from the upper right angle so that it would create a shadow as if it were floating above a surface. We wanted to convey a sense of CRMSE “illuminating” mathematics and science learning. The photo was tweaked in Photoshop™ to adjust the color and give prominence to the shadow.

Until recently CRMSE did not have a Logo. Instead, we have used the San Diego State University logo in our documents and web pages. The design of the logo and its approval by CRMSE members took almost 10 months. The CRMSE logo incorporates several key elements. The first one is “pi” as a sign of mathematical activity. Pi is usually denoted with the upper horizontal line either flat or bent downwards on the left side (e.g. \( \pi \) or \( \Pi \)). Exploring alternatives we decided to bend it upwards on both sides, in a manner that evokes eastern shapes. See for example, an image of the famous Shinto monument in Hiroshima.
My Life as a Scientist/Educator Dilettante

By Kathleen M. Fisher

Many thanks to Kathleen Fisher for providing the transcript of her Presidential Address at the American Association for the Advancement of Science—Pacific Division, 2006

Many academics and other professionals aim straight for the mark. They decide early what they want to do, make a plan, and follow it closely. Not me. Meandering rivers, unexpected tributaries and cul-de-sacs are my venues. This is the story of intellectual growth and development of a young woman who grew up not knowing that a Ph.D. existed or what it was.

Ours was a modest house in a small New Jersey town. Our family seemed to split down the middle, Dad and me, Mom and my older brother. My Dad, a life-long Boy Scout leader, took me to all sorts of camporees, jamborees, and scout meetings. Scouts practiced their first aid on me and I climbed the towers they built of sticks. Often there was just one horse available and I was the one allowed to ride him through camp. Dad bought a sailboat and taught me the rudiments of sailing. I even visited my Dad’s AT&T office on Canal Street in New York City, climbing to the top of tall rolling ladders and pretending I knew what to do with the racks of intricate telephone equipment. During WW II blackouts, we sometimes walked together at night, crunching through the snow, watching for breaches of light in the darkness. By opening the doors of the male preserve to me, I believe my Dad empowered me. I didn’t realize that until I read a study reporting that most women scientists of my day had close relationships with their fathers.

But I learned another lesson, too: Men were born to be in charge. How did I come to believe that? Perhaps it was because, at home, Dad ruled. Maybe it was the US government’s program promoting at-home Moms after WW II. Maybe it was the ’50s ambience. In any event, I thought I knew what was and was not expected of me. Consequently, when my GPA put me at the head of my class in high school, I felt it wasn’t right. It would be improper, I thought, for a girl to be Valedictorian. So I actually worked to lower my GPA. I succeeded in dropping it to a tenth of a point below that of my closest GPA neighbor, a popular football player in the general studies curriculum. I felt great satisfaction when he became Valedictorian.

Belief is a powerful thing.

One summer I worked at the Waksman Institute, isolating DNA from calf thymus. A mundane job, but a definite step up from my previous five years as a waitress. Then I had a conversation with a friend, a year ahead of me in the same major. It was snowing lightly and we were walking down a sidewalk at Rutgers. He told me about the revolutionary works of Watson and Crick, Meselson and Stahl. I tingled from head to toe. Mendel was way ahead of his time, Darwin stirred the pot of controversy, but the world was waiting for Watson and Crick. And I was delighted because I was already on familiar terms with DNA; I had seen it and felt it and wound it around my glass rod.

I applied to study biology at Rutgers University, twenty miles from home. But I was steered into Douglass College, the girl’s school on the other side of town. After one semester, I knew I needed to get out. I did that by switching to a major in the College of Agriculture—because this major wasn’t offered at Douglass. Since the ‘Preparation for Research in Agriculture’ major paralleled the pre-med curriculum, I was able to take all the science courses I wanted at Rutgers. Field Crops and Dairy Judging were simply icing on the cake. With 21 units per semester and classes five and a half days a week (yes, even Saturday mornings), I was a happy camper. I guess my philosophy is either learning matters, and you can’t get too much of it, or else I’m a glutton for punishment.

The next summer, I was asked to teach a biology lab at Rutgers. Graduate students were unavailable, fighting the Korean war. What a thrill! I studied for hours every night to stay ahead of my students. They were older than me, Korean War veterans, and full of the devil. They harassed me unmercifully. They let our 10-foot snake out of its cage. They took the king crab out
of the sink and put it onto the floor, where it skittered around knocking over chairs while they howled with laughter. They--well, you get the picture. I don’t think the term ‘classroom management’ had yet been coined, but I surely could have used it. At any rate, we all survived the summer, and I can only hope they learned half as much biology as I did. I had discovered what all teachers know, that You learn much more as a teacher than you ever did as a student.

In my senior year I eloped with my high school sweetheart. Upon graduation, we moved to Cincinnati where I worked in the malaria project at Christ Hospital Institute for Medical Research. I enjoyed the work immensely. My mentor was the Director of the laboratory, Dr. Leon Schmidt, a brilliant man who had graduated from the University of Chicago at age 16. I began each day by taking a drop of blood from the ear of each of our infected Rhesus monkeys. Animal handlers would catch the monkeys for me and hold them while I performed my task. I smeared their blood on a glass slide, fixed and stained the slides, and sat at a microscope to read them. Reading entailed counting the red blood cells and malaria parasites in them, identifying the stage of development of each parasite, and recording the data. I also treated the monkeys with intramuscular injections of anti-malarial drugs as needed, aiming to keep both muscular injections of anti-malarial drugs as needed, aiming to keep both

We raised our own Anopheles mosquitoes at the Institute. Often we dissected the salivary glands from thousands of these tiny mosquitoes to isolate the malaria parasites inside. Of all of my duties, my favorite was operating on Rhesus monkeys. In order to maintain our weakest malaria strain, we needed a steady supply of splenectomized monkeys. I found being a surgeon very satisfying, and perhaps would of, could of, should of gone off to medical school. Except for my inner voices and the traditional expectations of marriage holding me back.

During the cold Cincinnati winter, my lab partner came down with malaria. How extraordinary! At that time, no one believed diseases could jump across species. After checking with public health officials, however, we determined that the only place he could have contracted malaria was in our own facility. Could that be possible? To find out, we shaved the bellies of our Rhesus monkeys at the peak of their infections and fed about a thousand mosquitoes on each one. (ouch!) Next, we removed the males, one at a time, from the mosquito population by sucking them into a glass tube with a cotton plug at the end. The males don’t ingest blood and so are easily distinguished from the engorged females.

We shipped the fat females overnight to a prison located in another state. Prisoner volunteers allowed themselves to be bitten on the arm by the mosquitoes. The volunteers came down with malaria like clockwork. Blood samples were then taken from them, sent to Cincinnati, and injected into fresh, uninfected monkeys with matching blood types. The monkeys came down with malaria like clockwork. Thus we demonstrated that malaria passes readily between Rhesus monkeys and humans. This is the primary reason why eradication of malaria has been and still is impossible in countries with wild monkey populations. It was exciting to learn that, even as a lab technician, I could play a key role in making an important scientific discovery. I believe the prisoner volunteers were cured of their malaria and their prison time was shortened in recognition of their contribution to science. (Nonetheless, it seems unlikely that we could repeat this experiment with today’s constraints).

In 1963, twenty families from the Research Institute moved across the country with all of our Rhesus monkeys, to the University of California Davis. We were to establish the National Primate Center there. I was in the operating room at UC Davis, leaning over my pregnant belly, splenectomizing the fifth of six monkeys in succession, when I heard over the loudspeaker that President John F. Kennedy had been shot and killed in Dallas. A month later, at age 53, my mother passed away, a victim of cigarettes, emphysema, and chronic lung infections. A month after that, my daughter was born on Thanksgiving day.

For my daughter’s sake, I left the study of diseases behind (we studied cancer and TB as well as malaria) and moved to the UC Davis Department of Genetics, where I worked for Dr. Harris Bernstein. I was just in time for the raucous birth of molecular biology. Through the collaborative efforts of scientists all over the world, the 64 triplet codons that are involved in translating DNA to RNA to protein were elucidated. Every few weeks, a new codon would be discovered. There was intense competition among the young molecular biology upstarts. At the same time, frictions erupted everywhere between traditional biologists and these newcomers who thought they knew it all. I learned first-hand that Thomas Kuhn is right about scientific revolutions. Radical new ideas are rarely embraced by old-timers. I also realized that
the old-timers’ beliefs about science were not too different from my beliefs about women. In both cases, our belief systems were like molasses, exerting a firm grip and impeding our movement into the future.

The next six years were incredibly hectic. We bought a 3,000 square foot Victorian house that was so dilapidated it had been condemned by the city. We adopted our son, Dore, just ten months younger than our daughter, and so had two babies in diapers—with a washing machine but no dryer and very rainy winters. My husband and I were both working full-time as laboratory technicians. We hired a live-in housekeeper to keep ourselves sane and rode a motorcycle ten miles to work to save gas money.

To keep up with the ongoing discoveries in molecular biology, I enrolled in a graduate course every semester. Since I was thriving on these courses, Dr. Bernstein encouraged me to get my Ph.D. It had never occurred to me to go that far. I was fearful. It didn’t seem right for a woman. Yet with a steady stream of encouragement I did it, with great trepidation. I learned that I could actually step across the line in the sand drawn by the nagging voices in my head.

After receiving my Ph.D., it seemed inappropriate to continue working as a lab tech. At the very same time, my husband left his job and opened a motorcycle shop in Davis. Our two comfortable salaries plummeted to zero. What was I to do? I couldn’t jet around the country looking for a position like my fellow graduates, because again, in my mind, I was expected to stay at my husband’s side. It wasn’t just my voices holding me back now. There were many external factors as well-hard-core reality. For the first time in my life, I became aware of sex discrimination. Betty Friedan had published her book six years earlier, but I had been too busy to notice. Now suddenly I could see how different things were for men and for women.

I decided to go to Chancellor Meyer for help. “Look, I said, you folks gave me this Ph.D. Can you help me figure out how to use it? Because if you can’t, I’m going to go sell motorcycles.” Shortly thereafter, I was invited to join the faculty in the UC Davis Department of Genetics as a Lecturer, to produce a televised genetics course they had been planning. This only emphasizes the familiar line: you’ll never know if you don’t ask.

A month later I found myself Chair of the Task force on the Status of Women at UC Davis. I had never been on a university committee in my life and now I was chair of one. Wow. I found a way to let the committee grow from six to thirty women. As I learned more and more about the low status of women at all levels in the UC system, I became a raging feminist. This must have been the flip side of my internal voices. When I insisted on driving 50% of the time, the kids would ask, “What’s the matter? Is Daddy sick?”

A friend commented to me that “If you were already free like me, you wouldn’t need a Task Force.” I think I just smiled, but in my heart, I knew she was right. Our feminist issues definitely existed on both sides of our skulls. This was brought home again and again, as when we tried to organize the secretaries. We had some secretaries with Master’s degrees who were making less than some custodians with eighth grade educations. They had a legitimate gripe, but they didn’t want to ‘make waves.’

The Genetics Department and I first produced a series of talking head televised lectures. I knew in my gut this was a deadly approach, but it was their plan, and we did it. When our first disgruntled students marched on the Dean’s office in protest, I was dismayed, delighted and prepared.

My goal was to make the ‘Sesame Street’ of higher education. I submitted a proposal to the Alfred P. Sloan Foundation to develop a video-auto-tutorial method of teaching. My plan was to condense 50-minute lectures into 25-minute TV programs that were visually illustrated throughout. The programs would be played every half hour throughout the day and evening, in small, comfortable TV viewing rooms. Students could see the programs when they wanted and as many times as they wanted.

Implementing the plan was an uphill battle all the way. It took me six months, for example, just to persuade the Regents to let me carpet the classrooms—a radical idea at the time. I learned that some innovations can succeed—at least for a while.

After a year as a lecturer, I thought I should become a full-fledged faculty member. My colleagues agreed with me. I was a little surprised, however, when a meeting was called that included the Academic Vice-Chancellor, the Dean of the College of Sciences, the Dean of the Division of Biological Sciences, and my Department Chair. They had drawn up a page delineating my responsibilities and their expectations, and we all
signed it. I thought to myself, “What is the big deal?” Little did I know that paper would save my hide a few years down the road, when a couple of pissed-off colleagues tried to torpedo me at tenure time. I learned first-hand that if you take a novel path, you’d better cover your ‘a’.

The Genetics faculty wrote the audio scripts for the programs and I created each video script. Inventing visual images to represent abstract as well as concrete ideas in genetics was challenging, exciting, and exhausting work, a lot of which I did at three in the morning. Talented student artists implemented my sketches. I produced the video programs and also conducted ongoing formative research on many aspects of the course, especially on student learning and attitudes. This helped us make fine adjustments as we went along.

The video-auto-tutorial method was a success. Students liked the fast-moving programs. They watched each tape two and a half times on average, so while the programs were shorter, students were spending more time listening than they would have in a traditional lecture course. About 7,000 students learned genetics from these videotapes over a period of about five years. It wasn’t quite Sesame Street, but it was definitely proof of concept. That experience laid the groundwork for me to collaborate subsequently with both the BBC and the Science Media Group at the Harvard/Smithsonian Center for Astrophysics. Each layer of life’s experience lays the groundwork for the next one.

The Sloan Foundation offered to double my budget if I would not only produce TV, but also conduct research on student learning. In this not-so-subtle way, they seduced me into becoming a science education researcher. In collaboration with Stanford Research Institute, I compared introductory genetics learning at three different UC campuses. Alas, we were unable to detect any significant differences in student learning, but we did find large differences in student attitudes. Intense pre-med competition seemed to be quite discouraging. Student morale went down as the proportion of pre-meds went up. This illustrates a not uncommon event in research, that experiments often produce completely unanticipated findings.

As the lone science education researcher at Davis, I was delighted when I was invited to join the SESAME Graduate Group in Science and Mathematics Education at Berkeley. Being part of the graduate group allowed me to work with graduate students and post-doctoral fellows for the first time in my career. SESAME’s weekly seminar program was worth its weight in gold. We enjoyed top-of-the-line speakers in science education, cognitive science, psychology, linguistics, philosophy, and computer science. I happily drove the seventy miles in each direction for this fare. The seminars were at 4 p.m. each Monday, and afterwards the we would dine with the guest speaker, continuing the dialog. I loved these opportunities for learning!

At about the same time, I was appointed UC Davis’ Founding Director of the Teaching Resources Center, aiming to help graduate students and faculty improve their instructional skills. Five years later in quick succession, my husband and I divorced; I went to University Sains, Malaysia on a Fulbright Scholarship; and then served as Program Officer in the Research in Science Education program at the National Science Foundation. The assignment at NSF opened a window on the latest and greatest science education research, showing that science students across the country were increasingly memorizing the ‘facts’ and forgetting them just as quickly. Researchers were also discovering how students’ naive conceptions often interfered with science learning. Large lecture classes and simplistic multiple choice testing were sinking American education!

The Director of our Division, Joseph Lipson, and I addressed the memorization issues in an article entitled “The Crisis in Science Education,” which garnered a lot of attention. It was read into the Congressional record and excerpted into popular magazines. The NSF administration was incensed, however, because the paper had been given to a Congressional committee without ‘going through proper NSF channels.’ Dr. Lipson was summarily fired. Shortly thereafter, Ronald Reagan came to town and closed down the entire NSF Division of Science Education, firing us all. When people don’t like the message, they often shoot the messenger.

Returning to UC Davis, I teamed up with Joseph Faletti, professor of computer science. He had done his graduate work at Berkeley and was steeped in cognitive as well as computer science. We aimed to make a difference. With a small group of faculty colleagues, dubbed the SemNet Research Group, we designed a learning tool to help students move up the comprehension scale from memorization to meaningful learning. Joshua Callman, a Berkeley graduate student, created a computer-based mock-up.
of our plan, Joe wrote the first line of SemNet code 20 years ago, on June 28, 1986. SemNet was launched with UC Davis biology students in 1987. Apple Computer’s Wheels of the Mind contest awarded a third prize for the young SemNet software. Seventeen years after receiving my Ph.D., I finally found the project that would become a central theme in my life.

Then I began suffering from intense daily migraines. All attempts to mitigate them failed and I knew I had to do something. I suspected they would go away once the pressure subsided, so I took a year’s leave of absence to test my theory. Skipper Harris Freihon and I sailed out of San Francisco Bay under the awesome Golden Gate Bridge on his 35-foot sailboat, “Misty Sea.” We visited every port down the coast and fell in love with San Diego. Before heading into Mexico, I applied for a position at San Diego State University. Our SemNet collaborations continued even as Joe moved to the Educational Testing Service in New Jersey and I sailed into the sunset. Misty Sea was packed with long-life milk to keep my bones strong and with my Macintosh Plus computer and SemNet research data to keep my mind engaged. Much to my surprise, migraines continued to plague me daily. With a steady supply of migraine medicine (Cafergot), we nonetheless managed to enjoy a superb year of sailing. As we were beating up the coast, SDSU called me on the ham radio to come for an interview. Joining the Department of Natural Science and the Center for Research in Mathematics and Science Education (CRMSE), I was finally fully immersed in a wonderful group of science and mathematics education researchers. What a treat!

A liquid protein diet helped Harris and me shed the pounds added by all those churros, and bingo, my headaches disappeared. Imagine that: I was suffering in part from food allergies! With guidance from scientists at Optifast, I identified my sensitivities. This was another unexpected twist, but you could say the trip was successful, if indirectly. A doctor in San Diego told me about the rebound effect Cafergot has on the blood vessels: It clears today’s headache while triggering one tomorrow. With self-discipline at the table and limited use of Cafergot, my headaches were finally under control.

Fiscal woes at SDSU resulted in the dissolution of eleven departments, including Natural Science. Fortunately, I was welcomed into the Biology Department where I have enjoyed more wonderful colleagues and relished being able to teach biology again. When I was asked to take on the role of CRMSE Director, my reticence flared up but was more easily overcome. Having a supportive and encouraging partner helped.

Joe and I regrouped in San Diego and continued working on SemNet. Over the years, the software has been used by hundreds of faculty and teachers and thousands of students, from 3rd grade to post-graduate levels. College students who worked in groups to construct semantic networks about the topics they were studying were able to learn and retrieve significantly more than similar students who didn’t use the software, sometimes by a factor of two. Yet SemNet never became a commercial success, being Mac-based and thus limited to just 4% of the software market. I was getting ready to retire and “put the software to bed.”

Then in 2001, Richard Harrison and Charles Gillespie approached us with a desire to market SemNet. They had the experience, the know-how and the backing to launch a new company, Semantic Research Inc. (SRI). As the twin towers came tumbling down, SRI began its long slow climb upward. The coincidence was timely in that our software is proving especially useful to the intelligence communities, helping them to knit together little fragments of information. With Chip Harrison and Charles Gillespie leading the way, the Semantica software series has been launched.

I learned that successful software development is 90% marketing!

In 2006, Harris and I went to my 50th high school reunion in New Jersey. I had not seen or kept in touch with any of my fellow students in fifty years. Yet the first thing many said to me was, “You should have been Valedictorian!” I was stunned. Dealing with the hazy insecurities of my youth, I made decisions that made sense to me, but I never thought about their impacts on others. My clever avoidance of a wedding, aiming to spare my family unnecessary expense and hassle, and my avoidance of the Valedictorian honor, were actually hurtful to my family and friends. But it seems that most have eventually forgiven me. And as far as we know, I am the only one among our graduating class of 103 to earn a Ph.D. I’d like to think I now have the wisdom that comes with age, but I think I’d just be telling myself more lies; all I can really claim is humility.
A Brief History of Semantic Networking

By Kathleen M. Fisher

In 1968, Ross Quillian, a talented graduate student in Great Britain, developed semantic network theory to explain the way in which humans store denotative factual information in long-term memory. Unfortunately, Quillian died in a horrible car crash shortly afterwards, but his legacy lives on.

Gordon Pask in England constructed what may have been the first external semantic network, taping concepts on his walls and stringing lines between them. Then in the early eighties, semantic networks were created by several American groups working on mainframe computers, such as Xerox Park’s Notecards and Fairchild et al’s three-dimensional graphic representations of large knowledge bases.

In 1980, Kathleen Fisher served as a Program Officer at the National Science Foundation. Data were emerging to indicate that American college students across the country were memorizing science instead of learning for understanding. Fisher and Joseph Lipson, Director of her unit at NSF, summarized the problem in a paper called “The Crisis in Science Education.” Their paper was read into the Congressional Record and subsequently made headlines.

Fisher returned to the University of California Davis with this problem on her mind. She wanted to do something to help biology students shift from rote to meaningful learning.

Fisher linked up with an exceptional American computer scientist, Joseph Faletti, who had moved to Davis after spending years working in computer science and artificial intelligence at Berkeley. Together they formed the SemNet Research Group (SRG), along with a few interested UC Davis faculty, including Robert Thornton, botanist; Hugh Patterson, anatomist; and Carl Spring, education specialist. Joseph Lipson, now at the California State University Chico, also participated in the SRG. Their goal was to use computers to facilitate higher level learning. One of the SRG members promoted learning by putting a series of concept names on cards and placing the cards in a hat. Students were then challenged to pull any two cards out of the hat and say how those two particular concepts were related.

Hearing this, Joe Faletti immediately thought, “semantic network!” The idea was that if students had a tool with which they could construct their knowledge in the form of a semantic network, their learning would certainly become more expert-like.

To help them get started, Graduate Dean Jerry Marr gave SRG two microcomputers, a Macintosh and a PC. However, since only the Mac was capable of handling graphic displays, the PC was promptly traded in for another Mac. The software design gradually emerged from a long series of discussions among SRG members. Joe Faletti wrote the code for the first and presumably the only semantic networking application ever to run on a MacPlus computer. At the same time, Josh Callman, a Berkeley grad student, constructed a SemNet prototype using Filevision software. (Callman is now Director of Director of Continuing Medical Education in the Stanford School of Medicine). As working versions of SemNet emerged, SRG faculty and their students provided test beds for evaluation and refinement of the product.
The first students to use SemNet® were volunteers drawn from a UC Davis biology class in fall 1987. Although none had ever worked on a computer before, they constructed biology networks containing up to 700+ concepts (noun ideas) linked together with relationships (verbs and verb phrases). The SemNet software has been used by college students every year since that time, in various states and countries. SemNet was also introduced into selected K–12 classes on an experimental basis, ranging from third grade to high school. In the meantime, cognitive scientists were discovering that experts had well-organized hierarchical knowledge and much richer, interconnected knowledge structures (semantic networks) than did students.

Fisher’s group learned that when biology students constructed computer-based semantic networks as they were learning, and subsequently were asked to write short essays, they were able to retrieve and use about twice as many biology concepts as those who hadn’t used the software. SemNet users’ knowledge structures began to look more expert-like. SemNet users also acquired other cognitive skills, such as knowing how to distinguish between big ideas and little ones. This knowledge changed the ways in which they took notes in other courses.

SemNet never made a commercial splash, in part because there were few computers in schools, and partly because Macintosh computers accounted for only 4% of the market. In addition, the concept of semantic networking was still a bit ahead of its time.

Kathleen Fisher and Joe Faletti independently moved to SDSU in the late eighties/early nineties. Then in 2001, they were approached by Richard (Chip) Harrison, Charles Gillespie, and Chris Staczak. The three expressed interest in marketing SemNet. A new company, Semantic Research Inc. (SRI), was born—just months before the World Trade Center came crashing down.

SRI developed the descendent of SemNet, the cross-platform Semantica® software. The education market remained flat, however. On the other hand, US Intelligence Agencies and Homeland Securities groups gradually began to discover the power of semantic networks in assessing dangers and solving problems. Marvelous new capabilities were gradually added to Semantica to meet their needs, in part via links with other companies. These include the ability to:

- respond to queries by scanning documents with natural language processing;
- link networks geospatially;
- automatically construct semantic networks from text; and
- handle very large data bases (Tripleletspheres®) with millions of concepts linked by relationships into triplets (i.e., ‘noun-verb phrase-noun’ units).
- establish a timeline that allows the user to ‘see’ events unfold.

In 2003, Tim Berners-Lee proposed using semantic networks to make the Internet smarter. In his talk at the Gartner Web Services and Integration Group in Los Angeles, he launched an entire new discipline, ‘semantic webbing.’ Several semantic webbing companies have since been formed. These will provide tools for Facebook, YouTube and other sites in which users build many complex linkages. Reuters is now in the process of buying one of those companies to increase responsiveness and efficiency in managing their financial empire. The commercial community is finally beginning to appreciate the power of semantic networks! Let’s hope the education community soon follows.
CRMSE Remembers Nicholas Branca

The CRMSE community mourns the loss of Nicholas Branca, who died in February while traveling in Australia. The biography and article were reprinted from a website created in Nicholas’ name, http://pdc.sdsu.edu/nicholas/Site/Home.html. Thanks to the Professional Development Collaborative for providing the site.

Nicholas A. Branca, Professor Emeritus, San Diego State University, was involved in the field of mathematics education for over 30 years. He received a Bachelor of Science degree in Mathematics from Iona College, a Master of Arts in Teaching degree in Mathematics from Harvard University, and both a Master’s Degree and Doctorate in Mathematics Education from Teachers College, Columbia University where he specialized in K–12 Mathematics Teacher Education.

At the University level, in addition to his tenure for over 25 years in the Department of Mathematics and Statistics at San Diego State University, Professor Branca taught at Columbia University and New York University and served on the faculties of Stanford University and the Pennsylvania State University. He specialized in teaching mathematics to prospective elementary and secondary teachers of mathematics, and in programs for both masters degree and doctoral candidates in mathematics education. He was also a visiting scholar at the University of London, Chelsea College, and the University of Michigan. Before his career at the University level, Professor Branca worked as a teacher of mathematics at the junior and senior high school levels. The recipient of numerous awards, Professor Branca received two prestigious awards from SDSU. He received the Alumni Association Award for Outstanding Faculty Contributions to the University, also known as the Monty, in 1988, and received the Top 25 at SDSU Award in 1999.

During the past 20 years, Professor Branca focused on the design, development, and implementation of professional development programs for K–12 mathematics teachers. He served as the Director and/or Principal Investigator of various local and regional professional development projects sponsored by the State of California and/or the National Science Foundation; among them, the San Diego Mathematics Project, the Mathematics Renaissance K–12 and the Video Cases in Mathematics Professional Development Project. Professor Branca also served as the Executive Director of the California Mathematics Project, a statewide network of over 20 university-based professional development projects.

In addition to his teaching at both the Secondary and University levels, and his professional development work with teachers, schools, and districts, Professor Branca has conducted research and published in the areas of mathematics problem solving, learning and teaching. He was involved in a number of mathematics curriculum development projects, including the Secondary School Mathematics Curriculum Improvement Study, the School Mathematics Study Group, the Connected Mathematics Project, and the Reconceptualizing Mathematics Courseware for Elementary and Middle School Teachers Project. He created mathematics curriculum material for both students and teachers, and he was a life member of both the California Mathematics Council and the National Council of Teachers of Mathematics, where he served on the writing team for the Professional Standards for Teaching Mathematics.

Professor Branca was serving as a Co-Director of the Professional Development Collaborative (PDC) of the Center for Research in Mathematics and Science Education at San Diego State University. The PDC provides a variety of professional education programs to mathematics teachers in San Diego County, offering teachers the opportunity to reexamine the mathematics they teach in order to come to a deeper understanding of the content and its connections to other mathematical ideas and concepts. Professor Branca also served as a mathematics consultant to various schools and districts and to publishers and professional organizations, providing professional development to teachers and educational leaders.

Survivors include wife Melanie Ruth Branca of San Diego, son Nicholas Noel Branca of Darien, CT; daughter Melanie Anne Branca of Manhattan, New York; daughter Marisa Cath-
erine Ruth Branca of San Diego; eight grandchildren, and long-time friend Paul Kerry of San Diego.

The San Diego Union Tribune Honors Dr. Branca

http://www.signonsandiego.com/uniontrib/20080306/news_1m6branca.html

Nicholas Branca, 65; taught better ways to teach math

By Jeff Ristine
STAFF WRITER, San Diego Union Tribune

March 6, 2008

All over California there are students with better math skills because of Nicholas A. Branca, a man almost none of them have met.

Mr. Branca wanted teachers to move away from the notion of relying on constant drilling to convey mathematical concepts. In a variety of roles at San Diego State University, his mission was to help K–12 teachers better understand the math they teach, so that they could improve their strategies in the classroom.

Associates said he worked with thousands of teachers across the county. “One of his gifts with teachers was to help them see that there are a lot of different ways to solve problems,” said Nadine Bezuk, a math professor and colleague of Mr. Branca’s at SDSU. “It really all centers around the (idea) that ... all kids are capable of doing mathematics, not just the elite few.”

Mr. Branca died of a heart attack Feb. 25 while canyon-rappelling in Australia. He was 65.

Mr. Branca came to San Diego State as a mathematics professor in 1976. He had earned a bachelor’s degree from Iona College in New York, a master of arts in teaching degree from Harvard University, and both a master of arts in mathematics and a doctoral degree from Teachers College at Columbia University. After the doctoral work, he had an internship at Stanford University and a professorship at Pennsylvania State University.

He saw San Diego as a golden opportunity to concentrate on his love of math education, said his wife, Melanie Branca. It was a field he developed an interest in as a boy. Melanie Branca said her husband remembered being in classrooms with struggling classmates and thinking, “Why doesn’t the teacher just say this?”

Mr. Branca retired from teaching at San Diego State University about four years ago. Since 2001, however, he had been co-director, with Bezuk, of the university’s Professional Development Collaborative. The program has assisted more than 2,000 mathematics and science teachers in K–12 classes throughout San Diego, with Mr. Branca focused on helping them learn more effective strategies for teaching math.

In a 1991 interview, Mr. Branca said it was imperative for schools to move beyond drills and work sheets to teach higher-math concepts. Without connecting math to real life, he said at the time, teachers could “lose hundreds of kids along the way who never put it together.” “No one does drudgery-type mathematic skills as part of their personal life,” he said.

In workshops with teachers to hone these skills, Bezuk said she saw almost immediate results from Mr. Branca’s suggestions. “There were a lot of light bulbs coming on in the participants’ heads,” she said.

Mr. Branca developed a teaching tool he called “RecTiles”—a combination of rectangles and tiles—as a geometric introduction to algebra. Designed for teachers of students in fifth grade and above, it makes children pretend they are “owners of a struggling tile company” to learn algebra, geometry and number theory.

He also helped develop video tools that used interviews with teachers and lessons filmed in real classrooms to show good models for math instruction. He got a $5 million grant from the National Science Foundation to work with 16 school districts throughout the state in a five-year professional development program called Mathematics Renaissance K–12.

From 1982 to 1996, he also was executive director of the California Mathematics Project, another professional development program based at universities. He led the San Diego Mathematics Project, the local spinoff, for two years, ending in 2004. In addition to his work at San Diego State, in recent years Mr. Branca had been a consultant for schools in his native Bronx.

Outside the world of numbers, Mr. Branca loved travel, music and dance. He was a doting grandfather of eight, traveling frequently to their homes in New York and Connecticut. Last Christmas, he wrote a personal song for each one.

A celebration of his life was held May 3 at the San Diego Zoo. The family suggests donations to the Nicholas A. Branca Memorial Scholarship Foundation, 550 Front St., Unit 2101, San Diego, CA 92101.

Jeff Ristine: (619) 542-4580; jeff.ristine@uniontrib.com

Nicholas Branca, 65; taught better ways to teach math

By Jeff Ristine
STAFF WRITER, San Diego Union Tribune

March 6, 2008

All over California there are students with better math skills because of Nicholas A. Branca, a man almost none of them have met.

Mr. Branca wanted teachers to move away from the notion of relying on constant drilling to convey mathematical concepts. In a variety of roles at San Diego State University, his mission was to help K–12 teachers better understand the math they teach, so that they could improve their strategies in the classroom.

Associates said he worked with thousands of teachers across the county. “One of his gifts with teachers was to help them see that there are a lot of different ways to solve problems,” said Nadine Bezuk, a math professor and colleague of Mr. Branca’s at SDSU. “It really all centers around the (idea) that ... all kids are capable of doing mathematics, not just the elite few.”

Mr. Branca died of a heart attack Feb. 25 while canyon-rappelling in Australia. He was 65.

Mr. Branca came to San Diego State as a mathematics professor in 1976. He had earned a bachelor’s degree from Iona College in New York, a master of arts in teaching degree from Harvard University, and both a master of arts in mathematics and a doctoral degree from Teachers College at Columbia University. After the doctoral work, he had an internship at Stanford University and a professorship at Pennsylvania State University.

He saw San Diego as a golden opportunity to concentrate on his love of math education, said his wife, Melanie Branca. It was a field he developed an interest in as a boy. Melanie Branca said her husband remembered being in classrooms with struggling classmates and thinking, “Why doesn’t the teacher just say this?”

Mr. Branca retired from teaching at San Diego State University about four years ago. Since 2001, however, he had been co-director, with Bezuk, of the university’s Professional Development Collaborative. The program has assisted more than 2,000 mathematics and science teachers in K–12 classes throughout San Diego, with Mr. Branca focused on helping them learn more effective strategies for teaching math.

In a 1991 interview, Mr. Branca said it was imperative for schools to move beyond drills and work sheets to teach higher-math concepts. Without connecting math to real life, he said at the time, teachers could “lose hundreds of kids along the way who never put it together.” “No one does drudgery-type mathematic skills as part of their personal life,” he said.

In workshops with teachers to hone these skills, Bezuk said she saw almost immediate results from Mr. Branca’s suggestions. “There were a lot of light bulbs coming on in the participants’ heads,” she said.

Mr. Branca developed a teaching tool he called “RecTiles”—a combination of rectangles and tiles—as a geometric introduction to algebra. Designed for teachers of students in fifth grade and above, it makes children pretend they are “owners of a struggling tile company” to learn algebra, geometry and number theory.

He also helped develop video tools that used interviews with teachers and lessons filmed in real classrooms to show good models for math instruction. He got a $5 million grant from the National Science Foundation to work with 16 school districts throughout the state in a five-year professional development program called Mathematics Renaissance K–12.

From 1982 to 1996, he also was executive director of the California Mathematics Project, another professional development program based at universities. He led the San Diego Mathematics Project, the local spinoff, for two years, ending in 2004. In addition to his work at San Diego State, in recent years Mr. Branca had been a consultant for schools in his native Bronx.

Outside the world of numbers, Mr. Branca loved travel, music and dance. He was a doting grandfather of eight, traveling frequently to their homes in New York and Connecticut. Last Christmas, he wrote a personal song for each one.

A celebration of his life was held May 3 at the San Diego Zoo. The family suggests donations to the Nicholas A. Branca Memorial Scholarship Foundation, 550 Front St., Unit 2101, San Diego, CA 92101.

Jeff Ristine: (619) 542-4580; jeff.ristine@uniontrib.com
AERA Award Winner Amy Ellis

The award committee was impressed with the strong use of theory, the well conceptualized methods used to undertake the study, as well as its contribution to the field.

Ellis Receives AERA Award

Reprinted from the AERA's web page for the Special Interest Group: Research in Mathematics Education http://www.sigrme.org/

The Special Interest Group on Research in Mathematics Education announces the award of the 2008 Early Career Publication Award to Dr. Amy B. Ellis. Dr. Ellis received her Ph.D. in mathematics and science education from the University of California, San Diego and San Diego State University in 2004. She is now an Assistant Professor of Mathematics Education at the University of Wisconsin Madison. This award is given to Dr. Ellis in recognition of the outstanding qualities of her article entitled “Connections between generalizing and justifying: Students’ reasoning with linear relationships” published in the Journal of Research in Mathematics Education, 38 in 2007. The paper by Dr. Ellis examines the relationship between the mathematical practices of generalizing and justifying. In particular, Dr. Ellis explores the complex interplay between students’ generalizing and justifying practices and explains the bi-directional nature of the relationship between these practices. She provides evidence that the ways in which students generalize influence the tools they access when working to justify their generalizations and in addition, the ways in which students justify influence the nature of the generalizations that they produce. Furthermore, Dr. Ellis’ research provides insights concerning the types of generalizing activities that support the development of increasingly sophisticated reasoning strategies among middle school students. The award committee was impressed with the strong use of theory, the well conceptualized methods used to undertake the study, as well as its contribution to the field.

Sandifer Honored with Excellence in Teaching Award

Reprinted with permission from Howard Kaplon, Associate Dean, College of Science and Mathematics, Towson University http://www.towson.edu/fcsm/faculty/excellence-in-teaching.asp

(As presented at the Fisher College of Science and Mathematics Forum on November 30, 2007.)

Editor’s Note: Cody Sandifer earned his doctorate in science education from the Mathematics and Science Education Doctoral Program at San Diego State University and the University of California at San Diego.

The recipient of the 2007 Excellence in Teaching Award [at Towson University] earned a Ph.D. in 2001, and then really started producing results. This is the teaching award; but as we know, good research and good teaching go hand-in-hand. In the first two years here, our recipient was awarded three Towson University grants. After getting warmed up, our recipient was awarded two external multi-year grants totaling over a quarter million dollars. Our recipient has published two refereed journal articles and five refereed articles in the proceedings of major conferences. Our recipient has given 19 conference presentations and invited talks; and has participated in the planning and presentation of 20 professional development workshops for teachers in elementary, middle and high school as well as at the university level. In his spare time he has written four course texts and resource materials for use in courses in his department. As one nominator stated, “He has been able to implement what he has learned from his own and others’ research to construct productive learning environments.”

Our recipient is described a master teacher of both students and teachers at all levels from kindergarten through university. His student evaluations are among the highest in his department, and in several courses he received the maximum evaluation possible. Some of the written comments include:

- What an amazing professor!
- Truly engages his students.
- Best teacher ever.
- This is the best course I have ever taken.

One of his former students who is now teaching in an elementary...
school wrote: “I needed only to think to about ten minutes ago in a parent teacher conference to when I last thought about him and the impact he has had on me as an educator.” and “It was in his class, more than any other, that I felt great teaching was modeled as well as taught.”

Several of his colleagues wrote about how much he has influenced and mentored them. One wrote “To watch him teach is to see a true genius at work.” Another wrote “He is an active, thoughtful and inspiring teacher. He’s a great resource for this new faculty member.” Still another wrote “He is a dynamic and gifted teacher who is a seemingly all knowing resource for those working to improve as teachers.” The one comment that says it all was “He is the embodiment of the Teacher-Scholar model we aspire to here at Towson.”

For anyone who needs to know the absolute best path between Smith Hall and the Administration Building, just ask our recipient of the 2007 Excellence in Teaching Award, Cody Sandifer of the Department of Physics, Astronomy and Geosciences.

Colorado University-Boulder Program Working To Draw More Science Majors To Teaching

MSED Graduate Valerie Otero leads the effort

By Greg Swenson, News Services

Photo credit: Casey A. Cass

reprinted with permission from Inside CU: The CU-Boulder Faculty/Staff E-Newsletter

CU-Boulder is a nationally recognized leader in science research and education. However, like many universities across the country, the majority of CU’s science graduates go on to pursue careers in areas other than education, a continuing trend that spells trouble for America’s schools.

A growing program at CU-Boulder called the Colorado Science, Technology, Engineering, Mathematics (STEM) Learning Assistant project is working to combat what many experts call a growing crisis brought on by a shrinking pool of new K-12 science teachers. Over the past couple of years, the program has received national attention.

Supported by a $2.5 million grant from the National Science Foundation, funding from the American Physical Society’s PhysTEC program, the CU-Boulder administration and a $120,000 private donation, the STEM Colorado Learning Assistant project’s main goals are to both improve introductory math and science classes at the university and recruit and train future K-12 science teachers, according to Valerie Otero, director of the program and an assistant professor in CU-Boulder’s School of Education.

Later this month approximately 20 physics faculty from nine universities throughout the nation, including Cornell University, University of Maryland and the University of Minnesota, will visit CU-Boulder to attend a Learning Assistant workshop so they can implement similar programs at their universities. The workshop is supported by the American Physical Society and will be headed by Otero and her colleagues Noah Finkelstein and Steven Pollock from the CU-Boulder physics department.

Otero says there is a critical shortage of new teachers in the sciences, especially in physics, chemistry and math. In fact, she says two out of three K-12 physics teachers who are teaching physics don’t have a degree in physics. To help change this, Otero and colleagues from several campus science departments and the School of Education are successfully attracting some of the top science and math students into the world of teaching.

Each semester about 60 undergraduate learning assistants are hired to help science faculty in six departments make changes to their large undergraduate courses. One thing they do is break the large classes – some have more than 500 students – into smaller learning teams, each led by a learning assistant. The teams meet at least once a week to work on group problems and other activities.

The learning assistants also meet with faculty members to plan for future classes and to talk about how each class is going. They are required to take a 2-credit course on mathematics and science education taught by School of Education faculty and K-12 teachers, which gives them teaching guidance and helps with tips on different teaching techniques.

“The exciting thing about this program is that the undergraduate learning assistants are the pool from which we recruit new teachers,” Otero said. “It also couples teacher preparation with course transformation, and it provides the mechanism for collaboration among science and math faculty and education faculty.”

The program appears to be working. To date 255 math and science majors have participated as learning assistants and 28 have joined teacher certificate programs.

“Most of these students did not consider teaching as a career until they participated as a learning assistant,” Otero said.


Bezuk, N. October 2–3, 2008. Laying the foundation for success in algebra. Regional meeting of the National Council of Teachers of Mathematics, Oklahoma City, OK.


Fred Goldberg and Valerie Otero (former MSED doctoral student and currently assistant professor of science education at the University of Colorado) co-led a workshop titled “Physics and Everyday Thinking and Physical Science and Everyday Thinking” at the January national meeting of the American Association of Physics Teachers in Baltimore, Maryland. PET and PSET are two curricula developed with funds from the National Science Foundation. Goldberg was PI of that project and Otero was co-PI, along with other co-PIs, Steve Robinson (Tennessee Technological University), Rebecca Kruse (University of Pennsylvania) and Nephi Thompson (Wright State University and finishing doctoral student in our MSED program).

At the same conference Goldberg also gave two invited talks. One was a talk on “Interactions in Physical Science: A Middle School Curriculum for Students and Teachers,” which was part of a session entitled “Directions of the New NSF Division of Research in Learning.” The other invited talk was called “Physics and Everyday Thinking and Physical Science and Everyday Thinking” and was part of a session “The Case for Specialized Physical Science Courses for Pre-Service K-8 Teachers”

March 1 and 2

Goldberg gave two workshops, one on Physics and Everyday Thinking and the other on Interactions in Physical Science, at the annual conference of the Physics Teacher Education Coalition (PTEC) in Austin, Texas.