SUMMER 2004

education views

UNIVERSITY OF COLORADO AT BOULDER SCHOOL OF EDUCATION

Education Project Improves Undergraduate Courses and Teacher Recruitment

STEM-TP participants consult before presenting program information to a visiting accreditation team. From left: Steve Iona (Teacher in Residence), Valerie Otero (School of Education faculty), Emily Quinty (physics Learning Assistant), Richard McCray (astronomy and planetary sciences faculty), and Jennifer Whitcomb (School of Education assistant dean).

When Professor Mike Klymkowsky recently asked his beginning biology class, "What does it mean to understand biology?" he was incorporating an approach to teaching designed to improve the way science is learned at the undergraduate level.

Klymkowsky is part of an innovative project funded by the National Science Foundation that promises to reform undergraduate teaching and recruit the best and brightest mathematics and science students into teaching.

The Science, Technology, Engineering, and Mathematics Preparation (STEM-TP) joins CU-Boulder faculty from math, science, and education in a unique collaboration designed to accomplish the following goals:

- Attract highly qualified mathematics and science majors into teaching
- Improve teaching and learning in large, introductory mathematics and science courses
- Understand issues of the nature of knowledge construction in mathematics and science disciplines, and
- Foster positive faculty attitudes toward teaching as a legitimate endeavor not only for students pursuing careers in education, but for faculty seeking to improve their own teaching, as well.

Learning teams in math and science courses become communities where students are invited to learn and make knowledge.

Based on the belief that quality teacher education begins in the College of Arts and Sciences when students begin their content preparation, the project is headed by Dr. Richard McCray, astronomy and planetary sciences; Dr. James Curry, applied mathematics; Dr. William Wood, molecular, cellular, and developmental biology; Dr. Carl Wieman, physics; and Dr. Valerie Otero, School of Education.

To attract qualified math and science majors to teaching, undergraduate Learning Assistants (LAs) are selected to receive fellowships and work with other students in large introductory mathematics and science courses. LAs serve as coaches, mentors, facilitators, and collaborators as they lead learning team sessions of approximately 20 students designed to personalize learning of math and science content.

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Message from the Dean

The purpose of this newsletter is to stay in touch with our alums. Please send an e-mail if you would like to know about a favorite professor or tell us about your accomplishments. We would love to hear from you.

We have been too busy this year to worry long over budget cuts or football scandals. An Education Diversity Scholars (EDS) neighborhood was established this year to recruit and support students of color and first generation college students committed to careers in teaching. EDS is part of the CU-LEAD Alliance (Leadership, Excellence, Achievement, Diversity), conceived of by education Professor Ofelia Miramontes.

The homecoming scholarship program, which Dean Phil DiStefano began in 1993 with five scholarships totaling $2,500, has grown to fill the old Harvest House ballroom. This October, we awarded 38 scholarships totaling $140,000. Most recently the Hach Scientific Foundation has contributed five $6,000-per-year scholarships for undergraduate chemistry and physics majors who want to teach.

Also in October, convinced that policymakers needed better first-hand knowledge of what goes on in schools of education, CU-Boulder, along with CSU, UNC, Metro, and CU-Denver, convened a Quality Teacher Preparation Workshop. Forty first-year teachers met in focus groups with state legislators, state board members, and commissioners from CCHE. Policymakers asked about content preparation, the use of data, and the quality of cooperating teachers. Teachers said that they felt well prepared to teach content standards and use assessments and valued their field experiences.

In January and February, we conducted five faculty searches in educational psychology, research methodology, science education, bilingual education, and educational policy. These positions are in addition to the four wonderful new faculty members pictured below. We're proud that a drawing card for faculty candidates is the School of Education's reputation for collaborative work and strong connections between research and practice. We're a small but mighty faculty. It puts me in mind of the little engine that could.

In March, we were visited by two accreditation teams representing the National Council for Accreditation of Teacher Education (NCATE), the Colorado Commission on Higher Education, and the Colorado Department of Education. Our programs have been revised dramatically since 1999 to focus on clinical experiences and the performance-based proficiencies of teacher candidates. The NCATE team concluded that we had met all standards with no weaknesses, and the state team likewise recommended program approval.

In April we announced the first endowed chair in education. Bob and Judy Charles contributed $1.5 million to create the endowment, and Margaret Eisenhart was named the first chair holder in recognition of her work on women in science.

In May, teacher licensure candidates, master's candidates, and PhD candidates attended a School of Education graduation ceremony in Macky Auditorium. Our separate event gives us the opportunity to recognize each individual graduate in a more intimate setting with all of their professors and classmates there to congratulate them.

Lorrie Shepard, Dean
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School Welcomes New Faculty

Derek Briggs, Assistant Professor, Research and Evaluation Methodology

Dr. Briggs applies statistical and psychometric methods to address a wide range of topics in educational settings. In particular, Dr. Briggs has studied the effectiveness of coaching programs for college admissions tests, the potential for multidimensional analyses of testing instruments, racial/ethnic performance gaps in science achievement, and the development of large-scale standardized tests with diagnostic utility.

Brian Sevier, Assistant Professor, Instruction and Curriculum with an emphasis in Social Studies

Dr. Sevier's research includes critical analysis of the creation of curricular materials, the process of becoming a teacher, the impact of teacher gender on elementary classroom experiences, and the use of instructional practices to further students' critical thinking skills. He has studied the education and experiences of male elementary teachers and the involvement of elementary and middle school teachers in the creation of anti-racist/multicultural materials.

Susan Jurow, Assistant Professor, Educational Psychology and Teacher Education

Dr. Jurow's work explores the relations between learning, culture, and human development. She uses multidisciplinary approaches to studying learning and teaching from the learning sciences, anthropology, and discourse analysis. Her publications focus on how middle school and elementary students learn mathematics and science in long-term design projects.

Luis Urrieta, Assistant Professor, Instruction and Curriculum in the Content Areas with an emphasis in Social Studies

Dr. Urrieta's general research interests center on issues of identity and agency, activism, altruism, new social movements, and social practice theory. He is specifically interested in Chicana/o and Indígena identity, and in activism as a social practice in educational spaces both in the United States and internationally. Methodologically his work is grounded in anthropology and qualitative research methods. Dr. Urrieta's work specifically makes claims for native anthropology and native educational research as a political practice and method.

State Senator Ron Tupa Combines Teaching and Politics

Teaching and politics may not be such strange bedfellows, at least not for CU alumnus Ron Tupa. Simultaneous careers as a teacher and legislator are not necessarily what the state senator intended when he moved to Colorado 14 years ago, but that's exactly where his talents and interests have taken him.

The passion to teach has been with Tupa since 1986 when he majored in philosophy at the University of Texas, hoping eventually to teach college. And although he wasn't politically active until the end of his degree program, Tupa says that after working as an aide at the Texas House of Representatives, "the political bug really bit me."

When he moved to Colorado, Tupa decided to pursue teaching. In addition to philosophy, he had an economics background and loved history so decided to enroll as a post-baccalaureate in the social studies licensure program. It was then that Tupa became active in the CU College Democrats and the Colorado Young Democrats—the first time he had worked in organized politics. He headed both organizations while attending classes in Boulder. "I loved it; I loved the activism," Tupa notes.

As the first member of his family to attend college, Tupa understands the financial stresses that plague many students. To help pay off college loans, he joined the Teamsters and worked nights for an Aurora trucking company on the loading docks. But when the demands of full-time student teaching forced him to quit his night job, Tupa received a Paul Douglas Teaching Scholarship, which he says "really helped and paid the rent."

In 1994, Tupa started substitute teaching and took his first political position when he was narrowly appointed to Senator Dorothy Rupert's seat. Since then he's had contracts at Evergreen High School, Boulder High School, and Monarch High School in Louisville.

When asked how his political fame affects his students, Tupa says, "Kids all have an image of government when they read about it in a text book—that it's bland, medicinal. I try to give them real world experiences. For example, I won my first appointment in 1994 by one vote, so when the book says 'every vote counts,' I tell them it's true! They're always a bit more interested in me as a mini-celebrity in the first week or so, but when the first grades come back or the first papers are returned and a 'C' appears, the kids say, 'Wait, we thought you were cool!' At that point I lose my luster and become just another teacher."

Like most teachers in Colorado, Tupa has worked with and learned from diverse learners. Several years ago, Tupa taught government and sheltered geography to students learning English, an experience he describes as both a challenge and a way to learn more about teaching and modifying instruction. "The lesson I took back is that experienced teachers are worth their weight in gold," Tupa states. "They understand the nuances of learning and how to adjust and change lessons according to students' needs."

Tupa acknowledges that doing both jobs is hard. Because of spring legislative sessions, he is only able to work as a teacher fall semesters. And when the governor calls a special session, or when he is required to attend fall committee meetings, juggling the two positions can be difficult.

In spite of the challenges, Tupa thinks his education experiences are invaluable to his senate job, especially on the Education Committee, where he has served for 10 years. "My experience is valuable for bills that are introduced," he says. "It's easier to 'read' how bills are going to affect teachers. I can bring this information to my colleagues. They view me as knowledgeable." Tupa has sponsored legislation to use American Indian and CU alumni license plate proceeds for scholarships, decrease K-12 class size, and provide teachers with loan forgiveness.

Citing the state budget as our biggest education issue, Tupa recently sponsored legislation to amend the constitution to take tuition out of TABOR calculations to free $1.5 billion in surplus for higher education. "This protects K-12," he says. "We're trying to amend TABOR without changing Amendment 23, but it's an uphill battle."

Tupa's legislative work has earned him a Friend of Higher Education Award (2004) from the American Association of University Professors and a Commitment to Children Award (2000) granted by the Colorado Association for the Education of Young Children.

And there's no question that Tupa appreciates the value of good teachers and the contributions they make. "Good teachers work more than full-time jobs, up to 80 hours a week," he notes. "Even teaching only two classes last fall, I worked 40 hours a week."

"I'd say I've made a mark," Tupa reflects. "There are always some kids who shadow me, visit the capital, express interest in the political process. But any good teacher could do that."

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Education Project

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"Traditionally universities value knowing, not learning," science education Professor Valerie Otero said. "For students planning to teach, math or science teaching is what they've seen in large lecture courses. We're trying to change that in more learning-centered courses. Learning teams in math and science courses become communities where students are invited to learn and make knowledge."

To facilitate collaborative learning, LAs and supervising professors attend a special course in Educational Philosophy, Theory, and Practice taught by Otero and Teacher-in-Residence Steve Iona. The course teaches Learning Assistants and department faculty about educational research on knowledge construction and reform pedagogy as they reflect on their own teaching practices.

"My LAs are benefiting enormously," physics Professor Steve Pollock said. "In Valerie's class, the physics LAs are better able to make sense of what they're learning about pedagogy, because they've got something concrete, some teaching that they're doing that they're able to connect it with. So when they read about some aspect of collaborative learning, they've got a real example to hook in with."

And the LAs are turning to teaching as a desirable career option. Through their undergraduate teaching, education course experience, and faculty interactions, LAs have developed positive attitudes about mathematics and science teaching. Of 40 LAs participating for the past year, almost half have already enrolled in teacher licensure courses through the School of Education.

Faculty mentors are encouraging teaching career goals as they take an active role in promoting teaching as a worthy career. "This is the best thing that I've personally experienced here in the physics department to make people aware of the possibility of teaching as a career," Pollock notes. "We have a critical need for knowledgeable science and math teachers."

Undergraduate students are also benefiting from the changes in teaching. Professor Wieman, a Nobel laureate in physics, notes that "students who come regularly to the problem-solving sessions clearly change how they learn, what they think of as learning. They're working out reasoning together, explaining things together—that's clearly very different from the way they approached doing homework problems before. It used to be, 'What formula do I need to plug in to get this answer?'"

As a result, undergraduate students have increased their conceptual understanding of science as a process of investigation, creativity, observation, evidence, and consensus. All STEM Colorado mathematics and science faculty now assess students for conceptual understanding, the nature of science, and attitudes toward teaching and learning. Professor Pollock measured learning gains of over 60 percent in Physics 1110 last fall, a huge gain that is 30 percent above the national average for traditional courses.

Project professors appreciate the opportunity to improve their own teaching. Professor Klymkowsky notes that if he hadn't been part of STEM-TP, he might still be lecturing rather than trying out collaborative learning with students discussing problems in groups. And Professor McCray provides his own testimonial: "I'm getting a lot of rewards from it . . . I believe in what I'm doing, I believe we're making a big contribution, and it's worth my time."

The second phase of the project will follow Learning Assistants in K-12 schools as they move from the mathematics and science undergraduate community into the community of mathematics and science K-12 educators.

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