

Community Colleges Impact K-12 STEM Teaching



Projects
supported by
National Science
Foundation



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Text by Madeline Patton
Edited by Lynn Barnett



The American Association of Community Colleges (AACC) is the primary advocacy organization for the nation's community colleges. The association represents 1,200 two-year, associate degree-granting institutions and more than 11 million students. AACC promotes community colleges through five strategic action areas: recognition and advocacy for community colleges; student access, learning, and success; community college leadership development; economic and workforce development; and global and intercultural education.

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Introduction

The role of community colleges in teacher education has grown significantly over the last decade as the growth in the population of school-age children coincided with the retirement of many experienced teachers. State legislation and the federal No Child Left Behind Act of 2001 have also instigated programmatic reforms, prompted the addition of more rigor in the science and mathematics courses for prospective teachers, and increased demand for professional development for employed teachers.

The National Science Foundation (NSF) has for many years called attention to the important role community colleges play in preparing elementary and secondary school teachers. Through its Advanced Technological Education Program and other competitive grant initiatives, the federal science agency has encouraged community colleges to enhance the science, technology, engineering, and mathematics (STEM) courses for preservice teachers and other students. The reasons include research that indicates

- 20% of teachers begin their postsecondary education at community colleges. (Recruiting New Teachers, Inc., 2004)
- 40% of teachers complete some of their math or science courses at community colleges. (Shkodriani, 2004)
- 44% of science and engineering graduates attended a community college at some point during their postsecondary experiences. (Tsapogas, 2004)

As the higher education institutions attended by 46% of all U.S. undergraduates, community colleges are a major provider of postsecondary education. With 46% of the nation's African American undergraduates, 55% of Hispanic undergraduates, 55% of Native American undergraduates, and 46% of Asian and Pacific Islander undergraduates, community colleges also have the diverse student populations that can help NSF carry out its mission to broaden Americans' participation in STEM fields. (AACC, 2008)

The community colleges featured in this publication have responded enthusiastically and creatively to the challenge of increasing the quantity and quality of teacher preparation programs. All of them have received an Advanced Technological Education grant from the National Science Foundation or have been recognized with a Teaching by Choice Community College Teacher Preparation Program Award.

The Teaching by Choice winners were given \$10,000 awards from the American Association of Community Colleges' Teaching by Choice program, which was funded with NSF support as well. The award winners were chosen according to criteria based on recommendations from a 2004 conference to inform and encourage community college educators and their colleagues in other education sectors to become more involved in teacher preparation. The conference was hosted by the American Mathematical Association of Two-Year Colleges (AMATYC), the National Association of Community College Teacher Education Programs (NACCTEP), and AACC. The recommendations are outlined in the conference report, *Teaching by Choice: Community College Science and Mathematics Preparation of K–12 Teachers*. Another conference hosted by AACC and AMATYC resulted in recommendations to help community colleges develop their STEM faculty. The results of that conference appear in *Teaching by Choice: Cultivating Exemplary Community College STEM Faculty*.

A third report, *Teaching by Choice: Community Colleges Expand K–12 STEM Pathways and Practices*, recommends ways for community colleges to expand post-baccalaureate teacher education and professional development programs for current and future STEM teachers. It is based on the discussions at the Teaching by Choice: Beyond 2+2 conference, convened by AACC in Denver, CO, in February 2008. This conference was co-hosted with NACCTEP. All three Teaching by Choice publications are available on the AACC Web site at www.aacc.nche.edu.

This book showcases 22 programs at and for community colleges that contribute to the development of teachers in elementary and secondary schools throughout the nation. They represent 2+2 transfer programs from community colleges to 4-year colleges and universities, associate degree programs, post-baccalaureate programs for “career switchers,” and professional development programs for current K–12 teachers. The array of offerings bodes well for all of us who care about education.

We are grateful to the National Science Foundation and particularly Dr. Elizabeth Teles for their persistent attention to the nation's community colleges and their dedication to educating K–12 teachers with expertise in STEM disciplines.

George R. Boggs
President and CEO
American Association of Community Colleges

Antelope Valley College

Lancaster, CA

<http://pathways.avc.edu>

Transfer (2+2) Program
Professional Development



CREATING PATHWAYS FOR PROSPECTIVE SCIENCE AND MATHEMATICS TEACHERS IN A TECHNOLOGY-ENRICHED ENVIRONMENT: A COMPREHENSIVE PARTNERSHIP FOR PROGRAM IMPROVEMENT

Online Pathways Model Expands Beyond STEM

The Creating Pathways for Prospective Science and Mathematics Teachers in a Technology-Enriched Environment program at Antelope Valley College (AVC) works to increase the number of college students enrolling in science, technology, engineering, and mathematics (STEM) courses. It does this by improving the preparation of middle school and high school teachers and of people who plan to become secondary school teachers. The comprehensive partnership

- Reforms mathematics and science college courses for preservice teachers.
- Establishes a supportive, structured program for prospective mathematics and science middle school teachers.
- Provides professional development programs for middle school mathematics and science teachers to improve their content knowledge through discovery-centered, technology-based instruction.
- Links nearly 100 preservice teachers at a time with mentor teachers.
- Involves the U.S. Air Force, Boeing Employees Community Fund, National Aeronautics and Space Administration, Hewlett-Packard Company, and other community partners and colleges to support both teachers and prospective teachers.

“Teachers are energized by the new active learning methods in high school physics. Students are engaged in their learning and having fun.”

Matthew Winheim

*Math and Science Curriculum
Coordinator*

Antelope Valley Union
High School District

Pathways to Teaching Mathematics and Science has been so successful that it is expanding into other subject areas and grades with a \$3.5 million grant from the U.S. Department of Education. The project also received an honorable mention in Phi Theta Kappa’s Best Practices in Teacher Preparation program.

School districts throughout the region have responded to the successful summer workshops for middle and high school teachers by requesting that AVC develop similar programs for their elementary school teachers. The relationships formed across districts and disciplines have prompted the school districts to use the college's preservice teachers as volunteers, paid tutors, and substitute teachers.

The entire endeavor is becoming a permanent part of AVC's teacher preparation program, which is closely linked to California State University, Bakersfield, Antelope Valley campus. The college is also working closely with other California community colleges through the Association of California Community Colleges Teacher Education Programs to institute similar teacher preparation programs throughout the state.



Enthusiastic Teacher Shares New Technologies with Colleagues and Students

Ramona Blanski's passion for teaching and improving science education is contagious. Since attending Pathways to Teaching Mathematics and Science professional development programs at Antelope Valley College, she has been organizing professional development workshops for other science teachers in her district. Blanski is a lead science teacher with the Antelope Valley High School District, where she teaches chemistry and physics at Littlerock High School in Littlerock, CA. Blanski particularly likes the active learning methods for physics. She is currently testing an interactive program that incorporates Vernier's data collection system and Physlet® Physics simulations.

Ramona Blanski directs her students at Littlerock High School in Littlerock, CA, in motion experiments using Vernier data collection equipment.

Austin Community College

Austin, TX
www.austincc.edu/teach

Transfer (2+2) Program
Associate of Arts in
Teaching

“After taking EDUC
1301 Introduction
to Teaching, I am
now much more
prepared to enter
the teaching field.”

Molly Anderson
2008 ACC Graduate



GET AN EDUCATION AND TEACH: SCIENCE AND MATH ARTICULATIONS ON THE RIGHT TRACK (GET SMART)

GET SMART Innovations Incorporated in Statewide Initiative

The GET SMART program at Austin Community College (ACC) addresses the shortage of qualified, well-prepared mathematics and science teachers in central Texas, where rapid population growth is exacerbating the disparities in academic quality between well-financed suburban schools and underfinanced urban and rural schools. GET SMART’s multipronged approach includes

- Education courses for teaching mathematics and science in secondary schools.
- Articulation agreements with St. Edwards University, Texas A&M University, the University of North Texas, and Texas State University to help ACC’s preservice math and science teachers transfer, complete bachelor’s degrees, and attain licensure.
- Recruitment efforts to inform students of the college’s teacher preparation programs.
- Professional development for secondary school teachers and community college faculty.
- Collaborations with Austin Independent School District (ISD), Round Rock ISD, Del Valle ISD, and San Marcos ISD that allow ACC preservice teachers to observe teachers working in classrooms.

Since it began in 2003 with an Advanced Technological Education grant from the National Science Foundation (NSF), GET SMART has become part of the Texas Higher Education Coordinating Board’s statewide initiative. The board incorporated elements of GET SMART into the

Education majors at Austin Community College are encouraged to develop their teaching skills by tutoring other students.

associate of arts in teaching (AAT) degree program when it was established in 2005. Mirroring GET SMART, the AAT program includes 16 hours of observation for two courses: EDUC 1301 Introduction to the Teaching Profession and EDUC 2301 Introduction to Special Populations.

Thanks to GET SMART, ACC had the EDUC 1301 course already in place and became one of the first Texas colleges to offer the AAT degree. AAT graduates enter any public Texas university with junior standing. In 2008, AAC had more than 500 self-identified education majors, compared with fewer than 50 before the grant began. The college awarded 3 AAT degrees in 2007, 4 in 2008, and anticipates granting 12 in 2009. The low numbers of AAT recipients are caused by three factors: (1) it typically takes ACC students 3 years or more to earn an associate degree, (2) some education majors are opting for the associate degree in early childhood education rather than the AAT, and (3) some students transfer to universities before earning an AAT degree.

Students enrolled in ACC's education courses are diverse and somewhat older than traditional college-age students. They report being attracted to the college's flexible schedules, low cost, and small classes. The college is attracting younger students by using a part-time recruitment officer, hired with NSF grant funds, to focus on high school juniors and seniors. All ACC freshmen receive GET SMART's recruitment CD-ROM in the college's information packet.



Kareem Lehman

Caregiver Aspires to Teach

Kareem Lehman, recipient of a \$250 GET SMART scholarship in 2008 that covered the cost of his course, is interested in teaching because he enjoys working with children and helping them learn. While attending ACC, he works as a caretaker for children in a treatment facility. "I currently provide care for children 5 to 12 years old who have been abused, neglected, or abandoned. Children are our future. For this reason I have decided to become an elementary school teacher," Lehman said. He will transfer to Texas State University in 2009.

Brookdale Community College

Lincroft, NJ

www.brookdalecc.edu/pages/323.asp

Post-Baccalaureate Program
Professional Development



MATH/SCIENCE/TECHNOLOGY NETWORK

Brookdale Community College Offers Strong Source of Professional Development and Alternative Certification

For 21 years, Brookdale Community College has provided educators in kindergarten through grade 12 (K–12) with discipline-specific and grade-specific workshops that support their teaching of mathematics and science to meet New Jersey’s Core Curriculum Content Standards. The Math/Science/Technology (MST) Network workshops address the challenge of the shortage of mathematics and science teachers, the need to incorporate technology in instruction, and the goal of merging math and science curricula with engineering applications.

Nineteen public school districts, a vocational high school, and four private schools participate in the MST Network. With steadfast support of member school districts, Brookdale has sustained this noncredit professional development program long after the initial funding from an Eisenhower grant ended. Each member district pays dues based on its size.

“Network training at Brookdale improved my ability to communicate science to my students.

They helped me to improve my ability to ‘find’ science all around me.”

**Luke Tirrell, Fifth Grade
Teacher**

Summerfield School,
Neptune, NJ



Art Corvo, a physicist and engineer with 25 years of industry experience, became a high school math teacher in 2004 through Brookdale Community College’s New Pathways program. In addition to teaching high school, he shares his instructional strategies with other teachers as an instructor for the New Pathways program.

Administrators from the member districts meet annually to discuss the needs of their respective teachers and students with the program coordinators. The evaluations completed by the teachers after the previous year's professional development sessions also influence the choice of mathematics and science topics that are covered throughout the year.

The receipt of a Teaching by Choice Community College Teacher Preparation Program Recognition Award from the American Association of Community Colleges boosted the program's credibility. It also prompted new work with the college's Engineering and Technology Department to incorporate engineering into K–12 curricula.

Brookdale was a founding partner in New Pathways to Teaching in New Jersey, a partnership between 15 New Jersey community colleges and New Jersey City University that offers an alternative route to mathematics and science teacher certification for midcareer professionals (www.nptnj.org). In fall 2008, 400 New Pathways participants began their first year of teaching. Since 2003, 3,000 people have completed the New Pathways preservice teaching component and 2,000 have gone on to complete 140 hours of New Pathways instruction during their first years of teaching. Those who complete the program earn graduate credits and full New Jersey teaching licenses. Approximately 25% of those who have completed the New Pathways program teach mathematics, science, or technology.



Melissa Gissubel

Teacher Quickly Applies MST Lessons

Melissa Gissubel has attended 16 MST workshops in 6 years. She consistently uses what she learns at the workshops in her science classes at Ocean Township Intermediate School. During 2007–08, she attended three programs on how to use new technologies in teaching and one on teaching science across the curriculum. "I have yet to participate in a program that could not be directly applied and implemented in my classroom the very next day," she said.

Cerritos College

Norwalk, CA

www.teachertrac.com

Transfer (2+2) Program



TEACHER TRAINING ACADEMY (TEACHER TRAC)

Teacher TRAC Successfully Adds to Teaching Ranks

Teacher TRaining ACademy's award-winning programs at Cerritos College offer many services and pathways for community college students interested in teaching. Its partnership with California State University Long Beach (CSULB) offers an integrated, standards-based bachelor's degree with credentials in multiple subjects.

Teacher TRAC's success, with 275 students transferring seamlessly to CSULB and persisting in degree programs from 2001 to 2007, is all the more remarkable given that 91% of the program's graduates began their postsecondary education in developmental courses. After they transfer to the university with associate degrees, Teacher TRAC students consistently attempt more units, earn more credits, and achieve higher grade point averages than prospective teachers who begin at the university. Of the 275 Teacher TRAC students who transferred from Cerritos to CSULB before fall 2007, only three changed majors or left the university.

"In partnership with Cerritos College, we have the opportunity to mentor the next generation of teachers in math and science and to assist our teachers in staying current in content and strategies in these important areas. Cerritos College communicates and models seamless learning for the future teachers in our district through the Teacher TRAC program."

Ginger Shattuck
Superintendent

Norwalk-LaMirada Unified
School District



Teacher TRAC graduate Dave Laboranti explains how to calculate radius and circumference.

Teacher TRAC offers specific programs for students interested in teaching: kindergarten through grade 6; middle school and high school mathematics, chemistry, and biological and geological sciences; and welding, automotive technology, and woodworking at high schools and community colleges.

After completion of their bachelor's degrees, Teacher TRAC graduates are highly sought after. One local school district gives preferential treatment to its high school alumni who complete the program. Another district has changed its induction program because Teacher TRAC graduates have surpassed the original outcomes of its program. In May 2007, a Teacher TRAC graduate in just her third year of teaching was selected by her colleagues as her school's Teacher of the Year.

In addition to the Teaching by Choice Community College Teacher Preparation Recognition Award, Teacher TRAC received an Advanced Technological Education grant from the National Science Foundation. It also was identified as an exemplary program by the California Board of Governors in 2006 and received the 2006–2007 Phi Theta Kappa Exemplary Preservice Community College Teacher Education Program Award. These awards helped the program obtain a State Career Technical Education Teacher Pathways Grant and a Boeing Foundation Math and Science Special Education Grant. These grants are making other innovations possible.

Teacher TRAC Grad Leads Math Department

Dave Laboranti is an education leader. While in college, he thoroughly invested himself in every Teacher TRAC opportunity available to prepare himself for teaching. After his first year of teaching mathematics at Jefferson Leadership Academy in Long Beach, CA, he became head of the math department. In 2008, he was selected to participate in the school district's Aspiring Assistant Principals program. He is also completing graduate work for his administrative credential.

City College of San Francisco

San Francisco, CA

www.ccsf.edu/Departments/Child_Development/Teacher_Prep_Center/

Transfer (2+2) Program
Professional Development



TEACHER PREP CENTER

Teacher Prep Center Provides Full Complement of Services to Prospective Teachers

The Teacher Prep Center at City College of San Francisco (CCSF) has provided resources, course work, advising, counseling, and support to future teachers since 1999. Housed within the Child Development and Family Studies Department, the center is a stand-alone resource at the public community college's main campus. Because CCSF serves more than 100,000 students each year and is one of the most diverse community colleges in the country, it is a logical place for concentrated teacher recruitment and development of teachers who are comfortable in urban environments.

The high cost of living in San Francisco and the Greater Bay Area, which inhibits teachers from relocating to the area, exacerbates the shortage of mathematics and science teachers in the metropolitan area. The Teacher Prep Center has developed efficient and cost-effective recruiting strategies by focusing its efforts on recruiting future teachers from the pool of community college students already residing in the area.

It casts a wide net for prospective teachers through its publications, Web sites, e-mail blasts, mailings, and other outreach activities that encourage people interested in teaching to visit the Teacher Prep Center for assistance. The center helps students pursue the academic requirements needed to begin teaching by offering group and individual advisement services, financial aid resources, activities, and course work, including test preparation. The center's partnership with CCSF's Mentoring and Service Learning Office provides both mentoring and service learning projects in math and science. Credit-bearing fieldwork courses make it possible for students to gain valuable early fieldwork opportunities in urban classrooms.

The Teacher Prep Center's partnership with the San Francisco Unified School District's Teacher Academy provides a 2+2+2 opportunity for high school students interested in becoming teachers to take community college courses and complete paid fieldwork in summer school classrooms. Grants fund scholarships and fieldwork opportunities in San Francisco elementary and secondary public school classrooms.

One of the Teacher Prep Center’s most successful activities is its annual Math, Science, and CTE (Career and Technical Education) Summer Conference for future teachers and for educators currently working in elementary and secondary schools, as well as community colleges. Each



summer since 2004, more than 200 San Francisco Unified School District teachers have joined CCSF faculty and teacher education students to share information and improve their content knowledge and teaching strategies.

The recognition events that followed CCSF’s receipt of the Teaching by Choice Community College Teacher Preparation Program Award provided opportunities for Teacher Prep Center leaders to discuss the center’s mission and goals with the chancellor and the CCSF board and engendered local appreciation.

San Francisco Unified School District teachers learn about Project WISE during CCSF’s annual Math, Science, and CTE Summer Conference. Project WISE is a free online learning environment that allows students to explore contemporary scientific controversies by designing, debating, and critiquing solutions. It has received support from the National Science Foundation.

CCSF Students as a Percentage of All SFSU Credential Recipients by Category in Summer '06, Fall '06, Spring '07

	Total SFSU	CCSF	CCSF% of SFSU
Multiple credentials	334	113	34%
Single subject credential	357	115	32%
Mathematics credential	55	19	35%
Science credential	37	16	43%
Total recipients of multiple and single subject credentials	691	228	33%

CCSF students are well represented among science and mathematics teaching credential recipients at San Francisco State University during three semesters for which data are available.

Source: Teacher Prep Center, San Francisco State University

El Camino College

Torrance, CA
www.science-fest.org

Transfer (2+2) Program



SCIENCE FEST: CONNECTING COLLEGE COURSE WORK TO THE ELEMENTARY SCHOOL CURRICULUM

Science FESF Adds Depth to Future Teachers' Knowledge

El Camino College's Science FESF (Future Elementary School Teachers): Connecting College Course Work to the Elementary School Curriculum helps prospective kindergarten-to-grade-8 (K-8) teachers acquire more science knowledge. Open to all the students in the college's teacher education program, the program adds depth to preservice teachers' knowledge of science with the support of an Advanced Technological Education grant from the National Science Foundation. Northrup Grumman supported Science FESF after grant funding from the National Science Foundation ended.

"Any prospective teacher who has the opportunity to participate in the FESF program should take it! It opens your eyes to new and improved ideas that you can implement into your classroom. It makes science FUN for you and your students!"

Molly Gardner
Fifth-Grade Teacher
Jefferson Elementary School
Hawthorne, CA

Third graders discover why the Milky Way looks like a band of light in the night sky during a Science FESF module.



Science FEST instructs the future elementary and middle school teachers to study science topics, design their own science modules and instructional materials, teach with these materials in multiple classrooms, and share their work with other educators at professional meetings and conferences. The modules developed by Science FEST participants focus on the physical sciences and space. Topics of the modules, which are posted on the project's Web site, include the solar system, stars, galaxies, seasons, Earth's moon, optics, magnetism, and luminescence.

The preservice teachers learn to devise modules that encourage K–8 students' inquiry-based involvement in science lessons. The pace and quality of youths' learning is obvious in their excitement during lessons and their ongoing interest in science. One school principal attributes the increase in science scores among fifth graders to the students' participation in Science FEST when they were in third grade.

The preservice teachers who have participated in Science FEST complete significantly more science courses at the community college than required by their major. Data from pretests and posttests indicate that the content competencies of Science FEST participants were higher than those found in the general college population taking targeted science courses. The participants also reported that their attitudes about science improved as a result of the program.



Renee Bazant

Student Overcomes Bias Against Science

When Renee Bazant joined Science FEST, she had to overcome her bias against science. "It was not until college when I experienced my first few Science FEST Academy meetings that I discovered how much I truly enjoyed the subject. The informal science setting gave me the opportunity, as a visual learner, to participate in science curriculum in a hands-on fashion," she said. Science FEST inspired her to teach fun, interactive science lessons that spark elementary students' interest in science. She now "loves" teaching first graders at Dr. Theodore T. Alexander Science Center in Los Angeles, CA. It is affiliated with the California Science Center.

Green River Community College (GRCC)

Auburn, WA

www.projectteach.org

Transfer (2+2) Program
Associate of Arts
in Teaching
Professional Development

"The proximity to home and affordability clinched the decision for me when I was choosing a program. It was the only program available that fit those requirements and gave me a strong math and science background."

Debbie Hanninen

*Fifth and Sixth Grade Teacher
Kent School District*

*Central Washington University
at Green River Community
College graduate*



TEACHER EDUCATION ALLIANCE OF COLLEGES AND HIGH SCHOOLS (PROJECT TEACH)

Project TEACH Meets Multiple Needs

The yearlong math and science series offered by Project TEACH (Teacher Education Alliance of Colleges and High Schools) provides exemplary mathematics and science education for preservice and classroom elementary school teachers. It also offers six transfer degrees specifically designed for people interested in teaching secondary school biology, chemistry, earth science, general science, and physics.

Both the elementary and secondary school options have become pathways for paraeducators, such as teachers' aides, and place-bound adults to pursue teaching degrees and attain licensure.

Project TEACH, which was developed with support from an Advanced Technological Education grant from the National Science



Professor Steve Kinholt instructs prospective teachers at Green River Community College how to incorporate manipulatives in mathematics lessons in a course developed by Project TEACH.

Foundation, maximizes Green River Community College's (GRCC) partnerships with five school districts, Central Washington University (CWU), and the Boeing Company. CWU offers the final 2 years of baccalaureate teacher education courses on the community college campus. This facilitates articulation and encourages students to persist. Graduates of the CWU program at GRCC consistently score in the top 15% of Praxis II, the national licensing examination that prospective teachers take at about the time they complete their bachelor's degrees.

As more of the GRCC students who participated in Project TEACH achieve their bachelor's degrees and begin teaching, they share their science knowledge and science teaching skills with their colleagues. This is an example of how expertise expands beyond the number of Project TEACH graduates.



Anastacia Nicole

GRCC Grad Wins National Honor

Anastacia Nicole, a graduate of Green River Community College, was selected as an associate fellow to the New Science Teacher Academy, a partnership between the National Science Teachers Association and the Amgen Foundation.

"They've found that it takes 5 to 7 years to really become a competent, effective science teacher. So the goal of the New Science Teacher Academy is to cut that down to 3 to 5 years," Nicole said. She was one of three Washington teachers selected to attend the 2008 National Science Education Conference, where experts shared the latest developments in science, teaching strategies, and research.

Indian River State College

Fort Pierce, FL

www.ircc.edu/portal/layout_web1.aspx?AdminEdit=False&PortalPageID=573

Post-Baccalaureate Program



EDUCATOR PREPARATION INSTITUTE

Educator Preparation Institute Prepares Teachers to Stay in Profession

The Educator Preparation Institute (EPI) offers an accelerated pathway to alternative teaching certification in Florida. Indian River State College created EPI to help people obtain certification in all disciplines. However, it focuses programs and recruitment efforts among U.S. military veterans, displaced midcareer professionals, and stay-at-home parents whose academic and work experiences provide them with the background to teach mathematics and science. EPI also emphasizes the development of highly qualified teachers for exceptional students because of the critical shortage of teachers for these students. Exceptional students include challenged learners as well as gifted learners.

In addition to its Teaching by Choice Community College Teacher Preparation Program Recognition Award, EPI received the 2006 Southern Regional Association for Teacher Education Innovation in Teacher Education Award.

In response to concerns about teacher retention, EPI offers courses on classroom management and pedagogy to give people the skills to succeed in the profession. With teachers in extremely short supply, Florida allows school districts to hire people with bachelor's degrees to teach without a professional teaching certification. However, many districts have found this is an inefficient stop-gap measure because so many people hired without any preparation to teach leave after 1 or 2 years.

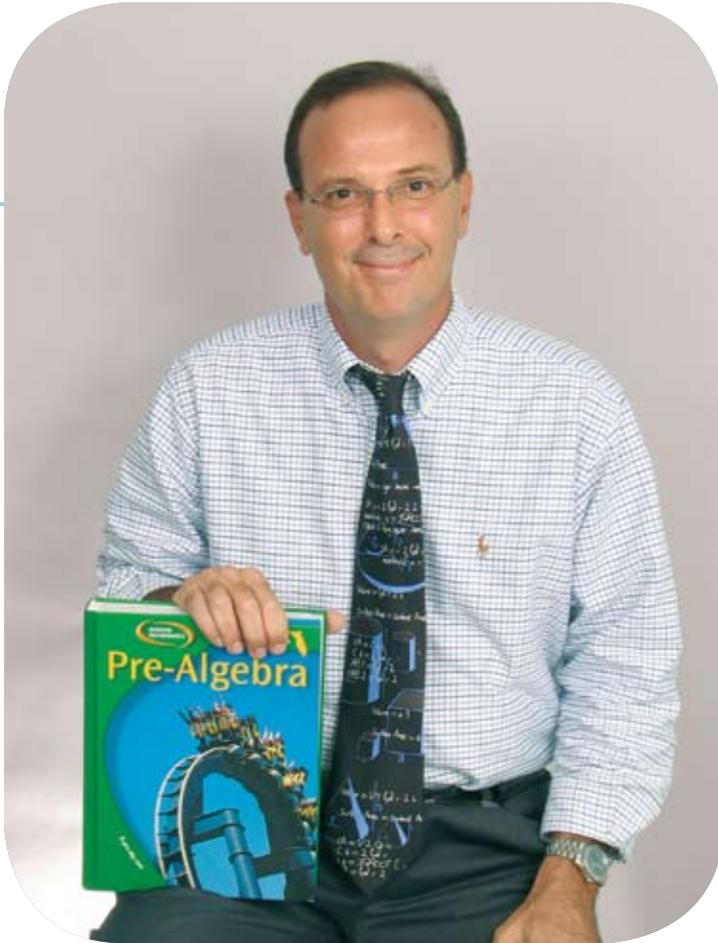
Between June 2005 and May 2008, 560 students had taken EPI courses. Eighty-nine percent of the 174 students who completed the 1-year program were teaching in 2008. All of EPI's graduates have passed all three certification exams that Florida requires for a professional certificate. Of the 320 EPI participants who are employed but who

"As a former Green Beret, I have been all over the world, and now I want to give something back to the kids—and now I am as a teacher."

Tommy White

World Geography Teacher

Forest Grove Middle School
Fort Pierce, FL



Jose Rivero uses concrete objects to help students understand mathematical concepts.

have not yet completed the course work, 38% are teaching in critical shortage areas. Nineteen percent of those not employed in 2008 were in the process of obtaining certification in these critical areas.

School principals actively seek EPI students, and many EPI graduates are already distinguishing themselves professionally. EPI alumni have received honors such as New Teacher of the Year, Minority Teacher of the Year, and Rookie of the Year awards. One alumnus won the St. Lucie County Lamplighter Award, and another was named one of 44 Disney Teachers in the United States in 2006. One has been selected for a summer teaching fellowship in Japan, and others have been promoted to department chairs in their schools.

Certified Public Accountant Becomes a Teacher to Give Back to Community

Jose Rivero, a Cuban immigrant and certified public accountant, decided he wanted to give back to the community as a teacher after succeeding in business. By combining his love of mathematics with creative teaching techniques, he motivates sixth grade students at Southern Oaks Middle School in Port Saint Lucie, FL, to learn mathematics. "As a result of the EPI program at IRCC [Indian River Community College was renamed in 2008], I now have a solid foundation upon which I can achieve my goal of becoming an effective educator," Rivero said.

Itasca Community College

Grand Rapids, MN

www.itascacc.edu/academics/programs/classact/index.cfm

Transfer (2+2) Program



CLASS ACT TEACHER EDUCATION PROGRAM

Class Act Encourages Persistence

The Class Act Teacher Education program, Minnesota's first community college teacher preparation program, offers first-year college students experience with the art of teaching. The program helps students become proficient in educational technologies as they investigate curricula in the subjects that most interest them. The community college students gain instructional experience by participating in dynamic, hands-on activities in classroom laboratories that help solidify their academic choices.

"The Class Act program supplies its students with a well-rounded foundation on which their teaching careers can be strongly built. I wouldn't trade my experience for anything else."

Tyler Flint
Student

University of Minnesota Morris
Nashwauk, MN
2008 Class Act graduate



Class Act student Cassie Clarke instructs a second-grade student on a computer project. Class Act students regularly work with their college instructors on projects at elementary, middle, and high schools.

Class Act focuses attention and resources on recruiting people interested in teaching and helping them to complete their degrees. The program works with public school districts on career fairs, school visits, and marketing campaigns to provide a steady supply of students for the program. Class Act's student retention efforts earned it a Teaching by Choice Community College Teacher Preparation Program Award.

Each year since 1998, Class Act has filled its 25-person cohort with freshmen interested in teaching. Over 11 years, it has served 275 students and retained between 65% and 80% of the 25 students in each cohort. Class Act has achieved success because of the highly individualized attention and cohesive learning communities the program provides. Students in the cohorts take most of their general courses together. This interaction builds bonds among the students and helps them persist. A devoted group of master teachers makes it possible for Class Act to provide two 50-hour field experiences for all students.

Itasca Community College maintains strong transfer partnerships by regularly updating articulation agreements with 4-year college and university partners. It also allows Bemidji State University to offer several upper-level education courses on the Itasca Community College campus.



Jenna Jespersen

Math Teacher Mixes Hard Work and Fun

Determined and dedicated as a student, Jenna Jespersen expects excellence from herself as a teacher. However, the 2005 Class Act graduate always mixes hard work with fun. This formula makes math enjoyable for her students at Virginia High School in Virginia, MN. For Jespersen, the best thing about teaching is when students first grasp a new concept. "When I get to see the light bulb turn on, it helps me know I am connecting with students and they are learning from me," she said.

Jespersen liked the head start that Class Act gave to her teaching career. "When I went to my 4-year college, I was pretty much the only person with any teaching experience," she said.

J. Sargeant Reynolds Community College

Richmond, VA

<http://org.reynolds.edu/NSF-ATE>

Transfer (2+2) Program



PATHWAYS TO TEACHING

Pathways to Teaching Recruits Middle School and High School Students

Pathways to Teaching uses several strategic initiatives at J. Sargeant Reynolds Community College (JSRCC) to increase the number, quality, and diversity of teachers in the college's service area. It focuses on recruiting secondary school students and college students to teach mathematics, science, and technology. Pathways to Teaching

Richmond Public School students analyze the DNA on seemingly identical red fibers for a crime scene investigation exercise. The exercise is part of the Technical Challenge Summer program that encourages middle school students to consider teaching careers.

- Offers a career education course on teaching as a dual-enrollment option that high school students can take online.
- Encourages middle school students who attend its Technical Challenge Summer program to consider teaching careers.



- Provides JSRCC students with the opportunity to teach at the Technical Challenge Summer program.
- Engages JSRCC students' attention with math and science seminars.
- Gives JSRCC students field experience by placing them as tutors in Richmond City Public Schools.

All of these initiatives, which are supported by an Advanced Technological Education (ATE) grant from the National Science Foundation, help students learn what it is like to teach in urban schools. The scholarships and new course development, also underwritten by the ATE grant, provide opportunities that would not otherwise be available to students.

The success of Pathways to Teaching has prompted JSRCC faculty members who were not directly involved in teacher preparation to recruit mathematics, science, and technology students to consider teaching those subjects.

Pathways to Teaching Provides Formative Experience for Math Teacher

Melody Martin's work as a preservice teacher at J. Sargeant Reynolds Community College's Middle School Technology Camp enriched her undergraduate academic experience. After graduating from the community college in 2005, Martin completed her bachelor's degree at Virginia Commonwealth University in 2008. She teaches mathematics at Elkhardt Middle School in Richmond, VA.

"The Pathways to Teaching grant gave me my first hands-on experience in the classroom. I received the experience and support I really needed to solidify my decision to be a math teacher."

Melody Martin
Math Teacher

Elkhardt Middle School
Richmond, VA

Jackson Community College

Jackson, MI

[www.jccmi.edu/academics/
teachereducation/](http://www.jccmi.edu/academics/teachereducation/)

Transfer (2+2) Program
Post-Baccalaureate Program
Professional Development



JACKSON COMMUNITY COLLEGE TEACHER EDUCATION

JCC Teacher Education Uses Service Learning

Jackson Community College (JCC)'s Teacher Education program offers 13 education courses that incorporate foundational preparation within content areas. These courses offer extensive field service experiences at all grade levels in science, technology, and mathematics. The natural science and chemistry courses sometimes involve bringing K–12 students to the college campus for laboratory experiences.

For fieldwork, JCC utilizes its partnerships with community organizations to provide an array of service learning options. Service learning combines community service with classroom instruction in ways that encourage both critical and reflective thinking skills. In addition to tutoring public school students, the community service that JCC preservice teachers provide range from mentoring youth at Big Brothers and Big Sisters, to assisting with field trips at a nature center, to managing Destination Imagination teams.



Students from the Chemistry for Future Teachers course at Jackson Community College provide fourth-grade students with hands-on science experiments like this one on chemical reactions.

Of the 100 JCC students who transferred to Spring Arbor University (SAU) and completed their certification in the 2006-2007 school year, 78 are employed as teachers. While enrolled at SAU, the community college's main transfer institution, a group of JCC graduates organized an Epsilon Chi club for future teachers. Its monthly meetings offer professional development opportunities open to all preservice teachers at the university. Five graduates of JCC's teacher education programs now work as adjunct instructors for JCC's mathematics and science departments.

JCC sponsors Michigan's largest future teacher conference in partnership with SAU, the Jackson County Intermediate School District, and the Michigan Department of Education. More than 300 preservice and novice teachers attend the annual conference where veteran teachers, administrators, and human resource personnel offer practical information for beginning teachers.

"Because of the high standards and best practices utilized by the JCC Teacher Education program, their graduates are some of the best prepared transfer students to our education program at Spring Arbor University. They have thoroughly explored the profession of teaching—from curriculum work, field experiences, reflections, micro-teaching, and portfolio preparation."

*Miriam Sailers
Professor of Education*

Spring Arbor University
Spring Arbor, MI



Scott Parks

Truck Driver Becomes Teacher with JCC's Help

Before he enrolled at JCC, Scott Parks was a long-haul truck driver with a wife, young children, and a dream to teach youngsters what he knew about the United States' geography and diverse cultures. "JCC's teacher education program helped me shift gears. I wasn't sure what I needed to do and JCC helped me to a great start," Parks said. Now a sixth-grade teacher at Jerome Elementary School in North Adams, MI, Parks is known for lessons that blend science with real-life experiences. One popular enrichment lesson teaches the physics involved in retrieving objects from Lake Michigan's choppy waters.

Montgomery College

Rockville, MD

[www.montgomerycollege.edu/
Departments/educatrv](http://www.montgomerycollege.edu/Departments/educatrv)

Transfer (2+2) Program
Associate of Arts
in Teaching
Post-Baccalaureate Program
Professional Development



SCHOOL OF EDUCATION AT
MONTGOMERY COLLEGE

Montgomery College Uses Teaching by Choice Award to Expand Options for Prospective Teachers

Montgomery College's School of Education offers dynamic options for people of all ages to become teachers. It has an early childhood education program; an associate of arts in teaching (AAT) degree program; and a post-baccalaureate program for midcareer professionals with bachelor's degrees to become licensed to teach secondary school mathematics, physics, chemistry, biology and technology education.

"Writing my personal philosophy of education [in the Introduction to Education class at Montgomery College] was a defining moment for me. It helped me to crystallize all that I had been thinking about in considering a change in career and gave me the motivation to continue."

Jennifer Forrest
Science Teacher

Rockville High School
Rockville, MD



Former civil engineer Jennifer Forrest begins a physical science lesson on the conservation of mass at Rockville High School.

All these programs include opportunities for early field experiences in public schools.

The college's early childhood program is accredited by the National Association for the Education of Young Children. The early childhood program and the AAT program are coordinated with the Montgomery County Public Schools Child Development and Teacher Academy programs to recruit high school students and help them transition smoothly into the teacher preparation programs at Montgomery College.

The recognition the program received when it won an award from the Teaching by Choice Community College Teacher Preparation Program for STEM curriculum development led to an expansion of the college's field experience opportunities into middle schools. Publicity about the award also boosted enrollments in the mathematics and physics options for the AAT. Before the Teaching by Choice award, the college had no declared majors in mathematics and physics. Since the award, there have been between 5 and 11 per semester.

The Teaching by Choice award instigated new, effective collaborations with the college's mathematics department. One immediate outcome was a Praxis I test preparation workshop series that prepares preservice teachers for the mathematics portion of the national teacher licensure exam. The greater involvement of the mathematics faculty got the attention of educators in the partner school district, who now have a greater appreciation of the breadth of Montgomery College's teacher preparation programs.



Caren Fitzsimmons

Early Field Experience Solidifies Student's Commitment to Teaching

After beginning her college career at the University of Maryland-College Park (UMCP) as a chemical engineering major, Caren Fitzsimmons transferred to Montgomery College. She enrolled in the community college to pursue teacher education course work and complete lower-level mathematics requirements. An early field experience in a middle school mathematics classroom solidified her decision to become a mathematics teacher.

In 2007, Fitzsimmons became the first Montgomery College student to receive an Associate of Arts in Teaching (AAT) degree in secondary mathematics. She has returned to UMCP as one of the first two AAT transfer students in secondary mathematics education.

Museum of Science

Boston, MA

www.mos.org/powerup

Professional Development



POWER UP! CREATING LEADERS FOR COMMUNITY COLLEGE AND HIGH SCHOOL TECHNOLOGY AND ENGINEERING

Power Up! Empowers Educators to Build STEM Programs

Power Up! began as a professional development program to create a cadre of lead teachers who would enhance technical and engineering programs at high schools and community colleges. But the program, which received support from an Advanced Technological Education (ATE) grant from the National Science Foundation, soon extended to high school guidance counselors and faculty members in other disciplines. Industry engineers helped teach the professional development workshops. The direct involvement of engineers provided industry-based career guidance information for counselors and engineering content experiences for educators.

Because the educators who participated in Power Up! set their own agendas for expanding the project at their schools and colleges, the project's exciting outcomes ranged from new engineering laboratory activities to full-scale certificate and degree programs. Power Up! activities included institutes for leaders and faculty members developing



Students in the Engineering Dynamics course at Bunker Hill Community College investigate impulse and momentum while learning about particle motions and systems. The course is part of the new associate of science engineering degree program that the college's faculty developed after participating in Power Up! at the Museum of Science. The engineering students (from left to right) are Mufassal Alam, James Joseph, Ahamed Masdook Saheed, and Svetlana Solodovnikova.

course content, school-year implementation, follow-up workshops, a technology educator summit, counselor symposia, regional seminars, and articulation workshops.

The Museum of Science continues to support the development and delivery of engineering and technology programs in school districts and community colleges through its National Center for Technological Literacy. The museum has just published a high school engineering text, *Engineering the Future*. With another ATE grant, Advancing Technological Literacy and Skills (ATLAS) of Elementary Educators, the museum is working with community college elementary education programs to integrate engineering and technology in preservice education courses.

“The Museum of Science Power Up! program has been directly responsible for opening my mind to the world of engineering and providing the knowledge and hands-on experience to enthusiastically embrace, discuss, and explain the engineering design concept.”

Janice F. Chiaradonna
School Counselor

Lynn Vocational Technical
Institute
Lynn, MA

Power Up! Generates New Degrees at Bunker Hill Community College

As a direct result of the Power Up! grant, Bunker Hill Community College (BHCC) in Boston, MA, developed a new associate of science (AS) engineering degree and redesigned its biological sciences degree. “The effect of Power Up! on BHCC students is substantial,” said Katherine Gustafuson, an adjunct mathematics professor who coordinated the college’s involvement in PowerUp!.

The grant was instrumental in the development of the college’s AS degree in engineering and its articulation to the University of Massachusetts in Amherst and Lowell. The grant also helped BHCC educators revise the curriculum for the AS degree in biological sciences and establish articulation agreements for its transfer to the UMass campuses in Amherst, Boston, Lowell, and Dartmouth. The new agreements ensure that BHCC students who

graduate from these programs enter the university programs as juniors. In fall 2008, 70 students were enrolled in the biological sciences degree program, and 30 students were enrolled in the engineering transfer program.

“In addition, the Power Up! program has introduced an element of community service and involvement into students’ experience that integrates with what they are doing in class,” Gustafuson said. Community outreach programs involve the engineering and biological science students and others majoring in science, technology, engineering and mathematics (STEM) in the college’s recruitment efforts. The students host high school students’ visits to BHCC, develop STEM recruitment materials, and participate in off-campus engineering demonstration programs for high school and middle school students.

Normandale Community College

Bloomington, MN

www.edtrac.net

Transfer (2+2) Program
Associate of Science in
Elementary Education



EDUCATION TRAINING ACADEMY (EDTRAC)

EdTrAc Attracts More Students to Teaching, Adds Depth to STEM Courses for Teachers

The Education Training Academy (EdTrAc) develops educators who specialize in teaching mathematics and science to an increasingly diverse student population. With support from an Advanced Technological Education grant from the National Science Foundation, EdTrAc expanded science, technology, engineering, and mathematics curricula for prospective teachers; broadened outreach to area schools; and provided support to preservice teachers' professional development through Teachers of Tomorrow club activities.

EdTrAc began by developing a 2+2 (community college to university) option that leads preservice teachers from the community college to university teacher preparation programs and K–8 licensure with specialization in mathematics and science. This program then served as the model for a 2+2 program that Normandale and Minnesota State University (MSU) Mankato developed for special education teachers. In fall 2008, Normandale and MSU Mankato launched a 2+2 program for secondary mathematics teachers that leads to licensure for teaching grades 5 to 12.

EdTrAc provides support services to Normandale students and faculty and coordinates recruitment, curriculum development, K–12 outreach, mentoring of students and faculty, grant initiatives, and collaborations with university partners. EdTrAc's programs

- Increased enrollment in teacher preparation programs at Normandale from 60 in 2004–05 to 171 students in 2007–08.

“Normandale’s work in supporting STEM education and teacher training has complemented our efforts to become a K–12 STEM district and to improve K–16 articulation and pathways for student success. We look forward to continued collaboration on our common goal of developing and delivering the best teaching and learning environment for all students”

Les Fujitaki
Superintendent

Bloomington Public Schools.
Bloomington, MN



Trudy Lynch gives a mealworm to one of her first grade students at Sweeney Elementary School in Shakopee, MN. Lynch, who led the Teachers of Tomorrow club while at Normandale, uses real bugs to teach students how to identify insect body parts.

Preservice Teacher Leader Implements Hands-On Lessons in Her Own Classroom

Trudy Lynch exemplifies the exceptional students in the Normandale and Minnesota State University, Mankato, program in elementary education. As president of Normandale's Teachers of Tomorrow club, she started initiatives that are ongoing. The Winning Strategies Conference, which was offered for the first time during her leadership, is now an annual staff development conference attended by more than 200 school paraprofessionals and preservice teachers.

As a student at Normandale, Lynch represented the EdTrAc program at several state and national conferences. She also won a scholarship from the National Association of Community College Teacher Education Programs. Now a first grade teacher at Sweeney Elementary School in Shakopee, MN, Lynch uses lots of manipulatives—including live insects—to teach math and science.

- Increased the number of underrepresented students in teacher preparation programs at Normandale. In 2005–06, 8 of 72 (11%) teacher preparation students were from minority populations, compared with 34 of the 171 (20%) in 2007–08.
- Prompted the college's foundation to fund a full-time mentor for a cohort of 30 students majoring in STEM fields and to provide \$3,000 per year in financial aid for each student in the cohort. Of the 33 students who participated in the first cohort during 2007–2008, 22 were non-White minorities, 15 were female, and 7 were preservice math or science teachers.
- Won a Best Practice in Teacher Preparation Award from Phi Theta Kappa.
- Led to two grants from the Minnesota Department of Education to prepare middle school educators to teach algebra to eighth graders.
- Encouraged the involvement of many different academic departments at Normandale in the preparation of future teachers.
- Enhanced the college's partnerships with MSU Mankato and the University of Minnesota.

Oklahoma City Community College

Oklahoma City, OK

www.occc.edu/bbdiscovery
www.occc.edu/mockbiotech

Professional Development



BIOTECHNOLOGY/BIOINFORMATICS TEACHER DISCOVERY!

OCCG Offers Teachers Authentic Biotech Lessons

Biotechnology/Bioinformatics Teacher Discovery (BBTD) offers preservice teachers authentic professional development experiences in biotechnology. The preservice teachers incorporate their new skills and laboratories into the lessons they conduct as student teachers. These lessons not only teach young students about biotechnology but also inform cooperating teachers about this emerging field. Several of the cooperating teachers have attended Biotechnology/Bioinformatics Teacher Discovery! (BBTD) workshops as a result of their interactions with student teachers. BBTD partners with the University of Oklahoma's baccalaureate teacher preparation program to recruit preservice teachers for its workshops.

BBTD offers workshops in everything from biotech basics and pedagogy to strategies for lead teachers. Its most innovative professional development program involves Discover INC, a simulated biotechnology company started with an Advanced Technological Education grant from the National Science Foundation.

"Doing the biotech labs as a novice gives you the perspective that you can use to teach your future students."

Ella Burkhalter
Graduate Student

University of Oklahoma
Norman, OK



Angela Clingman guides students through a biotechnology experiment she learned at BBTD, which she attended as a preservice teacher.

Discover INC operates from an Oklahoma City Community College laboratory where preservice teachers, other college students, and high school students prepare actual laboratory kits. BBTB lends the kits to secondary school teachers to use in their classrooms. The mock company gives its student employees experience and insights about how the biotech industry works. It also puts biotech instructional materials directly into the hands of secondary school teachers and students. Three school districts have added a dozen biotechnology courses to their curricula as a direct result of their involvement with BBTB and the kits from Discover INC.

Since 2005, BBTB has

- Provided professional development workshops for more than 1,000 science teachers regionally and nationally.
- Worked with more than 50 Oklahoma science teachers and 25 preservice teachers.
- Provided 28,350 student laboratory experiences.
- Institutionalized biotechnology experiences within science education course work at the University of Oklahoma.
- Added to teachers' biotechnology knowledge and skills.
- Improved teachers' attitudes toward biotechnology and authentic assessment.

Teacher's Leadership Spreads Use of BBTB Kits

After retiring from the military, Angela Clingman enrolled in the science education program at the University of Oklahoma and participated in BBTB. As a student teacher, she introduced biotechnology to Norman, OK, high school students and was instrumental in recruiting seven science teachers from the school to attend BBTB workshops. The school now averages 2,400 lab experiences each year. Clingman continues to use BBTB's kits as the director of biotechnology at the Moore Norman Technology Center in Norman, OK.

"One of the most important things for me was observing in the summer workshops how the leaders, who had backgrounds as high school teachers, presented these high tech labs in a manner in which any student could participate and feel successful about their efforts," Clingman said.

Pellissippi State Technical Community College

Knoxville, TN

<http://pstcc15.pstcc.edu/misc/tppnsf/>

Transfer (2+2) Program
Associate of Science
in Teaching
Professional Development

“At PSTCC, I gained a strong understanding of technology, mathematics, and science and how to stimulate learning through hands-on techniques and technology. The transition into teaching has been seamless.”

Mary Galloway
Fourth Grade Teacher

Eaton Elementary School
Loudon County, TN



THE MATHEMATICS AND SCIENCE TEACHER EDUCATION RESOURCE (MASTER) PROGRAM AND TENNESSEE BOARD OF REGENTS TEACHER PREPARATION (PARTNERSHIP) TBR-TP

Tennessee Colleges Revamp Teacher Prep with Two Advanced Technological Education Grants

The systemic changes that Pellissippi State Technical Community College accomplished with two Advanced Technological Education (ATE) grants from the National Science Foundation contributed to statewide improvements of Tennessee’s teacher preparation programs. Before these initiatives, there were no declared education majors at community colleges, teacher preparation courses were a hodgepodge at institutions across the state, and transferring to complete bachelor’s degrees in education was complicated.

In 2007–08, 2,500 Tennessee community college students were enrolled in education core courses that incorporated PSTCC’s revised science, technology, engineering, and math (STEM) curriculum for prospective teachers. Between 2005 and 2008, 98 PSTCC education majors graduated from Tennessee Technological University.

The Mathematics and Science Teacher Education Resource (MASTER) project created new STEM courses for prospective teachers at PSTCC. This project also provided professional development for the college’s STEM and education faculty members to learn new educational technologies and discovery-teaching methods. Enhanced advisement



PSTCC education student Dawn Blackburn (left) examines a petri dish with a variety of microbes as Yolanda Kirkpatrick, the instructor of Biology for Teachers, explains the characteristics of living organisms.

services and clubs for students interested in teaching were offered at both the college's main campus and at a branch campus in a city neighborhood where the high school has a 93% African American population.

The Tennessee Board of Regents Teacher Preparation (TBR-TP) project spread the MASTER project's innovations throughout East Tennessee. It established a seamless transfer process between six community colleges and two universities based on the institutions' development of a common core of courses for K–6 teachers. The collaborative regional effort meshed with other efforts in the state that led to implementation of Tennessee's associate of science in teaching degree. Today, prospective teachers enrolled at all Tennessee Board of Regents institutions take synchronized introductory teaching and technology courses as well as 9 hours of mathematics and 12 hours of science.

The pedagogical approaches that the STEM and education faculty members learned during the ATE projects and the student support systems the projects instigated are spreading to other academic disciplines in Tennessee. Both of the universities involved in the TBR-TP have opened STEM centers to improve math and science education on their campuses, within their local communities, and statewide. The community colleges have provided STEM outreach programs in rural areas. Walters State Community College held a “math evening” for more than 200 middle school participants. Motlow State Community College is working with three school districts on best teaching practices for science.



Stormy Hall

Student Teacher Attracts Youngsters to Science

“Science,” was Stormy Hall’s immediate answer when her practicum teacher asked what subject she wanted to teach. “Great,” the fifth grade teacher said, “you can start Monday.” Hall began by teaching students to keep daily science journals and giving them writing prompts based on hands-on science laboratories. She stoked students’ curiosity by carrying her science materials in shopping bags that hinted at the topic of each day’s lessons.

Hall became enthralled with science during her Motlow State Community College science courses. She graduated summa cum laude from Motlow and in 2008 was completing her bachelor’s degree at Tennessee Tech University. “I want to show students that science and overall learning can be interesting and fun. I learned during my practicum with the fifth grade that when you use hands-on [materials], they really do get it, and they don’t forget it,” she said.

On the last day of her practicum a student who had previously told Hall he hated science said, “You really have changed my life. I love science now.”

Phi Theta Kappa

Jackson, MS

www.ptk.org/special/nsf

Transfer (2+2) Program



PREPARING TOMORROW'S SCIENCE AND MATHEMATICS TEACHERS: THE COMMUNITY COLLEGE RESPONSE

PTK Helps 36 Colleges Enhance Teacher Prep Programs

Phi Theta Kappa (PTK), the International Honor Society of the Two-Year College, helped 36 community colleges strengthen their science, mathematics, and technology programs for preservice teachers. The PTK program, Preparing Tomorrow's Science and Mathematics Teachers: The Community College Response, responded to research that 20% to 40% of teachers take their mathematics and science courses at community colleges (Recruiting New Teachers, Inc., 2002; Shkodriani, 2004). The program received support from an Advanced Technological Education grant from the National Science Foundation.

Through a competitive selection process, PTK selected seven mentor teams, composed of educators from 2-year and 4-year teacher education programs, who worked with faculty teams at the 35 colleges. They developed action plans to meet the particular science, technology, and mathematics needs of the prospective teachers at the community colleges. Administrators and faculty members from local 4-year transfer institutions served as members of the community colleges' teams.

Participating community colleges strengthened their curricula, and several were able to expand their preservice teaching programs with support from other funders. PTK published two reports (Eisenberg & Risley, 2003, 2005) that described the achievements of each participating community college. Innovative efforts of seven exemplary community college teacher preparation programs—identified by PTK through another competitive process—are the subject of *Best Practices in Teacher Preparation Programs: Focus on Students* (Cunniff & Risley, 2006).

Six of the seven exemplary colleges had one or more 4-year partner institutions offering the junior- and senior-level courses of teacher education programs on their campuses. All 36 community colleges were

“The PTK grant gave us the jump start we needed. It gave us time and ideas to formulate a plan, as well as encouragement, and support needed to implement the plan. Our plan was later expanded into a local and then a statewide grant.”

Meg V. Moss
Teacher Program Coordinator

Pellissippi State Technical
Community College
Knoxville, TN

surveyed in fall 2006; 14 of the 27 respondents from this survey indicated that they had 4-year partners teaching junior- and senior-level courses on their campuses. One leader of a 4-year partner college reported, “Program completers on our 2+2 site at the community college outperform our home campus students on Praxis II [the national teacher licensing exam]” (Cunniff, Belknap, & Kinholt, 2007).

PTK reported in *Community College Review* (Cunniff et al., 2007, p.32) that although the specific goal of the project was to strengthen the science, mathematics, and technology components of the preservice teacher education programs in the community colleges, the project also exposed participants to exemplary approaches for student recruitment, retention, and advisement; field work; leadership development of future teachers; articulation strategies at the local, state, and national levels; and overall curriculum development at both the course and degree levels.



Jackson Community College (JCC) places teacher education students in elementary school classrooms for service learning projects. For a lesson on prehistoric cell structures, the JCC students guide the young students' examinations of various fossils.

Phi Theta Kappa Participating Colleges

Round I

- Blinn College, TX
- Central Piedmont Community College, NC
- College of DuPage, IL
- College of the Marshall Islands, Marshall Islands
- College of Southern Maryland, MD
- Jackson Community College, MI
- Kapi'olani Community College, HI
- Middlesex Community College, MA
- Normandale Community College, MN
- Northampton Community College, PA
- Northeast Community College, NE
- Lone Star College System, TX (formerly North Harris Montgomery Community College District)
- Ozarka College, AR

- Pellissippi State Technical Community College, TN
- Portland Community College, OR
- Raritan Valley Community College, NJ
- Salt Lake Community College, UT
- South Mountain Community College, AZ

Round II

- Bronx Community College and Mohawk Valley Community College, NY
- Butler County Community College and Johnson County Community College, KS
- Del Mar College and Navarro College, TX
- Floyd College, GA
- Kirtland Community College, MI

- Lake City Community College and Manatee Community College, FL
- Mid-South Community College, AR
- North Iowa Area Community College, IA
- Oklahoma City Community College, OK
- Rio Hondo College and Santa Barbara City College, CA
- Sinclair Community College, OH
- Somerset Community College, KY
- University of New Mexico-Gallup, NM

Exemplary Colleges

- Cerritos College, CA
- Chandler-Gilbert Community College, AZ
- Grand Rapids Community College, MI
- Green River Community College, WA
- Richland College, TX

Red Rocks Community College

Lakewood, Colorado
www.rrcc.edu/education/

Transfer (2+2) Program
Associate of Arts



**DENVER METRO
TEACHER PREPARATION PARTNERSHIP**

Partnership Creates New Courses, Recruits Diverse Students

The Denver Metro Teacher Preparation Partnership accomplished programmatic changes to increase the number of certified K-12 teachers with degree credentials in mathematics and science. The partnership's efforts also help paraprofessionals comply with the requirements of the federal No Child Left Behind Act and place them on track to pursue teaching licenses.

With an Advanced Technological Education grant from the National Science Foundation, the partnership led by Red Rocks Community College (RRCC) implemented an associate of arts (AA) in education degree that transfers seamlessly via statewide articulation agreements. The degree includes 12 preservice teacher preparation courses; 10 courses were developed with grant support. The new courses include a strong field experience component. It offers first-year students rigorous, focused experiences that help them determine early in their college experience whether they are committed to teaching. Some of the other new courses require students to demonstrate their competencies with

"I wanted to thank you for all of the energy and enthusiasm that you have put into this class (EDU 221). You show the true attributes of a teacher. You have left all of us with the belief that we can succeed."

John Wethey
Student

Metro State College of Denver
Graduate, Red Rocks
Community College



The Denver Metro Teacher Preparation Partnership includes a strong field experience that helps Red Rocks Community College freshmen determine whether teaching is the right career for them.

new technological tools used in teaching environments.

The partnership also broadened services for paraprofessionals and developed three new courses to meet federal and state class and its job skills assessment system identify and address skill gaps. Its certificate programs include credits that transfer to AA degree programs that lead to teacher certification. Between June 2005 and May 2006, 65 paraprofessionals passed the Work Keys class. The partnership also offers a certificate for adult educators who teach in the Denver public school district's adult literacy program. This certificate meets both federal and state requirements

New institutional collaborations resulted from the partnership. RRCC worked with Metropolitan State College of Denver to attract underrepresented students to the Introduction to Education course. RRCC also worked with the Colorado School of Mines for graduate continuing education credit for Teaching with Technology as a professional development course for employed teachers. The mathematics course competencies were developed by faculty from RRCC, the University of Colorado, and the University of Northern Colorado.

Courses Developed by Denver Metro Teacher Preparation Partnership

Courses for Preservice Teachers

EDU 221 Introduction to Teacher Education

Covers the U.S. public school system, current educational reform issues, and educational technology. Requires a field experience.

EDU 234 Multicultural Education

Covers the learning needs of children from different racial, ethnic, cultural, and socioeconomic groups and encourages teachers to integrate multicultural teaching into curricula.

EDU 240 Teaching the Exceptional Learner

Covers the individual differences and modifications for exceptional learners.

EDU 261 Teaching, Learning and Technology

Prepares students to integrate technology into curricula.

EDU 275 Special Topic: Field-Based Experience

Provides students with experiences in classrooms and gives them input for wise and early career choices.

MAT 155 Integrated Math I

Offers prospective mathematics teachers modern approaches to arithmetic and algebra.

MAT 156 Integrated Math II

Employs laboratory techniques to cover the fundamentals of probability, statistics, and geometry.

SCI 155 Integrated Science I with Lab

Examines the nature of energy and matter in the natural world.

SCI 156 Integrated Science II with Lab

Covers earth and biological systems, living and nonliving environments.

EDU 242 Expressive Arts in the Elementary Classroom

Integrates visual arts, music, and physical education using the multiple intelligences theory.

Courses for Paraprofessionals

EDU 151 Literacy Interventions for Paraprofessionals

Introduces phonemic awareness, alphabetic principles, fluency, vocabulary development, and comprehension.

EDU 152 Mathematics Interventions for Paraprofessionals

Focuses on the best practices of teaching mathematics in intervention situations.

EDU 153 ESL and Cultural Issues for Paraprofessionals

Introduces multicultural education and explains the challenges for students whose primary language is not English.

San Antonio College

San Antonio, TX

www.accd.edu/sac/biology/ticaproject/default.html

Professional Development



TECHNOLOGY-BASED INQUIRY AND CURRICULUM ALIGNMENT (TICA) PROJECT: IMPROVING SCIENCE EDUCATION IN SECONDARY AND POSTSECONDARY SCHOOLS

TICA Project Builds Capacity within Science Faculties

The Technology-Based Inquiry and Curriculum Alignment (TICA) project has multiple goals. Its primary focus is enhancing the content knowledge of San Antonio's science teachers and alternative certification science teachers in chemistry, biology, and physics. TICA also increases San Antonio College (SAC) faculty members' understanding of high school science issues and standards-based curricula. The project strives to strengthen the capacity of both SAC's and San Antonio's science teachers to use technology and research-based pedagogy to meet course objectives.

SAC and the San Antonio Independent School District (SAISD) both serve impoverished, predominantly minority populations. By accomplishing its immediate goals, TICA hopes to make a long-term impact that increases the number of San Antonio high school students who pursue postsecondary education in science, technology, engineering, and mathematics (STEM).

The professional development programs offered with support from an Advanced Technological Education grant from the National Science Foundation use inquiry-based methods that incorporate cognition theory and instructional technology. Educators learn to use teacher-facilitated methods for hands-on, student-centered instruction that promotes higher-order thinking skills. These thinking skills transcend all disciplines but are especially useful in science and mathematics. The laboratory technology software purchased with grant funds incorporate data collection, graphing, and analysis skills that reinforce concepts important for success in mathematics and technology usage.

Twenty-five SAISD teachers participated in the Summer Institute TICA Project Workshops in 2007 and 2008. Participants learned how to gather and present results using inquiry-based methodologies,

"This training will revolutionize how science is taught within an urban school district with economically disadvantaged students."

William Vinal
Science Director

SAISD
San Antonio, TX

probes and sensors for data collection, content enrichment materials, and field activities. Data collection technologies, such as probeware, are particularly helpful for disadvantaged students with language barriers. The technologies accommodate nontraditional learning styles and enable students to gather real-time data that can be used to evaluate hypotheses rather than rely solely on textbook explanations. Participants experienced how probeware may be used to engage students' higher-order thinking skills and their attention to the full spectrum of the scientific enterprise from observation to analysis. Participants presented their curriculum development ideas based on the instruction they received in guided inquiry learning and in chemistry, physics, or biology.



TICA Project Summer Workshops teach faculty how to teach with new data collection technologies.



Adam Zurita

Teacher Takes New Technologies to Students, Colleagues

Adam Zurita incorporates what he learned at the TICA Project Summer Workshops in his chemistry classes at Edison High School in San Antonio. "The kids love to use the technology because it is so computer based," he said of the probeware used in the workshops to instruct teachers how to apply it for data collection with their students. Funding from the TICA Project allowed Zurita to add Xplorer GLX, a type of probeware, to his laboratories. Since attending the first summer workshop, Zurita has become a workshop instructor, mentor, and liaison between the community college and the school district's science teachers.

According to Zurita, "With this workshop, teachers are given opportunities to learn not only how to operate the GLX but [also how] to create and test ideas that they would like to utilize in the classroom. The time needed to think of a good lab, apply it to new technology, and test to see if it works is a lot. For a teacher to do that during the school year is difficult. With TICA, a teacher is given all of these opportunities and a supporting college staff to help differentiate the learning for those college-ready students." Zurita reported that the TICA Project has helped improve his students' scores on standardized science tests.

San Juan College

Farmington, NM

Transfer (2+2) Program
Associate of Arts
in Teaching
Post-Baccalaureate Program



ALTERNATIVE LICENSURE PROGRAM

San Juan College Uses Teaching by Choice Award for Expansion of Alternative Licensure Program

The Alternative Licensure Program (ALP) is designed for midcareer and retired professionals who already hold bachelor's degrees or higher degrees to become teachers. The intense program prepares people to teach at the elementary and secondary levels, especially in high-need subject areas such as science, math, and technology, as well as bilingual and special education.

The effectiveness of the program has earned it local and national attention. For instance, in 2008, two ALP graduates were recognized by the Farmington School District because their seventh-grade students scored an average of 26 points higher than the state average on a standards-based science assessment.

San Juan College (SJC) won a Teaching by Choice Community College Teacher Preparation Award for professional development. The college used the award to establish a collaborative program with Santa Fe Community College (SFCC) and obtain approval from the New Mexico Public Education Department to add a special education track within ALP.

This innovative partnership with SFCC addresses the tremendous need for special education teachers in northwest New Mexico. Separated by 200 miles, the two community colleges combine on-campus and distance delivery of courses to prepare teachers who enrich special education classrooms because of their prior academic and work experiences in areas such as engineering and agriculture. For the 21-credit

"I am especially pleased that you have established a collaborative effort with Santa Fe Community College to deliver your new program. It is a model of cooperation between institutions of higher education for the benefit of children and youth in our state."

Veronica Garcia
Public Education Secretary
State of New Mexico



Olena Yermolova, an electrical engineer, took experiential science courses as part of the ALP at San Juan College. She now teaches algebra in West Jordan, UT.

Engineer Brings Joy, High Expectations to Teaching

Olena Yermolova, who earned a master's degree in electrical engineering in the Ukraine, completed the ALP during her first year of teaching mathematics to regular and special education students at Farmington High School in Farmington, NM. Yermolova's enthusiasm for teaching, her caring manner, incredible work ethic, and unabashed affection for her adopted country made her a favorite of her ALP instructors and classmates, as well as her colleagues at the high school.

Yermolova credits the high expectations she has for all her students to her SJC and SFCC instructors. When the special education students in her Algebra I class at Farmington complained about challenging material, Yermolova told them, "You don't have a disability in math . . . I always remember my professors' guidance from both colleges: 'High expectations give high results.'" In 2008, Yermolova was hired to teach algebra at Joel P. Jensen Junior High School in West Jordan, UT.

program of study, candidates for licensure take three courses from SFCC via WebCT, an online learning environment, for a total of 9 credits. These courses focus on special education theory and practice. They take the balance of their courses on Saturdays at SJC. Students also participate in a practicum in which they are fully responsible for classroom activities.

University of South Florida

Tampa, FL
www.hsti-online.usf.edu

Professional Development



HIGH SCHOOL TECHNOLOGY INITIATIVE

High School Technology Initiative Teaches How to Use Innovative STEM Materials

The University of South Florida's High School Technology Initiative (HSTI) facilitates teaching fundamental science and mathematics skills through high-technology applications and presentations. It aims to increase students' awareness and appreciation of the interdependence of science, technology, engineering, and mathematics (STEM) with society.

The project, funded with an Advanced Technological Education grant from the National Science Foundation, began with local high school and community college educators identifying the focus for HSTI learning modules. Hillsborough County has the 11th largest school district in the nation, and all of its secondary schools now use HSTI modules that involve lessons on problem solving and cover atomic, wave, and field concepts. For several years, the project offered professional development workshops in 13 states to familiarize teachers with the modules' structure

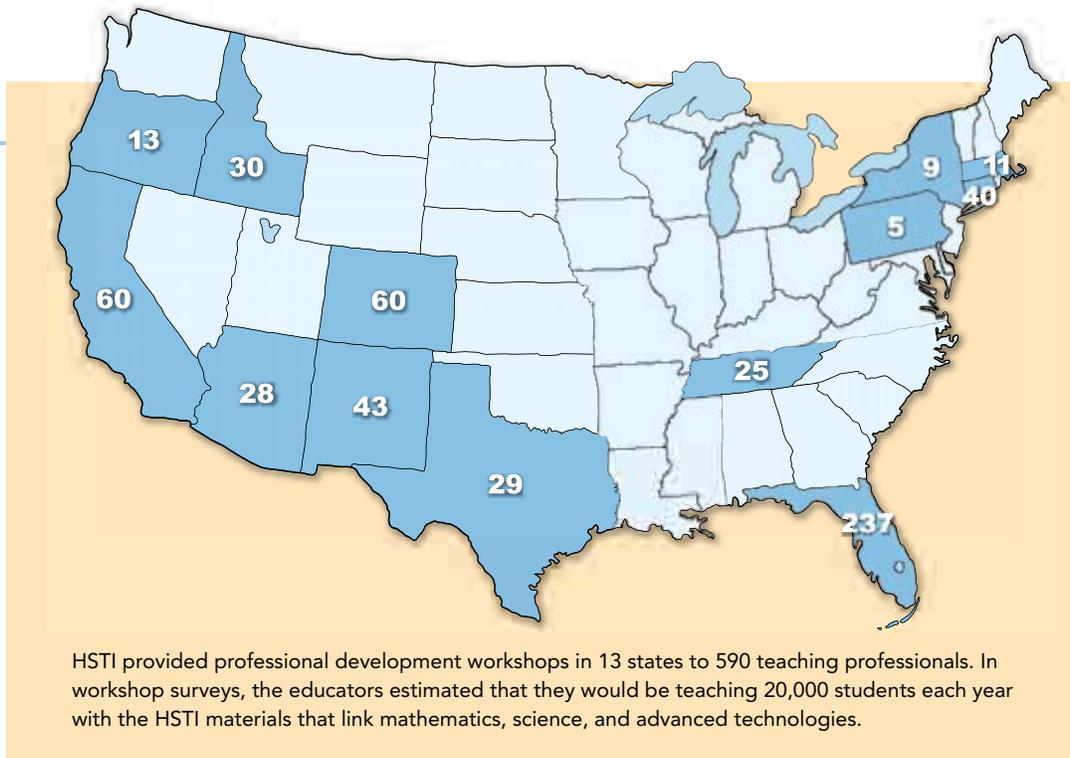
"This was one of the most useful resources I've encountered at any of the workshops I've attended. The material on the CD was immediately useful and well organized, and it fit nicely into my curriculum."

Kyo Narita
Teacher

Lyman Memorial High School
Storrs, CT



Eric Roe, FLATE Director, guides science teachers Bradley Smrstick (on the left) of Newsome High School and Al Greenway (in the center) of Henry B. Plant High School during a workshop at Hillsborough Community College—Brandon campus. The pattern transfer exercise they are doing was part of semiconductor workshop, one of several HSTI Educator Workshops presented to Florida teaching professionals.



and content. This strategy of providing instruction with the distribution of free modules and materials increased the likelihood that the innovative STEM materials would be used in classrooms.

As a result of HSTI,

- The Albuquerque New Mexico Regional School District developed its own professional development program modeled on the HSTI workshops.
- HSTI materials were adopted by Connecticut school districts that worked with the University of Connecticut on the Galileo Project and the Research Experience for Teachers, both NSF-supported initiatives.
- HSTI materials continue to be disseminated by the Florida Advanced Technological Education Center known as FLATE (www.fl-ate.org).

WGBH Educational Foundation

Boston, MA

www.league.org/gettingresults/web

Professional Development



GETTING RESULTS: ATE TEACHING IN COMMUNITY COLLEGES

Online Professional Development Program Improves Pedagogy in STEM Courses

To be effective, community college faculty—particularly adjunct instructors who are typically subject experts not educated as teachers—need both deep content knowledge and a repertoire of excellent pedagogical practices. WGBH Educational Foundation, a producer of educational multimedia programs, used an Advanced Technological Education (ATE) grant from the National Science Foundation to create Getting Results, a six-module professional development course.

WGBH consulted with a national advisory board about innovative, research-based pedagogy. It then produced the multimedia course using examples from ATE projects and centers to explain effective pedagogical practices for teaching science, technology, engineering, and mathematics (STEM). ATE projects and centers focus on educating technicians for high-tech fields of strategic importance to the nation. The course was pilot tested with ATE colleges, revised, and then launched as a free service on the Web site of the League for Innovation in the Community College. The course may be delivered online, face-to-face, or as a blend of face-to-face and online classes.

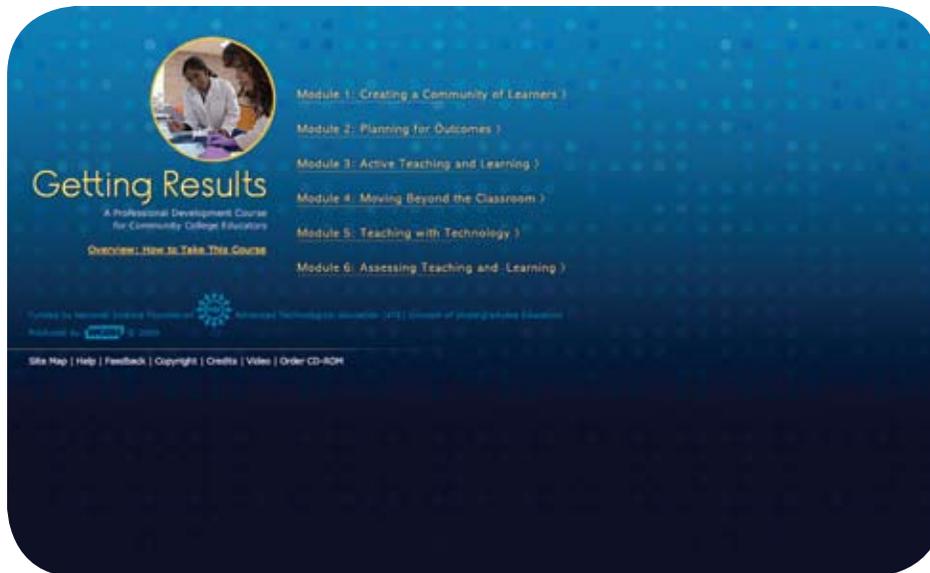
An external evaluator surveyed faculty who used the Getting Results course and noted the group's enthusiasm for the program and its positive impact on them.

- A significant majority of faculty participants (30 of the 35 faculty members who responded to the survey) reported that the Getting Results course strengthened their teaching.
- Thirty-two of the 35 the faculty members (92%) reported that their students are either significantly more engaged or somewhat more engaged in learning.

"To date, the results have been outstanding! The faculty truly enjoy the course, and it has generated excellent interaction among the faculty on teaching and learning strategies in their varied disciplines."

Terry L. Jones
Provost

Tidewater Community College—
Portsmouth Campus
Portsmouth, VA



The multimedia resources of the Getting Results course are tools that new and experienced educators can use to tap students' knowledge and propel their learning. Getting Results focuses on improving instruction in science, technology, engineering, and mathematics. It uses examples from ATE centers and projects, which receive support from the National Science Foundation.

- Faculty members who have taken the Getting Results course are more likely to have modified their practices to consider student outcomes and to make explicit connections to students' experiences and real-life work examples. Thirty-one of the 35 reported that they had added clearly defined learning outcomes, and 30 of 35 reported they had made explicit efforts to connect the subject matter to students' experiences with workplace examples.

The most positive unexpected outcome of the project is that both adjunct faculty, who were the original audience for the project, and full-time faculty in STEM disciplines and other academic areas embraced the program. Some faculty members used the Web site to network with colleagues about effective teaching strategies. Colleges incorporate Getting Results into their online learning environments or use it for in-person faculty development programs on their campuses. The South Carolina Advanced Technological Education Center helped distribute the program to community colleges.

Table 1: Teacher Preparation Programs by Type

Institution	Transfer (2+2) ^a	Associate Degrees ^b	Post-Baccalaureate ^c	Professional Development ^d
Antelope Valley College	X			X
Austin Community College	X	X		
Brookdale Community College			X	X
Cerritos College	X			
City College of San Francisco	X			X
El Camino College	X			
Green River Community College	X	X		X
Indian River State College			X	
Itasca Community College	X			
J. Sargeant Reynolds Community College	X			
Jackson Community College	X		X	X
Montgomery College	X	X	X	X
Museum of Science, Boston				X
Normandale Community College	X	X		
Oklahoma City Community College				X
Pellissippi State Technical Community College	X	X		X
Phi Theta Kappa	X			
Red Rocks Community College	X	X		
San Antonio College				X
San Juan College	X	X	X	
University of South Florida				X
WGBH Educational Foundation				X

^a Program focuses on general education requirements and transfer to four-year colleges.

^b Program awards associate degrees that transfer seamlessly to four-year teacher education programs.

^c Program prepares degree-holding "career switchers" to become teachers.

^d Program enhances current K-12 teachers' knowledge of STEM disciplines.

Acknowledgments

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References

- American Association of Community Colleges (AACC). 2008. Community College Fast Facts. <http://www2.aacc.nche.edu/research/index.htm>
- Cunniff, P.A., M.C. Belknap, and S. Kinholt. 2007. The Impact of a Grant-Funded Project on Selected Community College Teacher Education Programs. *Community College Review*. 35: 35-46. Raleigh, NC: North Carolina State University.
- Cunniff, P.A., and R.A. Risley. 2006. *Best Practices in Teacher Preparation Programs: Focus on Students*, Jackson, MS: Phi Theta Kappa.
- Eisenberg, D.U., and R.A. Risley. 2003. *Preparing Tomorrow's Science & Mathematics Teachers: The Community College Response*, Jackson, MS: Phi Theta Kappa.
- Eisenberg, D.U., and R.A. Risley. 2005. *Preparing Tomorrow's Science & Mathematics Teachers: The Community College Response, Round II*. Jackson, MS: Phi Theta Kappa.
- Recruiting New Teachers, Inc. 2002. *Tapping Potential: Community College Students and America's Teacher Recruitment Challenge*. Belmont, MA: Recruiting New Teachers.
- Shkodriani, G. 2004. Seamless Pipeline from Two-year to Four-year Institutions for Teacher Training. *PT3 Policy Brief*. Denver, CO: Education Commission of the States.
- Tsapogas, J. 2004. The Role of Community Colleges in the Education of Recent Science and Engineering Graduates. *InfoBrief 04-315*. Arlington, VA: Division of Science Resources Statistics, National Science Foundation.



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