



Serving Learners

**Preparing STEM Teachers:
The Key to Global Competitiveness**

Selected Profiles of Teacher Preparation Programs

AACTE's Day on the Hill • June 20–21, 2007



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Serving Learners

About AACTE

The American Association of Colleges for Teacher Education (AACTE) is a national, voluntary association of higher education institutions and other organizations and is dedicated to ensuring the highest quality preparation and continuing professional development for teachers and school leaders in order to enhance PK-12 student learning. The almost 800 institutions holding AACTE membership include private, state, and municipal colleges and universities large and small located in every state, the District of Columbia, the Virgin Islands, Puerto Rico, and Guam. In addition, AACTE has a growing number of affiliate members, including state departments of education, community colleges, educational laboratories and centers, and foreign institutions and organizations. Collectively, the AACTE membership prepares more than two thirds of the new teachers entering schools each year in the United States.

Mission

To promote the learning of all PK-12 students through high-quality, evidence-based preparation and continuing education for all school personnel.

Strategic Goals

1. **Build Consensus on Professional Issues:** Unify the membership by developing clear statements, based on evidence and professional consensus, about educator preparation in five areas: standards, curriculum, assessment, accountability, and who belongs in the profession.
2. **Advocate in State and Federal Policy Arenas:** Establish and maintain a credible voice in state and federal policy making, advocating for high quality in student learning.
3. **Strengthen Programs and Enhance Their Capacity:** Strengthen programs and build their capacity to prepare educators who can teach every child effectively.
4. **Improve All Educators' Ability to Serve Diverse Learners:** Increase the diversity of education candidates and improve programs' curriculum to ensure that all educators can serve diverse learners.

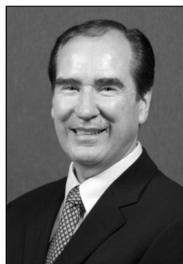
Contents

Letter From the Chair of the Board of Directors and the President/CEO.....	1
Preface	3
California	
California Polytechnic State University.....	4
California State University, Fullerton	5
San Jose State University	7
Sonoma State University.....	8
University of San Diego.....	9
University of Southern California.....	11
Florida	
Florida State University.....	13
University of Central Florida.....	14
University of Florida.....	17
University of South Florida	19
Georgia	
Georgia State University	20
University of Georgia	21
Illinois	
Bradley University	23
DePaul University.....	24
Northeastern Illinois University.....	25
Northern Illinois University.....	27, 28
Indiana	
Ball State University.....	29
Indiana University–Northwest	30
Indiana University–Purdue University Indianapolis	31
Purdue University	32
University of Indianapolis	33
University of Notre Dame	34
Louisiana	
Louisiana State University	35
Maine	
University of Maine.....	37
Maryland	
University of Maryland–Eastern Shore	38
Massachusetts	
Bridgewater State College.....	39
Michigan	
Wayne State University.....	40
Minnesota	
University of Minnesota.....	42
University of St. Thomas.....	43
Nebraska	
Creighton University	44
New Hampshire	
Plymouth State University	46

SOUTH CAROLINA STATE UNIVERSITY • ARKANSAS TECH UNIVERSITY • ARMSTRONG ATLANTIC STATE UNIVERSITY

EDUCATIONAL LABORATORY • APPALACHIAN STATE UNIVERSITY • AQUINAS COLLEGE • ARIZONA STATE UNIVERSITY, WEST • ARKANSAS

New Jersey	
William Paterson University.....	47
New Mexico	
University of New Mexico.....	49
New York	
Binghamton University, State University of New York.....	51
Lehman College	53
New York University.....	55
State University of New York–Buffalo State College	56
State University of New York at Plattsburgh.....	58
North Carolina	
Appalachian State University	59
North Dakota	
Valley City State University	60
Ohio	
Capital University.....	62
University of Akron.....	64, 65
University of Cincinnati.....	66
University of Toledo	68
Youngstown State University	70
Oklahoma	
University of Central Oklahoma	72
University of Oklahoma	73
Oregon	
Portland State University	75
Pennsylvania	
Pennsylvania State University.....	77
Tennessee	
University of Memphis	79
Texas	
Lamar University	81
Texas A&M University	83
Virginia	
Old Dominion University.....	85
Virginia Commonwealth University	86
Virginia Polytechnic State University.....	87
Washington	
Seattle Pacific University.....	89
Wisconsin	
University of Wisconsin–Eau Claire	91
University of Wisconsin–La Crosse.....	92
Wyoming	
University of Wyoming.....	93, 94
Index of Institutions by STEM Field.....	95
AACTE Member Institutions.....	97
AACTE Committee on Government Relations and Advocacy.....	106



Serving Learners

June 20, 2007

Dear Colleagues:

On behalf of AACTE, we are pleased to issue **Preparing STEM Teachers: The Key to Global Competitiveness**. Like many sectors in our society, the teacher preparation community is working to address the critical challenges our nation faces in relation to global competitiveness. This volume highlights institutions around the country that are preparing tomorrow's teachers in the fields of science, technology, engineering, and mathematics (STEM).

It is well known that our nation's ability to succeed in the global economy is lagging and that we are beginning to lose our unrivaled edge in mathematics, science, and innovation to competitor nations. The National Academy of Sciences, the National Governors Association, and the Business-Higher Education Forum are just a few of many organizations whose recent reports describe the problem with a great sense of urgency. The National Science Board (NSB), in introducing its 2006 Science and Engineering Indicators, noted the importance of remaining a world leader in science and technology to our long-term prosperity and security. Its chairman wrote, "Precollege STEM education is the foundation of that leadership ... and it must receive our highest priority as a nation."¹

The inadequate performance of American students in math and science on both national and international assessments presents a major challenge. Although average scores often increased, only about one third of 4th- and 8th-grade students were "proficient" on the 2005 NAEP math and science assessments. The scores of 12th-graders actually declined in science from 1996 to 2005, and appallingly, only 18% reached "proficient."² Even more worrisome to policy makers are comparisons with our competitor nations. Our 4th-graders showed no measurable change in math or science from 1995 to 2003 on TIMSS.³ They were outperformed in math by England, Japan, and Russia and scored higher than only one other industrialized nation. Similarly, in science, both our 4th- and 8th-graders outscored only one of the other G-8 countries. Among 15-year-olds assessed by the Programme for International Student Assessment of the Organization for Economic Cooperation and Development (OECD), our students performed below the OECD average in both math and science literacy and were near the bottom in math.⁴

Among the top priorities the NSB named for ensuring a world-class education in STEM fields for all Americans is a *high-quality teaching workforce*. Similarly, in *Rising Above the Gathering Storm*, the National Academies traced the nation's lack of technically trained persons to poor mathematics and science instruction in K-12 schools. "We need to recruit, educate, and retain excellent K-12 teachers who fundamentally understand biology, chemistry, physics, engineering, and

1 National Science Board. (2006, January). *America's pressing challenge: Building a stronger foundation* (NSB-06-02), "Dear Colleague" introductory letter from NSB Chairman Warren M. Washington. Arlington, VA: Author.

2 NAEP Nation's Report Cards for the 2005 math and science assessments

3 Trends in International Mathematics and Sciences Study

4 National Science Board. (2006). *Science and engineering indicators 2006*. Arlington, VA: National Science Foundation.



mathematics,” the report said. “Few factors are more important than this if the United States is to compete successfully in the 21st century.”⁵

Well-known shortages of qualified math and science teachers continue to exist in most states and districts across the country.⁶ Thus unprepared teachers are assigned to teach math or science “out of field,” although research shows that students learn more from mathematics and science teachers who studied teaching methods in the subject they teach than from those who did not.⁷ In 2002, between 17 and 28% of public high school science teachers, depending on their field, and 20% of math teachers lacked full certification in their teaching field; and the problem was proportionally higher for middle grades. In addition, the annual turnover rates of both math and science teachers of 16% are the highest of all fields.⁸ “Out-of-field” assignments and teacher turnover are much more prevalent in rural, urban, and high-poverty areas, and their combined effect has created a major national educational equity travesty. These factors largely account for the perception that mathematics and science teachers are not well prepared: Many are not, in fact, either math or science teachers; others are, but only temporarily.

Schools, colleges, and departments of education are very much aware of these challenges and are rising to the occasion to produce more and better teachers in the STEM fields. AACTE is proud to present this volume of concrete examples of the ongoing efforts of 50 schools of education across the nation that are addressing these critical needs. As the profiles illustrate, a variety of efforts are under way; one single model does not prevail. However, it appears that a greater emphasis on STEM content knowledge—increasingly involving partnerships between education schools and schools of arts and sciences—is stimulating a transformation in many teacher preparation programs. Further, it is clear that enhanced and extended clinical experience in diverse classrooms is a key component of most of the STEM teacher education efforts.

Some preparation programs have developed sophisticated accountability systems to assess their programs’ effectiveness, but many other institutions are in the infancy stage of developing the assessment systems needed to track their graduates after they leave the institution. It is clear that institutions want to know if their programs are effective, how long their graduates stay in the classroom, and how their graduates are affecting K-12 student learning. This is an area where the federal government can make a significant contribution to strengthening teacher quality and educator preparation. With the federal government’s partnership in this effort, these systems can be developed and strengthened and can serve as examples for the other units within the institution.

We hope these examples of innovative efforts of teacher preparation programs are of value to policy makers as they make key decisions about the nation’s future.



Randy Hitz
Chair, Board of Directors



Sharon P. Robinson
President and CEO

5 National Academies, Committee on Prospering in the Global Economy of the 21st Century. (2006). *Rising above the gathering storm: Energizing and employing America for a brighter future*. Washington, DC: National Academies Press.

6 An example of this is the fact that the Department of Education includes teachers of mathematics and science on its Teacher Shortage Area Nationwide list for purposes of deferred loan repayments.

7 Monk, D. H. (1994). Subject area preparation of secondary mathematics and science teachers and student achievement. *Economics of Education Review*, 13(2), 125-145.

8 Ingersoll, R. M. (2003, September). *Is there really a teacher shortage?* Center for the Study of Teaching and Policy and Consortium for Policy Research in Education (Document R-03-4), p. 14.

Preface

This publication profiles a selection of STEM teacher preparation programs at AACTE member institutions. The programs described herein are not the only educator preparation programs at the institutions, nor are they the only STEM teacher preparation initiatives in higher education. The programs profiled in this publication are based on responses to a survey sent by AACTE to its member institutions in spring 2006.



California

California Polytechnic State University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 50

Number of Graduates in 2007: 15-20

Description:

Cal Poly currently offers a 5th-year credential program used primarily by undergraduate majors in math, biology, chemistry, and physics; earth sciences is under development. Candidates take an early field experience course that provides an orientation to teaching, and they complete other prerequisites to enter the program. The program is designed to be completed in a year and meets all the requirements of the California Commission on Teacher Credentialing.

Mentoring and Clinical Practice Dimensions:

- Each math and science area has a faculty education adviser in the content department.
- College of Science and Mathematics (CSM) teachers-in-residence coadvise, teach, and supervise in partnership with the faculty adviser.
- Candidates have a series of field placements and clinical experiences with experienced, well-qualified master teachers.
- Candidates experience teaching at the middle and senior high levels and with students who are English learners, come from diverse backgrounds, and have special needs.

Program Innovations:

- The program is moving toward integrating the undergraduate major and credential course work in a 4-year + 1-quarter format.
- The College of Education (COE) and CSM are collaborating with the College of Engineering on a nonlicensure option for students interested in teaching.
- The COE is partnering with CalStateTEACH, a site-based, technology-supported, statewide program to extend clinical practice sites around the state.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The COE conducts multiple assessments of candidates—at admission to the university, at admission to the program, at admission to student teaching, and at program completion.
- Cal Poly conducts periodic focus groups with personnel directors, principals, and superintendents of employing school districts.
- The systemwide chancellor's office conducts two evaluations of program effectiveness:
 - Surveying candidates as they exit their preparation program
 - Surveying 1st-year teachers and 1st-year teachers' supervisors
 Results consistently indicate that Cal Poly graduates are well prepared, successful teachers who choose to remain in the classroom.

Partnerships Outside the College of Education:

Current and new programs are jointly offered between the COE and the CSM. The CSM also runs a teacher-in-residence program whose participants are K-12 educators who provide teacher education and undergraduate science courses.

External Funding:

The systemwide chancellor's office has allocated state funding specifically for the recruitment and preparation of new math and science teachers.

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California

California State University, Fullerton

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 50

Number of Graduates in 2007: 50

Description of Program:

The Mathematics and Science Teachers (MAST) Project is an innovative partnership of the Colleges of Education and of Natural Sciences and Mathematics at California State University, Fullerton, to provide strong, collaborative, and comprehensive efforts to improve practices in the areas of mathematics and science teacher candidate recruitment, preservice preparation, induction, beginning-teacher professional development, and retention. The MAST Project goal is to develop highly qualified secondary mathematics and science teachers whose training enables them to enter the classroom with the skills and knowledge to effectively serve students and enhance student achievement.

Mentoring and Clinical Practice Dimensions:

The Single Subject Credential program is a 5th-year program. Candidates complete a 40-hour field work experience in a prerequisite course. The program is 2 full-time semesters, and candidates spend 3 hours daily for 18 weeks at their school site in the 1st semester for a total of 270 hours. They spend 5 hours daily at their school for 18 weeks during the 2nd semester for a total of 450 hours. Candidates must have at least two preparations, and their students must include English learners, struggling readers, and students with special needs. STEM pedagogical content knowledge is the focus of 6 units of course work. However, candidates also integrate content knowledge with pedagogy in other courses, where they demonstrate their knowledge of the content area and pedagogical skills through completion of the California Teaching Performance Assessment.

Program Innovations:

- Separate middle school and secondary mathematics credential programs support candidates coming into the teaching profession through alternative pathways.
- A strong future-teachers program at 20 high schools provides students with 3 units of college credit in a lecture and field work format.
- The Colleges of Education and of Science and Mathematics collaborate extensively.
- Special programs support added authorizations in math or science for credentialed elementary teachers.
- An internship program allows professional-track teachers to earn their credential while working full-time in a paid position.

Research Initiatives:

Research is under way to determine whether candidates who demonstrate subject matter competency via the Subject Matter Preparation Program show significant differences in their performance than those who demonstrate competency via the California Subject Examination for Teachers (CSET).

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program uses standardized assessment data of the California Teaching Performance Assessment; additional evidence comes from program completers and from 1-year-out surveys with data on opinions of program completers and employers. Informal data are also collected on school district preferences and hiring trends. With minor exceptions, the data on program completers who are math and science teachers are excellent.
- Five-year retention data currently demonstrate a retention rate of 90% or greater among interns.



- Candidates' knowledge, skills, and dispositions are evaluated at program entry, at multiple midpoints, and in a final assessment by their university supervisor, master teachers, and program adviser. Scales are both unitwide and statewide and include the California Teaching Performance Expectations. In addition, candidates are assessed via the California Teaching Performance Assessment, a standardized assessment that requires candidates to analyze student work and a videotape of their own teaching.

Partnerships Outside the Division of Education:

The project includes the departments of secondary education and bilingual education, special education, mathematics, biology, chemistry, geological sciences, and physics as well as the science education program. It is supported by, is aligned with, and shares faculty and community members with the Center for Excellence in Science and Mathematics Education and the Secondary Education Cooperative Teacher Education Program.

External Funding:

Funding is provided by the California CPEC Improving Teacher Quality Grants, the chancellor's office, and Teacher Track.

Contact Information:

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California

San Jose State University

STEM Field: Science

Candidates Enrolled in STEM Program: 120

Number of Graduates in 2007: 35

Description of Program:

The College of Science at SJSU has a long history of extensive and successful involvement in science and math teacher preparation and professional development as well as working collaboratively and productively with the College of Education's Secondary Education Department. This program is specifically geared toward career changers, and approximately 75% of the credential candidates come from this source. Unlike many universities where teacher preparation is located exclusively in colleges of education, at SJSU, all of the colleges share equally in offering teaching credentials, partnering effectively with the College of Education's Secondary Education Department. College of Science faculty (who are tenure-track science faculty, some with joint appointments between their home science department and the Science Education Program) oversee and teach half of the professional development courses for the science or math teaching credential. All undergraduates planning to become teachers take their science and math classes from the College of Science. Recognizing its responsibility in K-12 teacher preparation, the College of Science funds and administers a large science and math education program that operates teacher preparation activities and many other outreach programs for K-12 teachers. This program currently has about 15 faculty, making the science and math education program at SJSU one of the largest in the country. STEM content is integrated throughout the program in methods, assessment, reading, and other required courses. Most professors in the College of Education give assignments in which candidates must draw from their content understanding. Candidates must be competent in their subject matter before enrolling in the methods course.

Mentoring and Clinical Practice Dimensions:

- In California, single-subject programs are 5th-year programs. To be accepted in the credential program, an applicant must complete 30 hours of observation. Student teaching consists of two phases. Phase I consists of observations and teaching for a few weeks. Phase II involves the candidate teaching two science courses for the entire semester. During the Phase II teaching, student teachers also observe other science classes.
- A Science Education Resource Center provides materials and technical support for preservice and new teacher candidates.

Program Innovations:

The science education program has just announced the option of obtaining a single-subject science credential and a master of arts in natural science, chemistry, biological science, earth science, or physics. The science education program will be adding a master of arts in science education by spring 2008.

Research Initiatives:

Current initiatives are focused on applying effective methods for continued professional development of science teachers.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program has teacher retention rates of approximately 50%.
- Several formative and summative evaluations are used during student teaching as well as the Teacher Performance Expectations set by the State of California.

Partnerships Outside the Division of Education: College of Science

External Funding: Yes

Contact Information: Maureen Scharberg, Director of Science Education, maureen.scharberg@sjsu.edu



California

Sonoma State University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program (2006 cohort): 32

Number of STEM Graduates in 2007: 27

Description of Program:

STEM teacher candidates enter a 5th-year credential program while demonstrating their subject matter knowledge either through subject matter waiver programs or through completion of subject matter tests (CSET).

Mentoring and Clinical Practice Dimensions:

- STEM teacher candidates participate in structured observations of STEM classrooms as part of their credential course work during their semester in the program.
- After completion of the structured observations, candidates participate in full-time student teaching for their 2nd semester in a STEM classroom working closely with their resident (master) teacher and a university supervisor, and they participate in weekly candidate seminars.
- Candidates participate in cohort groups centered in the science or mathematics methods course taught within the School of Education.

Program Innovations:

- Formation of a Science and Mathematics Teacher Recruitment Initiative (SMTRI)
- Allocation of stipends for teacher credentialing and testing costs
- Cohort groups of students in program
- Strong relationships between STEM university departments and the School of Education
- Participation of STEM faculty in program decisions
- Structured support for intern students (e.g., course scheduling, job time negotiations)
- Strong network with secondary science teachers in the region

Research Initiatives:

Research is under way on the relationship between candidates' work and their students' learning outcomes and on determining measures of candidates' success in the program and beyond completion.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Implementation of the Performance Assessment for California Teachers
- End-of-program exit evaluation of program effectiveness by candidates and mentor teachers
- California State University survey of school administrators on candidate preparedness
- Development and refinement of embedded signature assessments, program assessments, and candidate outcomes

Partnerships Outside the Division of Education:

Partnership with high school programs focused on teacher preparation; Mathematics Subject Matter Waiver Program; collaboration with School of Science and Technology

External Funding:

California State University teacher recruitment funds

Contact Information:

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California

University of San Diego

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: 30 in the M.Ed. in Math, Science, and Technology Education; 130 in sustained professional development

Number of Graduates in 2007: 25

Number of Graduates Since Inception of Program: 27

Total Number of Graduates in Division of Education: 150

Description of Program:

This program is based on a partnership that will increase student academic achievement in mathematics and science by building sustainable, professional development capacities in local school districts. The program offers practicing teachers standards-based workshops in content (math and science) and in pedagogical techniques (inquiry, formative assessment, curriculum development) necessary to translate content into rigorous math and science instruction in their classrooms. The Inquiry Learning Partnership provides 3 years of intensive professional development to approximately 155 teachers of Grades 4-6. The teachers work with students who range in language proficiency (21.1% are English language learners, or ELL, in Lemon Grove, and 32.6% in Chula Vista) as well as socioeconomic status (66.3% are eligible for free/reduced-price lunch in Lemon Grove, and 39.2% in Chula Vista). Participating teachers will reach approximately 3,600 elementary/middle school students. Over 95% of program teachers operate with an elementary or multiple-subject teaching credential and meet the “highly qualified” designation of the No Child Left Behind Act.

To address teachers’ diverse needs, this program offers three strands of participation: Teacher Professional Development, Master’s, and Leadership strands. While all levels of participation aim to provide at least 104 hours of professional development per teacher, each strand is differentiated to address the needs, in terms of career advancement and professional growth, of the teacher population. Beyond the traditional professional development model, the program also provides scholarships for a new master’s degree in mathematics, science, and technology education at the University of San Diego in addition to creating a cadre of math and science leaders at the district and site level. A cohort of 25 teachers from this group is enrolled in the USD master’s program. In the 30-unit program, 9 units are team-taught by education faculty and university faculty from the math and science departments as well as education specialists at museums and practicing teacher leaders.

Mentoring and Clinical Practice Dimensions:

- Teachers are provided in-class support from school district and science center specialists via an array of activities such as lesson planning, curriculum development, in-classroom coaching, and Teaching Learning Collaboratives.
- Candidates are practicing teachers, so their job is used as the clinical setting.
- Teachers are paired with education faculty for design and implementation of action-research projects.

Program Innovations:

- Professional development is divided into one week-long intensive training institute each summer and multiple day-long Saturday sessions through out the school year for 3 successive years. This professional development is built into graduate course work and offered on site at the museum.
- The program exit assessment is an action-research project that is conducted in the teacher’s classroom and presented as part of a public binational symposium for action research in schools.
- Resource materials and kits for implementing professional development can be checked out by participant teachers from the science center.
- The program uses inquiry-based pedagogy to teach math and science content.



Research Initiatives:

Faculty are currently carrying out three research initiatives:

- A longitudinal study of science-based professional development for elementary teachers
- Impact of professional development in science education on teacher practice
- Examination of the impact of action research on the practice of elementary math classroom teachers
- Twenty-five action-research projects by classroom teachers were generated and presented at the First Annual Binational Symposium on Action Research in Schools

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Participation in the project is voluntary. Teachers were recruited from low-performing schools, although teachers from any school in the districts were eligible to apply. All 25 of the first cohort of MSTE candidates graduated in May 2007.
- Assessment of the current grant is being conducted by an outside evaluator.
- The program uses K-12 student test data (initial examination of student achievement shows a modest, yet promising, gain in achievement for students of those teachers who were involved in project activities); university course evaluations; action-research data; and teacher data to assess the program (lesson observations indicated that participating teachers were implementing project-based instructional strategies in their classrooms) and teacher content knowledge (pretest scores, in both math and science, ranged from 20 to 43% correct, whereas posttest scores improved to 45 to 73% correct).
- Master’s candidates are assessed using classroom observations, course-work assessments, and action-research projects.
- The master’s program has institutional review in the form of an “advancement to candidacy” review of research proposal, candidate’s response to defense question after oral public presentation of action research, and two-reader assessment of final action-research paper.

Partnerships Outside the Division of Education:

Faculty in the College of Arts and Sciences, Reuben H. Fleet Science Center, Chula Vista Elementary School District, Lemon Grove School District

External Funding:

USD was able to offer students scholarship money from a California Mathematics and Science Partnership (CaMSP) grant, first awarded in January 2005. This grant supported an Inquiry Learning Partnership (ILP) that brought together Grade 4-6 teachers from two school districts (Chula Vista Elementary and Lemon Grove), the Ruben H. Fleet Science Center, and USD. In addition, the dean of the School of Leadership and Education Sciences reduced the cost per unit for tuition, making the graduate degree affordable for working teachers.

Contact Information:

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California

University of Southern California

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 21

Number of Graduates in 2007: 13

Description of Program:

A 13-month master of arts in teaching program with two of many emphases in science and mathematics education has existed at the University of Southern California for 3 years. Content focus begins prior to enrolling in the program depending on a candidate's undergraduate degree and emphasis. Candidates enroll in 32 units of course work in addition to experiencing 3 semesters of science- and/or math-focused field experiences. A directed research study in science or math with faculty mentorship culminates the program.

Mentoring and Clinical Practice Dimensions:

- Candidates are mentored by faculty, university field supervisors, and cooperating teachers in K-12 classrooms.
- Mentorship includes elements of both formative and summative evaluation.
- Candidates participate in science and math intersession camps on K-12 sites with their methods instructors.
- Beginning in their 1st year, candidates are in a K-12 setting for 3 semesters for 12-20 hours weekly.
- Clinical experience begins with a placement of 2-4 hours per week in math or science classrooms exploring and tutoring in content area literacy (during the summer).
- In the fall and spring semesters, candidates engage in 5 days per week of student teaching in secondary subject-area classrooms and in labs associated with the courses. They are mentored, supported, and evaluated by content-expert university supervisors and by classroom "master" teachers.

Program Innovations:

Candidates attend math and science camps where they work with K-12 teachers. They also work with high school students in intensive intersession camp settings in museums and K-12 lab sites.

Research Initiatives:

Urban teacher efficacy and the preservice and in-service efforts to improve it are being researched. The primary purpose of this study is to establish a set of criteria related to teacher beliefs, efficacy, and self-regulation that will allow faculty to transform the teacher preparation program to meet the diverse needs of preservice teachers entering urban educational environments in an effort to increase urban teacher efficacy and, ultimately, student achievement. Another study is being conducted on teacher dispositions in preservice and in-service teacher candidates. Also, a collaborative effort between the University of Southern California and the Los Angeles Unified School District (LAUSD) is aiming to increase students' academic achievement in science, health, and content specific areas via improved teacher training including an innovative DVD-ROM, an on-line teacher's guide and web site, and an immersive museum installation.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Eighty-six percent of candidates have been retained beyond 3 years, with significantly higher rates at the end of year 2.
- Candidates are evaluated through a battery of summative and formative assessments including observation records, rubric score sheets on lesson observations, and California Commission on Teacher Credentialing (CCTC) professional standards-based rubrics of performance score sheets while in the program.



- The Performance Assessment of California’s Teachers (PACT) is also used.
- The program is part of a statewide study with the California State University system that addresses retention.

Partnerships Outside the Division of Education:

The university is preparing to partner with the LAUSD Bravo Magnet School and the Foshay Learning Center to blend preservice and in-service training with the School of Engineering.

External Funding:

Faculty are applying for a grant to expand the program to include technology and to link preservice to in-service training efforts.

Contact Information:

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Florida

Florida State University

STEM Fields: Science and Mathematics

Numbers and Demographics: The program is in development to be established and open to enrollment by fall 2007. The first graduating class is anticipated in spring 2011.

Description of Program: The College of Education at Florida State University is spearheading the new FSU Teach project, modeled after the UTeach program at the University of Texas, already proven to dramatically increase the number of secondary science and math teaching graduates in their state. FSU Teach is a collaborative effort with the College of Arts and Sciences and is aimed at meeting the need for qualified and skilled teaching professionals in the secondary classroom. Recruiting and preparing excellent students to become reform-minded science and mathematics teachers and providing support for them after graduation to facilitate retention are major aspects of the project.

FSU Teach will allow students to obtain the content knowledge and pedagogical preparation necessary to begin the life-long learning process that defines a successful teacher through a dual-degree program structure (double major). Mentor relationships will provide support to graduates during their 1st year of teaching. Other components include financial support, research, and continual program evaluation to ensure that the program meets participant needs.

Mentoring and Clinical Practice Dimensions:

- FSU Teach will employ project personnel, faculty, and master teachers to provide instruction, guidance, and mentoring for its students. These master teachers are former secondary school teachers with a proven record of effective teaching using inquiry-based instructional strategies who will provide critical connections with local school districts.
- The mentorship will extend beyond student course work and into field experiences that begin early in the student career and extend throughout the program.
- Guidance and support for FSU Teach students both during their studies and after they graduate will be a hallmark of all project employees and be the exclusive province of master teachers and advisers. The goal is to support graduates in their 1st year of teaching, often the most challenging year of their careers and a critical time for retention in the teaching profession.
- Graduates will also be able to apply for support for professional development efforts through an endowment that FSU Teach will build.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- All aspects of the FSU Teach program are focused on the recruitment of high-quality students into teaching and drastically improving retention rates among graduates.
- FSU Teach will institute a rigorous, continuing program-evaluation component that will focus on collecting data on all of its aspects including, but not limited to, student recruitment and retention, teaching success and retention of its graduates, program quality and success, student demographic data, and graduation rates.
- Data will be used to maintain and improve the program and to contribute to the research base of what constitutes successful science and mathematics teacher preparation programs.

Partnerships Outside the Division of Education:

FSU College of Arts and Sciences; school systems in Leon, Gadsden, and Seminole counties in Florida; Florida State University Schools, FSU's charter school

External Funding:

\$248,836 (project funding in 2006-2007 within the new \$2 million Florida Center for Research in Science, Technology, Engineering, and Mathematics, funded by the Florida Department of Education)

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Florida

University of Central Florida

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Programs (Fall 2006) / Number of Graduates in 2007:

- M.A. Instructional Technology: 45 / 15
- M.Ed. Instructional Technology/Educational Media (Grades PK-12): 13 / 8
- M.A. Mathematics Education (Grades 5-9): 21 / 10
- B.S. Mathematics Education (Grades 6-12): 138 / 16
- M.A. Mathematics Education (Grades 6-12): 10 / 2
- M.Ed. Mathematics Education: 50 / 2
- M.A. Science Education (Grades 5-9): 7 / 5
- B.S. Science Education (Grades 6-12): 75 / 16
- M.A. Science Education (Grades 6-12): 16 / 4
- M.Ed. Science Education: 7 / 2
- M.Ed. Mathematics and Science Education (Grades K-8): 24 / 7

Description of Programs:

- M.A. Instructional Technology: Predominantly on-line professional development program with specialization tracks in educational technology, e-learning, and instructional systems.
- M.Ed. Instructional Technology/Educational Media (Grades PK-12): Designed for certified teachers in any field who wish to also become certified as an educational media specialist (Grades PK-12). Program is fully on line.
- M.A. Mathematics Education (Grades 5-9): A “fast track” program designed primarily for individuals with strong mathematics background in their undergraduate studies who wish to become certified as middle-grades mathematics teachers.
- B.S. Mathematics Education (Grades 6-12): Initial teacher preparation program leading to certification in secondary (Grades 6-12) mathematics.
- M.A. Mathematics Education (Grades 6-12): Designed primarily for individuals with strong mathematics background in their undergraduate studies who wish to become certified as secondary (Grades 6-12) mathematics teachers.
- M.Ed. Mathematics Education: Professional development program for certified mathematics teachers.
- M.A. Science Education (Grades 5-9): A “fast track” program primarily for individuals with strong science background in their undergraduate studies who wish to become certified as middle-grades general science teachers.
- B.S. Science Education (Grades 6-12): Initial teacher preparation program leading to certification in secondary (Grades 6-12) biology, chemistry, or physics.
- M.A. Science Education (Grades 6-12): Primarily for individuals with strong science background in their undergraduate studies who wish to become certified as secondary (Grades 6-12) teachers in biology, chemistry, or physics.
- M.Ed. Science Education: Professional development program for certified science teachers.
- M.Ed. Mathematics and Science Education (Grades K-8): A professional development degree for exemplary elementary and middle school mathematics and science teachers who wish to build on their professional knowledge and skills through action research and the application of research-based best practices in mathematics and science teaching.

Mentoring and Clinical Practice Dimensions:

All initial teacher preparation programs include a series of field/clinical experiences in a variety of school settings and at least 1 semester-long, full-time student teaching placement supervised by both an experienced and clinically trained classroom teacher and a university faculty member.

Program Innovations:

- Supported by the Lockheed Martin Academy, middle-grades M.A. programs in mathematics and science education house a “Transition to Mathematics and Science Teaching” (TMAST) designed to recruit and prepare new mathematics and science teachers.
- In addition, the Lockheed Martin Academy supports the K-8 Mathematics and Science Education program, designed to enhance elementary and middle school mathematics and science teaching, and Lockheed has endowed an eminent-scholar chair.
- Science education programs, in partnership with NASA, provide direct support and resources to local teachers to enhance science teaching.

Research Initiatives:

- A virtual classroom is being created to assist TMAST students with the difficulty of middle school teaching in the area of classroom management.
- An NSF CAREER Award grant is supporting research to improve inquiry-based science instruction in diverse classroom settings.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Annual surveys of both program alumni and their employers gauge graduates’ performance with respect to Florida’s teacher education standards, which are closely aligned with national model standards of the Interstate New Teacher Assessment and Support Consortium (INTASC) and other state-defined core teacher competencies. These surveys consistently provide highly positive feedback on the performance of the programs’ graduates.
- Data are compiled annually on the percentage of program graduates who are rehired or eligible for rehire after their 1st year of teaching. Data for the past 5 years indicate that 100% of all graduates from STEM programs at UCF were rehired or eligible for rehire after their 1st year of teaching.
- Program effectiveness is evaluated on a continual basis. Each program has developed a formal assessment plan. Assessment data are collected, analyzed, and used to support continuous program quality improvement via a formal annual reporting cycle. Additionally, extensive formal program reviews are conducted periodically according to a university program review schedule.

Partnerships Outside the Division of Education:

- Mathematics and science education programs work closely with academic departments in the College of Sciences regarding mathematics and science content courses included in program curricula.
- Mathematics and science education programs have partnered with the Lockheed Martin Corporation, Boeing Corporation, and Toyota Foundation to enhance mathematics and science teaching in Central Florida. As a result of the long-standing partnership with the Lockheed Martin Corporation, the Lockheed Martin/University of Central Florida Academy for Mathematics and Science has been established.
- The College of Education has partnered with the Florida Space Grant Consortium and NASA Kennedy Space Center to manage NASA’s Educators Resources Center/Exploration Station at Kennedy Space Center to help promote bringing science to life in the classroom.

External Funding:

External funding from several sources has supported the UCF STEM programs:

- The Lockheed Martin Corporation, Boeing Corporation, and Toyota Foundation have contributed in excess of \$3 million to programs for the preparation and professional development of mathematics and science teachers.
- A science education faculty member recently received a prestigious National Science Foundation CAREER Award for \$283,157 to support research on inquiry-based science instruction in diverse classroom settings.



- The instructional technology program currently has \$45,000 in research funding.
- A science education faculty member participated in development of a successful, joint College of Education and Florida Space Grant Consortium that resulted in a \$2-million award to manage and operate NASA's Educators Resources Center/Exploration Station at Kennedy Space Center.

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Florida

University of Florida

STEM Fields: Science, Technology, and Mathematics

Number of Graduates in STEM Programs: 40

Description of Program:

The University of Florida has several STEM education programs to enhance the quantity and quality of STEM educators. Below, two are outlined.

Science Education Minor and Mathematics Education Minor. An academic minor is available to undergraduates majoring in a science or mathematics field. The minor is part of an initiative created by the State of Florida to increase the recruitment of teachers into classrooms. UF's Science for Life, program funded by the Howard Hughes Medical Institute, partners in these minors by targeting bright and talented undergraduates in the sciences for recruitment. Consequently, the minor is part of an approved teacher education program where completers fulfill professional education requirements in 18 credits of course work. Experiences in classrooms are embedded throughout the program. Graduates are eligible for a Temporary Teaching Certificate and must complete a district-based induction program to earn a Professional Certificate.

ProTeach (Professional Teacher). This graduate-level program enrolls students who hold bachelor's or graduate degrees in a science or mathematics field. The 1-year program features preparation in content area reading, academic literacy, working with second-language learners, classroom management, and subject-specific pedagogy. In addition, there are practica at the middle school and high school levels and an intensive internship.

Mentoring and Clinical Practice Dimensions:

- All candidates must complete clinical experiences, ranging from observation of teaching through full-year, full-time internship in classrooms.
- Supervisors and on-site professional development staff assigned to schools as well as practicing teachers are prepared for effective mentoring and supervision. There are several models in place, including training in the Pathwise Observation System, graduate courses in teacher professional development, and school-based workshops on best practices in mentoring new teachers. An on-line mentor support system is in development to better serve teachers and other staff who provide mentoring to new teachers.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- 89% retention rate after 2 years of teaching (based on follow-up survey of graduates that had a 79% return rate—moved to any state)
- 100% pass rate on all three sections of the Florida Teacher Certification Exam (subject matter knowledge, professional education, and general knowledge)
- 662 graduates in all programs (2005-2006)
- Graduates' effectiveness determined by Employer Satisfaction Survey and by Rehire Survey. Employers rate UF graduates an average of 4.5 on a 5-point scale, indicating they are very satisfied with their performance. The Rehire Survey asks employers to indicate if they would not rehire any of our program completers due to poor performance. We have 0% of employers indicating they would not rehire our completers. 100% of our graduates are eligible for rehiring based on their performance.
- Performance during teacher education program is assessed in multiple ways, involving data collected at admissions through graduation. Data are collected from students (e.g., SAT, other test scores), from university faculty (e.g., completion of key tasks in courses, course grade), and practicing educators (e.g., internship evaluations).



Partnerships Outside the Division of Education:

The college has close partnerships with the College of Engineering, the College of Arts and Sciences, and the College of Agriculture.

External Funding:

The institution shares an HHMI-funded grant to develop a new science education minor, and it has a BellSouth grant to study virtual high schools in the Southeast.

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Florida

University of South Florida

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: 75 in M.A.T. program and 10 in B.S./M.A.T. program

Number of Graduates in 2007: 15 in M.A.T. program and 0 in B.S./M.A.T. program (started in fall 2007)

Description of Program:

The master of arts in teaching (M.A.T.) program has been in existence for 5 years. It provides an advanced degree in middle school math, high school math, biology education, chemistry education, or physics education. The bachelor of science/master of arts in teaching (B.S./M.A.T.) is a new program for the 2007-2008 school year. It is a 5-year collaborative program with the College of Arts and Sciences that allows undergraduate candidates in mathematics to begin the M.A.T. program in math education after the completion of 90 credit hours. The Florida Digital Educator Program is a Florida Center for Information Technology project that was launched in 2007. Its purpose is to mentor teachers in the use of technology via summer institutes, asynchronous on-line training, and in-person training.

Mentoring and Clinical Practice Dimensions:

- Candidates spend 45 hours per week in local schools during their methods course.
- Students must complete a 15-week full-time internship during their student teaching semester.
- Students are placed with a cooperating teacher who is certified in the subject area, has taught a minimum of 3 years, and has completed clinical educator training.

Program Innovations:

- M.A.T. candidates can complete a graduate degree that provides initial teacher certification while continuing to work.
- Candidates complete their student teaching as a paid internship.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Candidates are assessed in a variety of ways including course exams, state subject matter exam, state professional exam, state general knowledge exam, portfolios, and performance of the candidate's students on the respective sections of the middle school and high school state exam.
- Candidate follow-up studies are conducted for 3 years after graduation to evaluate graduates' status and assess the extent to which they are still employed as teachers.
- School principals are surveyed annually to determine their perceptions of alumni performance with respect to the Florida Educator Accomplished Practices. The responses provide evidence that graduates are attaining high levels of success across a broad range of teacher competencies. More than 75% of school principals reported that graduates' performance is strong or outstanding in the following ways: As teachers, they monitor students' progress using strategies that are appropriate to learning outcomes, employ strategies that support individual and group learning, use instructional time effectively, engage in self-improvement and professional development activities, and integrate a variety of experiences and activities to enhance learning.
- University supervisors and cooperating teachers provide evaluations of the performance of candidates during the final internship.

Partnerships Outside the Division of Education:

Collaborations with the College of Arts and Sciences and six Florida school districts

External Funding:

Grants from the Florida Department of Education totaling over \$1.3 million

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Georgia

Georgia State University

STEM Field: Mathematics

Candidates Enrolled in STEM Program: 36

Number of Graduates in 2007: 17

Description of Program:

Teacher Education Environments in Mathematics, Science, English, and Social Studies (TEEMS) is a nontraditional approach to mathematics teacher education and is based on current teacher education research as well as 7 years of experience with alternative teacher preparation. The TEEMS mathematics education program attempts to integrate four major components: knowledge of pedagogy, knowledge of subject matter content, knowledge of students, and knowledge of environmental contexts for learning. In particular, the program is flexible to accept both career-changers and those with a bachelor's degree seeking initial certification and master's degree.

Mentoring and Clinical Practice Dimensions:

- Candidates are mentored by faculty and cooperating teachers throughout the program.
- Candidates spend 1 semester in a middle-grade practicum experience and 1 semester in a high school teaching experience.

Program Innovations:

- The TEEMS mathematics program has innovated a specific focus on teacher preparation for urban school environments.
- Professional learning communities have provided much needed support for candidates. These learning communities consist of the Noyce Scholars, mentor teachers, counselors, principals, district administrators, and university professors.

Research Initiatives:

Research has been initiated on the program's effectiveness.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program intends to begin tracking the retention rates of its graduates.
- Candidates must complete electronic portfolios and pass performance assessments.
- Candidates are also assessed using the Student Teacher Assessment and Retention System. This is a large-scale data warehouse that can tie together assessment data with many candidate characteristics while they are in the program (e.g., GPA matched to self-ratings) and can also analyze graduates' follow-up data simultaneously with their workplace characteristics (e.g., grade level, school demographics, student achievement).

Partnerships Outside the Division of Education:

The Department of Mathematics and Instructional Technology

External Funding:

Robert Noyce Scholarships (NSF program) support 10 TEEMS students each year.

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Georgia

University of Georgia

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: ~200 in mathematics education at various stages, ~50 in science education at various stages

Number of Graduates in 2007: ~30 mathematics teachers at the undergraduate level and 8 at the masters level; ~25 science teachers at the undergraduate level and ~15 at the masters/postbac level

(Note: These data reflect the preparation of teachers for Grades 6-12 only in mathematics or science. They do not include those specifically prepared for middle school, nor do they include advanced preparation of existing teachers via a master's degree or the preparation of teacher educators via the Ph.D. or Ed.D.)

Description of Program:

- *Secondary mathematics education:* B.S.Ed. in mathematics education and a postbac route to certification (which usually leads to a master's degree). The B.S.Ed. includes 9 mathematics/statistics/mathematics education content courses, 3 mathematics education curriculum courses, 1 methods course, 2 field experience courses, ~12 weeks of student teaching, and a post-student teaching seminar. The postbac program varies based on the course work already completed as part of the bachelor's degree. To be certified, a student must have 33 hours in mathematics, 2 courses in foundations of education, 1 course in special education, 2 courses in the teaching/learning of mathematics, and a supervised internship.
- *Secondary science education:* B.S.Ed. in science education and a postbac route to certification (which may or may not lead to a master's degree). Students complete nearly all science content course work in arts and sciences. The B.S.Ed. program is a 2-semester program (3 courses on teaching methods/curriculum/school-base practicum, ~12 weeks of student teaching, a reflection course with student teaching, and a post-student teaching course on philosophy/leadership in science education). The 3-semester postbac program includes a methods course, a special education course, a curriculum course, a technology course, and a philosophy/leadership course, along with a year-long, supervised internship.

Mentoring and Clinical Practice Dimensions:

- *Mathematics education:* 50 hours of unsupervised field experience and take a corresponding 3-hour course after the field experience. In the fall of the senior year they have a variety of field experiences in conjunction with the methods course. Student teaching is 12 weeks.
- *Science education:* The first 3 courses in the program are taught on site in a secondary school with high school science teachers serving as coteachers of the courses, university professors teaching high school science classes, and preservice teachers working with high school students.
- Most field experiences and student teaching are supervised by a combination of faculty and doctoral students. Mentor teachers are carefully chosen for their experience with mentoring and their expertise as science teachers.

Program Innovations:

- *Mathematics education:* Significant use of mathematics-specific technology in all courses; 3 courses on the mathematics content of secondary schools.
- *Science education:* Site-based methods courses.

Research Initiatives:

- *Mathematics education:* Mathematical knowledge for teaching, professional learning communities among mentor teachers/student teachers/university supervisors
- *Science education:* Pedagogical content knowledge, development of animations for various biology topics, development of animations on evolution



Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

Program effectiveness is assessed through passing rates on state licensure exams, student feedback, and mentor teacher feedback as well as through the accreditation process.

Partnerships Outside the Division of Education:

Department of Mathematics, Department of Statistics, numerous science departments, College of Agriculture and Environmental Science, College of Veterinary Medicine, local schools

External Funding:

\$10 million, Center for Proficiency in Teaching Mathematics, National Science Foundation (NSF); \$1 million, Coordinating Students’ and Teachers’ Algebraic Reasoning, NSF; \$1 million, Does It Work? (scaling up professional development), subcontracts on NSF grants from Penn State (secondary mathematics) and Indiana University (elementary mathematics assessment); \$5 million, University System of Georgia, Partnership for Reform in Science and Mathematics (PRISM, K-16 math and science), Knowles Foundation—pedagogical content knowledge in secondary science

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Illinois

Bradley University

STEM Fields: Science, Engineering, and Mathematics

Candidates Enrolled in STEM Program: 70

Number of Graduates in 2007: 125

Description of Program:

Bradley University's undergraduate programs in elementary and secondary education provide special emphasis on STEM areas and a special interdisciplinary course for undergraduates and for master's or certificate teachers. These efforts are supported by grants from NSF, Annie E. Casey Foundation, and others. The education and engineering colleges work together on "Project Lead the Way" and other efforts also funded externally and by Caterpillar Inc. Bradley also has strong programs in math secondary education as well as middle school math options.

Mentoring and Clinical Practice Dimensions:

- Project Lead the Way (an engineering endeavor) mentors new teachers and others in science education.
- Undergraduates start field experiences in their freshman year and continue with increasing responsibilities each year. They spend the first two years doing observations and some participation. In their junior year, they teach half days for a semester, and in their senior year, they teach all day for a full semester.

Program Innovations:

- Faculty work with elementary and secondary science teachers in central Illinois on updating science information and providing internships in the summer for teachers to work in area labs with scientists. Internship opportunities are available to high school students interested in working with scientists for a semester.
- The Science 101 course is team taught with biology, chemistry, and education faculty to integrate the content and pedagogy.

Research Initiatives:

Grant results, publications, and some internal research pertaining to the assessment system are available.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Over 5 years, there is a 70-75% retention rate for Bradley's teacher graduates.
- Graduates and their employers/supervisors complete surveys assessing the graduates' effectiveness in the K-12 classroom.
- Candidates are evaluated using a comprehensive assessment system as well as being required to complete electronic portfolios.
- The Bradley College of Education and Health Sciences is accredited by NCATE, the National Council of Teachers of Mathematics, and the National Science Teachers Association.

Partnerships Outside the Division of Education:

This program is a partnership among the liberal arts and sciences, engineering, and education departments. In addition, it partners with Peoria NEXT, which includes hospitals, Caterpillar Inc., Peoria Public Schools District 150, community colleges, and others.

External Funding:

National Science Foundation grants as well as grants from foundations and corporations

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Illinois

DePaul University

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: 45

Number of Graduates in 2007: 23

Description of Program:

This master of science in science education program is designed for teachers of science, Grades 6-12. It is aligned with Illinois Learning Standards and complements the scope and sequence recommended by the Office of Math and Science of the Chicago Public schools. The program introduces a cohort of mathematics and science teachers to a 3-year professional development program, consisting of 12 graduate courses, whose major goal is to increase their content expertise in concepts, principles, and processes associated with mathematical inquiry and problem-solving, scientific inquiry, and technological design.

Mentoring and Clinical Practice Dimensions:

- Special recruiting for the master's in science program is done in the professional development schools of DePaul's School of Education.
- All candidates are practicing teachers and have extensive K-12 experiences.

Program Innovations:

The program focuses on classroom applications of the content. Participants are being guided in conducting action research in their own classroom. This activity promotes a professional culture of inquiry while raising awareness of their own teaching practice, classroom environment, and their students' experiences of science teaching and learning.

Research Initiatives:

DePaul will soon undertake a research initiative to better understand the link between teachers' participation in a program such as the master's in science and their students' interest in science and mathematics and performance on tests.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- DePaul is currently collecting data on teacher retention. To date, only two teachers of the 48 who began in the program have left teaching (one was due to temporary maternity leave).
- DePaul has been administering classroom surveys on the teaching and learning environments and on K-12 students' conception of the nature of science in order to assess changes in these areas.
- Pre- and posttests are used to assess candidates' mastery of science and mathematics content knowledge over the period of the program.
- Recent data from the Survey of Enacted Curriculum suggests that teachers in the program are participating in a different and more intense kind of professional development than in the past.
- External evaluators are collecting and analyzing data on program effectiveness. DePaul is also collaborating with the Program Evaluation Department of the Chicago Public Schools.

Partnerships Outside the Division of Education:

The program is based on a partnership between DePaul's College of Liberal Arts and Sciences and its School of Education. It involves faculty from all the sciences, from science education, and from mathematics. The program is supported internally by the Interdisciplinary Science and Technology Center and the NASA-funded Space Science Center for Education and Outreach, both housed in the College of Liberal Arts and Sciences.

External Funding:

Math and Science Partnership Program (Title II B, NCLB), the Illinois Space Grant Consortium, and Commonwealth Edison

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Illinois

Northeastern Illinois University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 50

Number of Graduates in 2007: 1

Description of Program:

The Middle School Teacher Quality Enhancement (MSTQE) program prepares undergraduates who major in elementary education to be prepared to teach students in the middle-level grades (5–8). MSTQE candidates will have their certificates endorsed in mathematics and general science. The MSTQE includes a major in elementary education with a unique and newly developed integrated mathematics and science minor. Candidates are prepared to engage in problem-solving across science and mathematics in an integrated approach to teaching middle-level students. Because the program entitles them to an Illinois Type 03 certificate (elementary), they also spend time in schools with primary and intermediate grades as well as middle grades.

Mentoring and Clinical Practice Dimensions:

- Candidates, in their methods courses in integrated elementary/middle-level math and science, engage in peer teaching and microteaching as part of their preparation. All clinical experiences tied to these courses require their interaction with middle-level students.
- Methods professors serve as supervisors for clinical and student teaching experiences and provide mentoring for the candidates during their placements.

Program Innovations:

- MSTQE was developed collaboratively by faculty from the College of Education and the College of Arts and Sciences at NEIU and faculty from Truman College and Wright College. Middle school teachers also were included on the design team.
- All courses are linked into clusters of 3 per semester and are team taught. Because of the integrated minor in mathematics and science and the need to have experiences with primary, intermediate, and middle-level students in schools, candidates' programs are both intensive and extensive with regard to content and placements.

Research Initiatives:

The first initiative is focused on changes in outcomes related to how the methods courses that are taught improve and enhance candidates' content knowledge and content-specific pedagogy. This inquiry is based on the work of Deborah Lowenberg Ball and uses her assessments. The next focus is on the integration of technology and carryover by candidates into their teaching. The MSTQE integrates technology as candidates are being prepared. The intent is to ensure that candidates use technology in their own teaching of middle-level students in mathematics and science. The third line of inquiry is focused on cultural competence. The intent is to determine if the MSTQE can have an effect on keeping the pipeline of females and minorities in mathematics and science at or above current levels.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

As the program is still new and there has been only one graduate to date, there are no data related to retention or effectiveness. Three students have been chosen to attend the summer program sponsored by NASA.

Partnerships Outside the Division of Education:

The MSTQE program partners with Truman College and Wright College, both of which are part of the City Colleges of Chicago. Two Chicago Public Schools and one private school are partnering with NEIU by providing field placements for candidates for their pre-student teaching clinical and student teaching experiences.



External Funding:

Initial funding was provided through a Teacher Quality Enhancement Grant (Title II, HEA). Additional funds are provided yearly by the State of Illinois in appropriations to Northeastern Illinois University.

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Illinois

Northern Illinois University

STEM Field: Mathematics

Candidates Enrolled in STEM Program: 150

Number of Graduates in 2007: 34

Description of Program:

The program provides math education candidates various types of teacher certifications by having them meet a set of requirements that gives them a strong background in mathematics as well as a foundation in professional education including extensive and intensive clinical experiences. The requirements for the teacher certification program in mathematics are the same for all candidates. Candidates with extensive backgrounds in previous education have any course/experiences that meet the requirements for certification counted toward that requirement.

Mentoring and Clinical Practice Dimensions:

- Students spend at least 110 hours in a combination of experiences at the middle and high school levels.
- Student teaching is a 13-week experience.

Program Innovations:

- The last pre-student teaching clinical experience is completed at the same school where the candidate will conduct his or her student teaching. This allows the student teacher to be more effective in his or her student teaching.
- Public school students evaluate the student teacher's performance every 3 weeks.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Graduates have a retention rate of nearly 80% going back 5 years from program completion.
- The program has a 95% hire rate for graduates.
- NIU teacher graduates receive very favorable evaluations from principals and department chairs.
- The K-12 cooperating teachers evaluate the NIU program every semester by completing an NIU survey and a survey specific to the math program. The completing students also evaluate the program.
- Candidates are assessed by their GPA, evaluations from their supervising teachers and NIU faculty, teaching performance, and self-assessment.

Partnerships Outside the Division of Education:

The Grade 6-12 certification programs are based in College of Liberal Arts and Sciences, and each program is based in the department of discipline.

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Illinois

Northern Illinois University

STEM Field: Science

Candidates Enrolled in STEM Program: 41

Number of Graduates in 2007: 5

Description of Program:

This is a 2-year certification program that leads to licensure in the science fields. All courses are taught at night, and the program is so popular that it has reached its student capacity. The program requires extensive content courses and also requires pedagogical courses specific to teaching the sciences. Candidates must pass the Illinois Basic Skills Test, the Illinois Assessment of Professional Teaching and the Illinois State Content test. The content test must be passed prior to student teaching.

Mentoring and Clinical Practice Dimensions:

- All students are required to complete two clinicals and to do a year of student teaching.
- Student teaching must be at least 10 weeks.

Program Innovations:

The clinicals are the first courses the student takes. They begin as observation opportunities and transition to direct participation and interaction with the students.

Research Initiatives:

There are dozens of research initiatives under way.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program uses standardized exams, electronic portfolios, retention rates, promotion rates, awards and state surveys to measure graduates' effectiveness in the classroom.
- There is a 100% teacher retention rate for the past three years of the program.
- NCATE and other external evaluators review the program.

Partnerships Outside the Division of Education:

This program is based in the College of Liberal Arts and Sciences.

External Funding:

Grants from NASA and the National Science Foundation

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Indiana

Ball State University

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: 200 to 250

Number of Graduates in 2007: 40

Description of Program: A traditional 4-year undergraduate program provides the potential for initial licensure. A postbaccalaureate, graduate-level program also exists and provides another avenue toward licensure. Alternative certification programs are available for career changers. Licensure requirements can be completed as part of a content-area master's degree.

Mentoring and Clinical Practice Dimensions:

- The physics department has a funded outreach program to mentor and support beginning teachers after initial certification. A teacher-in-residence (TIR), who is an experienced physics teacher on loan from a high school or community college for a year, visits, assists, and conducts seminars with new physics and physical science teachers in area schools in their first 3 years of teaching. The TIR also advises on inquiry-based curriculum development in introductory physics courses taken by all science teaching majors, assists in science methods courses, and advises the campus student chapter of the National Science Teachers Association. The retention rate of new physics teachers who interact with the TIR has been excellent.
- Students begin K-12 experiences during their freshman year, or when they first identify with the education program, and continue through their student teaching experience.
- The actual number of hours may vary by program, but most students devote at least 200 hours to classroom observation/participation in addition to a 640-hour (16-week) student teaching experience.
- Traditional undergraduates have more clinical time; the alternative certification route has the least.
- Student teaching placements are available in professional development schools and other partnership schools.
- All Indiana teachers are assigned a mentor by the school district during their 1st year of teaching.

Program Innovations:

- The program has the flexibility to design individual licensure programs to meet the needs of nontraditional students.
- Licensure program for degreed career changers uses a cohort model for both course work and field experiences.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Surveys of 1st-year teachers
- Surveys of principals of 1st-year teachers
- Surveys of mentors of 1st-year teachers
- Employer surveys
- Student teaching performance assessment
- External evaluation of the funded program in physics

Partnerships Outside the Division of Education:

The content area education faculty members are located in their respective departments, and the collaboration among these departments and the College of Education is integral to the preparation of all candidates. The university has a large network of professional development schools and partnership schools, which support the preparation of preservice teachers.

External Funding: Only the physics program receives external funding.

Contact Information: Judy Miller, Office of Teacher Education Services, jamiller5@bsu.edu



Indiana

Indiana University–Northwest

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 10

Number of Graduates in 2007: 8

Description of Program:

The goal of this initiative is to attract, train, certify, support and retain highly qualified teachers of math and science who have a desire to work in high needs urban districts, through the Urban Teacher Education Program (UTEP). This objective will be achieved by establishing a recruitment program with local school districts, businesses, and the College of Arts and Sciences to attract qualified candidates who have degrees related to math, science, and engineering and who have taken early retirement or who wish to make career changes. In addition, scholarships or stipends will be offered to students who have been identified within the last two years of their program through the anticipated success of being awarded the NSF grant. Curriculum in the program includes specific educational content method courses that are geared toward teaching content in urban classrooms.

Mentoring and Clinical Practice Dimensions:

- A mentorship program will be developed for UTEP. Faculty from the College of Arts and Sciences, UTEP District Coordinators, urban teachers, and the school/university liaison coordinator will serve as mentors.
- UTEP candidates spend 18-25 hours observing and conducting lessons in the classroom, and then they spend a semester student teaching.

Program Innovations:

- UTEP has a governing Policy Board that consists of the district's superintendent, union presidents, College of Arts and Sciences faculty, school of education faculty, the director of UTEP, the school/university liaison and district coordinators
- UTEP has professional development schools with K-12 schools in three cities
- The program establishes cohorts for National Board certification
- The program coestablished and monitors one of the K-12 district's programs, the Gary Career Ladder Incentive program for employees who wish to become teachers

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program is developing a database to track the retention rates of the teachers it graduates
- Supervising and cooperating teachers evaluate the field experiences in the program and the students completing them.
- Field teachers and university faculty assess students through the use of field experience evaluations, disposition evaluations and portfolio scores. In addition, candidates are assessed on their knowledge of conceptual framework outcomes.

Partnerships Outside the Division of Education:

The program works with departments in the College of Arts and Sciences.

External Funding:

UTEP received a Title II grant (HEA) in 1999 and has submitted a proposal to NSF to recruit math and science teachers.

Contact Information:

Andree Anderson, Interim Director, (219) 980-6889, ananders@iun.edu

Indiana

Indiana University–Purdue University Indianapolis

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 25

Number of Graduates in 2007: 12

Description of Program:

The T2T is a field-based program with an integrated professional education curriculum. All of the course work (18 credit hours) required for this program is offered at the graduate level, and these credits can be applied to a master's degree in education. The field experience sites for this program are primarily chosen from Indianapolis Public Schools and the surrounding township schools, providing an urban experience for the T2T candidates. The program's main target is career changers.

Mentoring and Clinical Practice Dimensions:

- The T2T program includes intensive field experience during the academic year.
- To assist interns in making the transition from student to teacher, a coteaching model has been implemented, placing two interns with one mentor each semester. This arrangement provides an opportunity for the interns to work with an expert teacher and to benefit from working together in a team. They can plan lessons and work on classroom management jointly. In addition, they are given the opportunity to begin the semester in a team-teaching role. Toward the end of the semester, they also assume individual responsibility for specific classes.
- Students spend 2 full semesters in middle and high school classrooms.

Program Innovations:

- Candidates are required to write in a journal weekly about course work, classroom experiences, and school-related issues. The journals enable the university instructors and mentors to gain insight into candidates' needs and views related to instruction and pedagogy and allow candidates to have an arena to ask for and receive help with issues ranging from classroom management to differentiation.
- During Unit 4, candidates engage in a final reflection of their program experiences, discuss issues related to teaching in the secondary school, and complete a professional portfolio, which is modeled after the one required for regular certification by the Indiana Professional Standards Board.
- A second area of focus is preparation for teaching diverse students, particularly those in urban settings. The program currently collaborates with Indianapolis Public Schools to provide technical assistance in its reform of traditional high schools to small schools. Participants in the program are assigned to mentors in the small schools.

Research Initiatives:

A teacher-effectiveness study is currently being conducted on the Robert Noyce Scholars.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Data are available on the first two cohorts (2002 and 2003) of 21 graduates, who continue teaching math and science. Nine are teaching at urban schools, and the cohorts' retention rate is 100%.
- A longitudinal study is currently being conducted on the 2006 and 2007 cohorts. These studies will be conducted by an outside evaluator as part of the Robert Noyce Scholarship Program evaluation.
- Performance is measured by a self-efficacy instrument, teaching portfolios, and classroom observations.

Partnerships Outside the Division of Education:

This program has a formal partnership with the Urban Center for the Advancement of Science/Math Education. This is a cooperative effort among the Schools of Education, Science, and Engineering.

External Funding:

Qualified candidates receive financial support from a Robert Noyce grant (National Science Foundation).

Contact Information: Susan Blackwell, Coordinator of the T2T Program, (317) 278-1110, sblackw@iupui.edu



Indiana

Purdue University

STEM Fields: Technology and Engineering

Candidates Enrolled in STEM Program: 80

Number of Graduates in 2007: 20

Description of Program:

The nearly-100-year-old Engineering/Technology Teacher Education Program prepares educators to teach in middle school and high school technology education classrooms. The curriculum develops professional educators with strong pedagogical and technical skills needed for success in today's high-performance workplace. The program places 100% of its graduates into the workforce.

Technology education teachers instruct both middle-level and secondary courses in the areas of design technology, drafting (CAD), construction technology, electricity/electronics, manufacturing technology, power and energy, and transportation technology.

The Engineering/Technology Teacher Education undergraduate curriculum is based on the scholar-practitioner model, NCATE accreditation standards, standards for technological literacy, Advancing Excellence in Technological Literacy, and Indiana Professional Standards Board standards. This solid foundation emphasizes the blending of practical experiences, technical expertise, and academic rigor. Students complete course work in general education, professional education, and technology education. The undergraduate preparation is capstoned by a supervised student teaching experience. Through a unique agreement between Project Lead the Way (PLTW) and the College of Technology, technology teacher education graduates were the first in the nation to receive PLTW pre-engineering teaching certificates with their Purdue University diploma in technology education. The Technology Teacher Education Program was recognized by the Association for Career and Technical Education—Engineering and Technology Education Division as the nation's outstanding program in 2004 and 2006.

Mentoring and Clinical Practice Dimensions:

- Tenure-line faculty teach all courses starting the first semester freshman year.
- Starting freshman year, students are involved in 20 hours of practicum.
- Students spend 16 weeks student teaching.

Program Innovations:

- Electronic portfolios are used.
- Courses are taught in both the College of Technology's state-of-the-art laboratories and the new DEPCO, LLC Engineering/Technology Education Laboratory that is designed to emulate a contemporary middle-level environment.
- All faculty are PLTW-affiliated professors.
- The program also integrates the pre-engineering requirements of PTLW throughout the curriculum.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Student teachers collect pre- and posttest data from their students.
- Students' portfolios are assessed.
- Third-party evaluations are done by ACTE/eTED and NCATE/CTTE/ITEA.

Partnerships Outside the Division of Education:

The program is housed in the College of Technology and has a partnership with PLTW.

Contact Information:

George E. Rogers, Associate Professor and Coordinator, Engineering/Technology Teacher Education, rogersg@purdue.edu



Indiana

University of Indianapolis

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: It is anticipated that all of the secondary education majors (60 per year) will be exposed to the New Tech High Schools.

Description of Program:

Through the New Tech Initiative, the university is leading the development, implementation, and networking of new high schools that are project based and STEM predictive. The New Tech High Schools utilize technology in ways rarely found in high schools. Three of these new schools will open in fall 2008, and another 4 to 5 are projected to open in fall 2009. It is significant that these schools represent a range of communities—urban (Indianapolis Public Schools), rural (Rochester, IN), and suburban (MSD Decatur Township).

Mentoring and Clinical Practice Dimensions:

- Course work for licensure requires field experiences and observations in secondary-level classrooms.
- It is anticipated that teachers in these schools will be involved in programmatic planning based on lessons learned and implications for teacher preparation in the 21st-century STEM environment.

Program Innovations:

- Partners with New Tech High, headquartered in Napa, CA
- Professional development course work is created through partnerships with other Indiana universities

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- A research component is under development.
- Faculty will be involved in the development of evaluation strategies both of the schools and of the effect of these schools on teacher preparation practices.

Partnerships Outside the Division of Education:

Collaboration with multiple departments across the university, in addition to cooperative efforts with Indiana University and Purdue University

External Funding:

Funding for the New Tech Initiative is provided through collaboration with outside partners including New Tech Foundation, Techpoint Foundation, the Lilly Endowment, and the office of Governor Mitch Daniels through the National Governors Association.

Contact Information:

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Indiana

University of Notre Dame

STEM Fields: Science, Engineering, and Mathematics

Candidates Enrolled in STEM Program: 40

Number of Graduates in 2007: 21

Description of Program:

The university has an accredited, 2-year, graduate-level, teaching-service program leading to initial licensure in science and mathematics and an M.Ed. degree. While most candidates come directly from completing their undergraduate degrees, some participants are career changers. Since its establishment in 1998, the program has integrated STEM content into its curriculum through a 2-semester sequence of classes focusing on methods of instruction in mathematics and science education.

Mentoring and Clinical Practice Dimensions:

- Completion of 12-14 semester hours in field experiences during the summer prior to entering the program
- Candidates live in communities of 4-6 in one of 33 cities across the United States
- Each candidate has a mentor teacher, community supervisor, and university supervisor
- Prior to completion, candidates will spend 2 full years in the field

Program Innovations:

- Created the University Consortium for Catholic Education (UCCE), an alliance of 14 Catholic universities in teacher education training
- Currently the UCCE places more than 500 teachers per year

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Survey and assessment information is collected from candidates' 2nd year of teaching, including evidence of mastery of state teacher content standards and evaluation by building principals using the INTASC standards.
- Program has met national NCATE accreditation standards in addition to a second, outside evaluation.
- Of the 121 STEM graduates who have completed the M.Ed. and received teaching licenses since the program began in 1996, 84 have remained in K-12 schools as teachers or administrators. Thirteen of the graduates have gone on to Ph.D. programs in biology, chemistry, engineering, physics, biochemistry, science education, and math education. One has completed dentistry school, and 10 have entered or finished medical school. These professionals will have greater ownership for education in their respective fields after having taught in K-12 schools during their 2 years in the program.

External Funding:

The Alliance for Catholic Education (ACE) program at the university has its own endowment, in addition to grant funding from GE. Selected by the governor of Indiana for the Indiana submission of the NMSI grant program through ExxonMobil Corporation.

Contact Information:

Joyce Johnstone, Ryan Director of ACE Educational Outreach, johnstone.3@nd.edu



Louisiana

Louisiana State University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 148 undergraduates; 3 graduate students

Number of Graduates in 2007: 20 undergraduates; 3 graduate students

Description of Program:

The baccalaureate program, which began in 2003, represents an unprecedented collaboration among faculty in the Colleges of Arts and Sciences, Basic Sciences, and Education and the area school systems to design content majors with a concentration in secondary education. The content courses are paired with pedagogy courses with carefully selected field experiences taking place in the area schools.

The masters-level initial-certification program, which began in 1996, is a 5th-year alternate certification program for students who have already earned undergraduate degrees in mathematics, biological sciences, chemistry, or physics.

Mentoring and Clinical Practice Dimensions:

- University instructors and classroom mentor teachers support candidates during their pre-student teaching experiences as well as during student teaching.
- Program coordinators from the college are also in the field to provide support and guidance to teacher candidates.
- Beginning in the junior year, candidates are involved in pre-student teaching field experiences (120-160 hours). Candidates participate in guided observations as well as teaching small and large groups.
- The student teaching semester consists of more than 270 hours of classroom time with at least 180 hours spent in actual teaching. A substantial portion of the 180 hours must be full-day teaching.

Program Innovations:

The baccalaureate program provides an induction specialist to support new mathematics and science teachers during their first 3 years of teaching.

Research Initiatives:

Since its inception, the baccalaureate program has made concentrated effort to disseminate the initial results of this project. Nine presentations at regional conferences have been conducted thus far. In addition, two papers have been submitted for publication in peer-reviewed journals. Research is currently being conducted by The Cain Center regarding the relationship between best instructional practices and student achievement.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Third-party evaluations of the program are carried out by NCATE, SACS, the State of Louisiana, grant evaluators, and U-Teach.
- Candidates are assessed through portfolios, teacher work samples, observations by university and classroom faculty, videos of student teaching, and PRAXIS exams.
- Graduates are surveyed by the College of Education each year after graduation for 5 years to determine their status in the profession, location, reasons for moving out of state or leaving the profession, and other information.
- New teachers are surveyed by the Louisiana Teacher Assistance and Assessment program and the Louisiana Department of Education to determine effectiveness of the teachers and of the programs that prepared them.

Partnerships Outside the Division of Education:

College of Arts and Sciences, College of Basic Sciences, Southern University, Southeastern Louisiana University, and East Baton Rouge Schools



Maine

University of Maine

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 30

Number of Graduates in 2007: 8

Description of Program:

The University of Maine's Master of Science in Teaching Program is a content-rich, research-based master's program with a track leading to initial certification. The program is designed for career changers; recent graduates with degrees in the sciences, mathematics, engineering, secondary science, or mathematics education, or closely related fields; and practicing teachers. Students may complete the program on a full-time basis, supported by an assistantship, or on a part-time basis. The program has been in existence for 3 years, with an in-depth look at introductory STEM content at the core of its curriculum. Courses integrate, topic by topic, the pedagogical and curricular aspects of the STEM content areas. Candidates learn the types of errors that their students are likely to make and how to help students realize and correct their own errors.

Mentoring and Clinical Practice Dimensions:

- Retain involvement with graduates who are placed in Maine and teaching at the secondary level
- Students complete mentored curriculum implementation projects with experienced secondary teachers
- Graduates return to the university during the summer to participate in research and curriculum development opportunities
- Offers a semester-long sabbatical for teachers in collaboration with the Jackson Laboratory
- Teacher candidates complete a 15-week teaching internship in their field

Program Innovations:

- Requires a research thesis related to student learning of science and/or mathematics
- Semester-long research opportunities are offered as part of the program experience
- Candidates are required to teach introductory university courses as a part of the teaching community
- Courses integrate content, research about student learning of that content, and pedagogical strategies for that content area

Research Initiatives:

Students complete thesis research, which often includes an in-depth study of student learning in a secondary or postsecondary classroom. Information about research initiatives can be found at <http://www.umaine.edu/center>.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program has been evaluated through the NCATE accreditation process
- Web-based system collects recommendations and input from faculty and mentor teachers about the teacher candidates
- Classroom teaching is evaluated using university-approved means

Partnerships Outside the Division of Education:

Center for Science and Mathematics Education Research with assistance from the Colleges of Liberal Arts and Sciences, Natural Sciences and Agriculture, and Education

External Funding:

U.S. Department of Education, with some students receiving external grants and fellowships for their internships and professional development classes

Contact Information: Susan R. McKay, Professor of Physics and Director of Center for Science and Mathematics Education Research, (207) 581-1019, susan_mckay@umit.maine.edu



Maryland

University of Maryland–Eastern Shore

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: 15

Number of Graduates in 2007: 4

Description of Program:

Four of the initial teacher preparation programs are in biology, chemistry, mathematics, and technology education. These initial programs are offered at the baccalaureate level and master's level. UM-ES also offers the only agricultural education program and technology education program in Maryland.

Mentoring and Clinical Practice Dimensions:

- Candidates spend a total of 135 hours in either a field or clinical experience. In addition, they have a pre-internship (60 hours) in a K-12 setting the semester prior to their internship.
- The internship is a full-time 15 week experience in 2 different settings.

Program Innovations:

Teacher candidates in all majors are involved in a 100-day consecutive day internship experience at one of our 24 professional development schools.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- UM-ES is part of a statewide retention study conducted by the University System of Maryland with the Jacob France Institute. The current study under way is examining the retention rates of Maryland's teacher candidates since 2000.
- NCATE, the Maryland State Department of Education, and Middle States Commission on Education all conduct evaluations of the program.
- Candidates are assessed using statewide assessments of basic skills, content, and pedagogy; portfolios; field experience evaluations; and other methods.

Partnerships Outside the Division of Education:

Because there is no College of Education, all STEM majors are housed either in the School of Agriculture and Natural Sciences or in the School of Business and Technology.

External Funding:

An NSF grant provides scholarships to majors in mathematics, mathematics education, and computer sciences.

Contact Information:

Karen Verbeke, Chair, Department of Education, (410) 651-6220, kaverbeke@umes.edu



Massachusetts

Bridgewater State College

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 21

Number of Graduates in 2007: 21

Description of Program:

The accelerated postbaccalaureate program at Bridgewater State College has endorsed 161 individuals as math and science teachers for initial licensure since December 2002. This is a fast-track, 2-semester graduate program aimed at middle and high school education. Bridgewater is an NCATE-accredited institution, and eligible candidates for the program must pass the Massachusetts Tests for Education Licensure in communication, literacy, and math content. Elements of the program include theory-into-practice seminars, curriculum and instruction development in mathematics and science, and the completion of a full-semester practicum in the teacher candidate's field. The main course, Curriculum and Instruction in Math and Science, challenges candidates to develop units of instruction and practice presenting instruction to fellow teacher candidates. The Reflective Practitioner course includes differentiated learning strategies, some of which integrate curriculum planning into their models.

Mentoring and Clinical Practice Dimensions:

- The college provides all teacher candidates with a direct supervisor for instruction.
- Participating master teachers and their school districts are required to provide an induction program for new teachers.
- Candidates complete a full-time, semester-long practicum at the grade level and in the area in which the teaching license is sought.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- A survey of candidates who have completed the program indicated 68% intend to be employed at their respective schools the following year.
- Three quarters of students participating in the program express the intention to be in their teaching field longer than 5 years.
- Students must demonstrate competency according to the Professional Teaching Standards in Massachusetts prior to recommendation for licensure.
- Unit is nationally accredited by NCATE.

Partnerships Outside the Division of Education:

CONNECT Partnership (consortium of 6 higher education institutions in Massachusetts). CONNECT serves as the principal investigator for the regional STEM Pipeline Fund grant.

External Funding:

Program originated with grant funding from the Massachusetts Department of Education; however, no state funding for this project currently exists.

Contact Information:

Lynne R. Yeamans, APB Coordinator, lyeamans@bridgew.edu



Michigan

Wayne State University

STEM Field: Mathematics

Candidates Enrolled in STEM Program: 50

Number of Graduates in 2007: 25

Description of Program:

Through the College of Education, the university offers initial preparation in secondary mathematics in two formats: a traditional undergraduate program and a master's program that provides teacher certification for students who already have an undergraduate major in mathematics. Students in the program complete two required methods courses, one focused on high school instruction and the other on middle school instruction. In addition, students must also complete two field experiences: a half-day program observing instruction in their chosen field that convenes four times a week and a full-time student teaching placement. Students participating in the program must also pass state licensing examinations in mathematics prior to the beginning of their student teaching experience. This program has been in existence for over 15 years at the university as a partnership with the Department of Mathematics, which tailors courses specifically designed to fit the needs of teacher preparation students.

Mentoring and Clinical Practice Dimensions:

- Initial field experiences are completed in cohort groups with placement of entire cohort group at the same site.
- Corequisite seminars are held on site for each cohort and are usually taught by the university supervisor for that cohort.
- Students spend 2 semesters in classrooms in their chosen fields. They pass the state licensure examination (Michigan Test of Teacher Competency) in their major field prior to student teaching (the second field experience).
- The initial pre-student-teaching field experience is one half day, 4 days per week, for a 14-week semester. Students typically observe and work with small groups of students. In some cases, they may teach one or more lessons for the whole class, but this is not a requirement of the initial field experience.
- The second-semester field experience is a traditional student-teaching experience: a full day, 5 days per week, for a 14-week semester.

Program Innovations:

- Candidates are required to complete field experience portfolios.
- In completing the portfolio, teacher candidates work with state and national standards and document the ways in which they have met professional competency standards in their field experiences.
- Students present their portfolios for review by a team consisting of one College of Education faculty member and one school-based professional (e.g., principal, subject area supervisor/director).

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The College of Education maintains assessment data on all candidates graduating from the program.
- Portfolios developed by the teacher candidates are utilized in evaluating teaching capabilities and granting state licensure.
- Assessment criteria align with state and national standards.
- At the completion of the program, teacher candidates complete an exit survey rating how well they believe their teacher preparation program has prepared them to enter the field.



Partnerships Outside the Division of Education:

Wayne State University Department of Mathematics; several partnerships with the Detroit Public Schools over the past 10 years

Contact Information:

Thomas G. Edwards, Associate Professor and Program Coordinator, (313) 577-0980,
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Minnesota

University of Minnesota

STEM Fields: Science and Mathematics

Number of Graduates in 2007:

Grades 5-8 science: 29

Grades 5-8 mathematics: 24

Grades 5-12 science (all fields initial license): 45 (22% of all MN prepared science teachers)

Grades 5-12 mathematics (initial licenses): 30 (20% of all MN prepared mathematics teachers)

Description of Programs:

These licensure programs exceed the State of Minnesota standards in content and content pedagogy. The University of Minnesota prepares a high percentage of all math and science teachers in Minnesota. The programs entail a 13-month licensure sequence that includes content pedagogy, educational foundations, and extensive clinical experiences. The M.Ed. licensure program is generally comprised of 70% of students coming directly from undergraduate degrees in their content area; the other 30% are career changers with appropriate content background.

Mentoring and Clinical Practice Dimensions:

- The postlicensure program includes a new-teacher mentorship class for 1st- and 2nd-year teachers.
- Candidates spend 6 months total in the middle school and high school setting during the M.Ed. licensure program.
- In addition, candidates must spend 100 hours in a school assisting teachers in order to apply to the program.
- Student teaching in the spring includes full-time teaching of the cooperating teacher's classes for 12 weeks. Fall teaching includes 3 months in the classroom assisting teachers and teaching a minimum of 2 units of instruction. Students enter the program in the summer and begin teaching immediately in the fall.

Program Innovations:

- The program includes middle school and high school student teaching experiences. Students have access to most state-of-the-art technology for implementation into classrooms.
- The mathematics program partners with a local high school where preservice courses are held.

Research Initiatives:

A current research study is under way investigating the preparation of new math and science teachers from three institutions.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention

- Approximately 80% of the graduates are still teaching after 3 years and come back to finish their M.Ed. degrees.
- Candidates are assessed using portfolios, supervisor and cooperating teacher evaluations, and analysis of lesson plans and video teaching sessions.

Partnerships Outside the Division of Education:

The College of Education and Human Development offers programs at the master's level in science and mathematics. Students come with undergraduate and graduate degrees completed in the content area.

External Funding:

Scholarships are available for licensure students.

Contact Information:

Leslie Flynn, Computer Science Coordinator, (612) 625-3267, leslie@umn.edu

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Mary Bents, Associate Dean, (612) 625-3481, mbents@umn.edu



Minnesota

University of St. Thomas

STEM Field: Science

Candidates Enrolled in STEM Program: 200

Number of Graduates in 2007: 100 (27 undergraduate; 73 graduate)

Description of Program:

In 1991, the University of St. Thomas conceived an innovative program through which elementary educators comajored in science and math education. SMEE (Science Math Elementary Education) is a collaborative effort between the School of Education and the Division of Sciences and Mathematics. Through SMEE, teacher candidates focus on development of specialized knowledge in science and math and are prepared to specialize in science and mathematics in the elementary and/or 5-8 (specialty) classrooms. The undergraduate and graduate preservice teacher program focuses on sound science instruction for all learners, the application of science content, and framing pedagogy that encourages inquiry-based thinking and multidisciplinary approaches and takes into account special learning needs and academic readiness. The program offers teacher candidates a curriculum that is designed around the Minnesota Academic Standards in science, which also encourage networking with professional organizations and science encouragement programs. The teacher licensure program at the graduate level has attracted a growing number of career changers, with increasing enrollment coming from business, finance, and real-estate-related backgrounds. SMEE is offered through the university, which requires additional course work and mentoring in the STEM subject areas and focuses on the application of those into the elementary education field.

Mentoring and Clinical Practice Dimensions:

- Block III of the elementary undergraduate program facilitates supervision and mentorship of undergraduate candidates during their senior year, just prior to student teaching.
- On campus, candidates are enrolled in 2 full days of classes each week that focus on math, science, literacy, and social studies. Candidates develop science lessons and a science center based upon Minnesota Academic Standards and a self-selected topic.
- Students and professors work collaboratively with partnership schools in diverse settings to ensure that teacher candidates teach science and receive feedback from a variety of assessments, including videotaping, reflection papers, discussion between clinical partners, and briefings with master teachers and university supervisors.
- Teacher candidates are in the classroom from the start of the first course and eventually develop and/or select curriculum, teach, work with small and large groups, and assist with classroom transitions and decisions.

Program Innovations:

- Program partnerships with metro schools in diverse settings
- Connections with Young Scholars and other grant-based opportunities

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Evidence gathered from graduates, school administrators, and teachers indicate that candidates are competent in subject, pedagogy, and classroom management.
- Program is evaluated by NCATE and other university protocols.

Partnerships Outside the Division of Education:

STEPS (Science, Technology, and Engineering Program) targets middle and high school girls from diverse backgrounds through the School of Engineering; collaboration and developing partnership with Farnsworth Aerospace Elementary (St. Paul's magnet school) serving 75% students of color; adviser to Cedar Park Elementary Engineering Magnet School, Apple Valley

Contact Information: Jan B. Hansen, Assistant Professor, jbhansen1@stthomas.edu



Nebraska

Creighton University

STEM Field: Science

Candidates Enrolled in STEM Program: 60 elementary education and 16 secondary science

Number of Graduates in 2007: 30 elementary education and 6 secondary science

Description of Program:

Creighton's program has been in existence for 11 years and prepares elementary teachers, whose fields include science, as well as secondary science teachers. Both groups include students who may have originally had a different undergraduate degree or career field. Creighton also offers special training for science teachers who want to work in Catholic schools. In addition to weaving content into pedagogical approaches in methods classes, elementary teachers take a minimum of 7 hours in science content, 6 hours in math content, and a specific course in using technology as a teaching and learning tool. Specific science and math courses have been redesigned to meet the content needs of elementary teachers in collaboration with the methods instructor, chairs of science and math departments, and content course instructors. Secondary candidates have bachelor's degrees in science or math, with specific (sometimes additional) content to meet state rules for certification.

Mentoring and Clinical Practice Dimensions:

- Individual faculty and specific course work are available to new teachers as mentors, resources, and instructors.
- Students are required by state rules to spend a minimum of 100 hours in school settings prior to student teaching.
- In the first introductory class, beginning teacher candidates take class field trips to numerous schools to experience a variety of school climates—elementary, middle, secondary, urban, low-SES, parochial, suburban.
- In the second set of classes, students spend a minimum of 40 hours observing and assisting in an elementary or secondary setting.
- Elementary candidates progress through their methods classes in numerous school settings offering individual instruction, tutoring, working in small groups, and eventually planning, preparing, presenting, and assessing 2-week units of instruction in hands-on/minds-on science.
- Science teaching experiences include feedback from the cooperating teacher and a formal observation by the instructor, videotaping and critique, journal and reflection, assessment strategies, and reports on student learning.

Program Innovations:

- Teacher candidates have extensive field experiences in a wide range of schools and grade levels.
- Elementary candidates practice teaching skills in a kindergarten, a primary, and an intermediate classroom.
- Secondary students have field experiences in several middle schools. Some field experiences include formal observation and feedback from the faculty instructor.

Research Initiatives:

Studies have been conducted related to teacher confidence, modifying science instruction for students with special needs and those who are English-language learners, and overcoming the challenges of teaching elementary hands-on science; summer programs have been conducted in conjunction with the School of Medicine and other health science divisions.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Input from advisory boards, school districts, and administrators of graduates inform the program's development.



- The 12 program outcomes are measured by course grades, student products, entrance and exit exams, portfolios, self-reflection, feedback from schools, and student learning.
- Survey feedback forms are sent to graduates and their administrators.
- The unit is nationally accredited by NCATE.

Partnerships Outside the Division of Education:

The Department of Education at Creighton University has had extensive STEM partnerships with the many health science divisions.

Contact Information:

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New Jersey

William Paterson University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 48 teachers over the life of the grant (3 years)

Description of Program: Two STEM teacher preparation programs at William Paterson University include

- **The New Jersey Consortium for Urban Education (NJCUE)**—Funded by the U.S. Department of Education, this program offers an alternate path to teaching certification in New Jersey for recent college graduates and career-change professionals who are interested in teaching in urban schools. A collaborative project of the New Jersey Department of Education, New Jersey City University, Kean University, Montclair State University, William Paterson University, and the school districts of Jersey City, Newark, and Paterson, NJCUE recruits, prepares, and supports teachers in mathematics, the sciences, and special education to work in Jersey City, Newark, and Paterson. The grant provides a tuition-free opportunity for participants to receive appropriate New Jersey teacher licensure.
- **The REFORMS project** is a partnership among the WPUNJ College of Science and Health, the College of Education, and the Paterson Public Schools, designed to strengthen the math and science content knowledge and pedagogical tools of participating teachers. The goal of the project is to improve the success of students in participating teachers' classes through a scientifically based intervention that addresses professional development, support for teachers, and recruitment of elementary math and science teachers.

Mentoring and Clinical Practice Dimensions:

- REFORMS project components for teachers include summer workshops and ongoing professional development and coaching throughout the year. The annual summer workshop emphasizes earth science and math content in the 1st year and chemistry, physics, and math content in the 2nd year; in the 3rd year, teachers implement what they have learned in a “classroom laboratory” with summer students.
- Two all-day professional development sessions are held during the school year focusing on pedagogical approaches to teaching math and science including inquiry-based learning, using culturally relevant approaches to teaching, and integration of technology.
- A professor-in-residence is assigned to each school and works with the coaching team of WPUNJ faculty members from science, math, and education to support teachers who are incorporating the new content and pedagogy.
- Teachers also enroll in a graduate course in math or science each semester to achieve subject matter endorsement or a master's degree in teaching science or math.

Program Innovations:

- The NJCUE partnership between the local school districts and the universities is a strong model. Each partner shares in the cost of preparing teachers in these high-need areas with significant support throughout their preparation.
- The REFORMS grant also includes sustained support from the university through ongoing professional development and the in-school professor-in-residence 1 day per week.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention

- The REFORMS grant is new, beginning in summer 2007; the evaluation is being handled by an independent company, Caliber.
- The assessment of NJCUE is being handled through Montclair State University, the lead institution in this initiative.



Partnerships Outside the Division of Education:

Paterson Public School District and Paterson Professional Development Schools

External Funding: U.S. Department of Education

Contact Information: Dorothy Feola, Associate Dean, feolad@wpunj.edu



New Mexico

University of New Mexico

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: (2006) 8; (2007) 15

Number of Graduates in 2007: 8 on track to complete program in July 2007

Description of Program:

The UNM Secondary Teacher Education in Math and Science (STEMS) Program is an intensive secondary teacher education licensure program that enables postbaccalaureate students with math and science degrees to earn a New Mexico secondary (Grades 7-12) teaching license. STEMS interns commit themselves to a 14-month course of study at UNM concurrent with a year of field experience in a local middle school or high school. Interns are assigned in paired teacher teams to full-time teaching positions with Albuquerque Public Schools (APS). Interns include both recent college graduates and individuals making career changes. They receive a stipend and tuition waivers and earn graduate course credit toward a master of arts degree in secondary education. Throughout the 14-month program, interns receive collegial and professional support from university faculty and APS teachers who serve as clinical supervisors. Additional support is provided by the intern cohort group.

STEMS is a collaborative partnership between UNM and APS. It is a program that deals directly with the seriously short supply of highly qualified secondary mathematics and science teachers. Currently, all funding for the STEMS Program is generated by a salary-replacement model in the memorandum of understanding between UNM and APS.

Mentoring and Clinical Practice Dimensions:

- Intern pairs fill full-time APS secondary classroom teaching positions. Interns receive regular mentoring support from the program manager.
- In addition, they receive support from other professors from whom they take classes in the College of Education, from other teachers in their schools, and from each other.

Program Innovations:

- The STEMS Program includes several features highlighted in Linda Darling-Hammond's book *Powerful Teacher Education* (2006). It is a cohort program that at every step links theory and practice. STEMS interns are visited regularly by UNM staff. They have regular opportunities to discuss their teaching situations at a weekly seminar conducted by the program manager. Reflection is an essential element of the STEMS program, in group sessions and in written journals.
- Special in-service workshops are provided for interns focusing on math and science in classroom contexts.

Research Initiatives:

A full-time UNM employee conducts program evaluation for all APS/UNM collaborative partnership programs. Results are reported to APS and the College of Education. Information is being generated on how well interns are performing in hard-to-staff schools, particularly working in low-performing schools with high-risk students. The state of New Mexico Legislators funded two bills on high school design, HB 584 and SB 561, which among their provisions add an additional year of required mathematics at the Algebra II level, effective for students entering ninth grade during school year 2009-2010. Other changes in the high school graduation requirements were also endorsed this year. The College of Education in collaboration with APS will evaluate various parts of the legislative mandates and the state accountability system mandated at the district level. The STEMS interns will be working in the settings where many of the changes will begin to occur; therefore, a study will be conducted that observes the changes in curriculum, classroom environment, student learning, teaching, and teacher morale. An observation and evaluation model will be designed for the partnership to implement.



Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

UNM is initiating a program evaluation that will track graduates and collect data using in-service teacher feedback on the effectiveness of the STEMS program in preparation and long-term retention. The survey instrument that will be used is the teacher survey in Darling-Hammond (2006).

Partnerships Outside the Division of Education:

STEMS is a teacher licensure program that is part of the APS/UNM Collaborative Partnership program. This is a 30+ year contractual agreement between the school district and the College of Education to support innovative programs in teacher education.

External Funding:

Partnership between the University of New Mexico College of Education and the Albuquerque Public Schools—\$2 million

Contact Information:

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New York

Binghamton University, State University of New York

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 20 total: 10 math and 10 science (plan to increase science to 17)

Number of Graduates in 2007: 20

Description of Program:

The master of arts in teaching (M.A.T.) program has been in existence for 35 years and has had full-time faculty during the last 20 years. It is a 40-credit, 3-semester program that attracts recent undergraduates with a 3.0 GPA or better and an interest in science and technology. In addition to supervised student teaching by a tenure-track professor, course work includes two 4-credit science or mathematics courses in pedagogical content knowledge taught by former classroom teachers; two 2-credit courses in Spanish education and English as a second language; and a 4-credit course in literacy and adolescent learning and foundations. M.A.T. students take 12 credits of graduate-discipline course work and are encouraged to take courses in which instructors are known to model effective curriculum–instruction–assessment practices. A combined B.A./M.A.T. (“3–2”) option has been authorized for especially strong applicants from the undergraduate science and mathematics departments.

Mentoring and Clinical Practice Dimensions:

- Microteaching with feedback from instructors and peers.
- Instructor-analyzed, live and videotaped student teaching observations are intimately connected to the “lessons learned” from the two pedagogical content knowledge courses. Students are also required to critically analyze their own videotapes.
- Selection of highly qualified cooperating teachers, including many who are graduates of the preservice M.A.T. or in-service M.S.Ed. program or of grant-funded summer institutes.
- Course assignments in the second pedagogical content knowledge course require implementation and analysis in the student teaching practicum.
- A minimum of 100 hours of student teaching is required in the student’s first two semesters in addition to 15 weeks of full-time student teaching.

Program Innovations:

Use of dual-purpose science discrepant-event demonstrations and hands-on-explorations in

- Model inquiry-based teaching
- Visual analogies for principles associated with cognitive learning theory and/or the nature of science, teaching, and learning

Research Initiatives:

The 5E Teaching Cycle approach (developed by the Biological Sciences Curriculum Study) and constructivist teaching practices (such as CMapping) were the cornerstones of a \$1.2 million National Science Foundation grant. The biology department procured additional NSF funding for using these approaches in undergraduate courses in ecology. A \$1.5 million Howard Hughes Medical Institute grant funded a series of summer institutes on “Evolution and the Nature of Science” several years before the National Research Council publication of the same name. A faculty mathematics educator has translated her work into combined research/training grants and serves as the editor for *Focus on Mathematics Journal*.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Several graduates have received recognition from national fellowships or as state science teachers.
- Several of the program’s past graduates serve as cooperating teachers, and new students spend time in their classrooms every fall.



- Detailed observation notes and a 20-item checklist correlate with the major research-based principles of effective teaching as modeled by the two pedagogical content knowledge courses.
- Students are observed and debriefed analyzing their own performance and reviewing the instructor’s analysis.
- The program has national accreditation from TEAC.

Partnerships Outside the Division of Education:

The M.A.T. program works in close collaboration with the STEM department; all M.A.T. applicants are reviewed by the graduate committee in science and mathematics as well as by the School of Education. The recent addition of combined-degree B.A./M.A.T. (“3–2”) programs will make collaboration earlier in the process more evident. Typically, as many as 10% of the candidates earn joint M.S./M.A.T. or Ph.D./M.A.T. degrees.

External Funding:

Over the last 20 years, more than \$4.5 million in science education grants and more than \$1 million in math and technology grants have been obtained to work primarily with in-service teachers. In addition, more than \$400,000 has been procured to fund preservice teachers.

Contact Information:

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New York

Lehman College

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: 10 in the Teacher Academy; 200 in alternate route programs

Number of Graduates in 2007: Approximately 50

Description of Program:

There are two programs. One is an alternate-route program for career changers in math, science, and technology that has been in existence for 7 years. The other, the Teacher Academy, is a new undergraduate program that recruits talented incoming freshmen and transfer students in the math and science departments for an innovative teacher preparation program where students work in “host schools” from their initial acceptance in the program through student teaching and graduation. Students learn to infuse technology and quantitative reasoning as part of their course work. Additionally, several of the classes they take may be offered asynchronously. SMART Board systems, including Blackboard, are in use in the courses taken by the participants of the program.

Mentoring and Clinical Practice Dimensions:

- The alternate-route and Teacher Academy programs use the University of Santa Cruz Professional Teaching Standards as a mentoring tool.
- In the Teacher Academy program, students spend 10 hours a week in classrooms for the first 3 years of the program and then spend the equivalent of a semester student teaching.
- In the alternate-route programs, students complete 100 hours of field work and 300 hours of supervised internship as teachers of record.

Program Innovations:

Classes are cotaught with school personnel and often located in host schools.

Research Initiatives:

The Teacher Academy already has a Fund for the Improvement of Postsecondary Education (FIPSE) component that will require data collection on curriculum development projects. Additionally, data gathering about all aspects of preparation of teachers for math and science careers is being evaluated systematically and will also provide fodder for articles and follow-up research activities. The alternate-route programs with the NYC Department of Education are already being documented via a formal “Pathways to Teaching” study conducted by James Wyckoff, assessing various routes to teaching in relation to teacher effectiveness and retention.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Focus groups are conducted with principals and district personnel about the effectiveness of candidates.
- New York City Department of Education special-programs data documents retention of teachers.
- The alternate-route programs have an evaluation program conducted by NYC Department of Education.
- All programs must be registered with New York State and must achieve specialty organization recognition as part of the NCATE accreditation process.
- Candidate performance is assessed through an ongoing collection of student work products (portfolio), exit surveys for graduating students, and student teaching/internship evaluations by cooperating teachers and college supervisors.
- Minimum GPA levels are set for continuation of candidates within programs.
- Alumni follow-up surveys have candidates rate their effectiveness and talk about the quality of preparedness they had for their position.



External Funding:

The Teacher Academy receives funding from the Petrie Foundation and NSF. The alternate-route programs receive support from the NYC Department of Education.

Contact Information:

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New York

New York University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 75

Number of Graduates in 2007: 35

Description of Program:

New York University (NYU) is in the first year of a program to recruit STEM majors to the math and science teaching in New York City. Career changers are targeted, along with recent graduates. NYU has over 900 STEM majors who are targeted in recruitment efforts.

Mentoring and Clinical Practice Dimensions:

- NYU uses a common set of standards across its preservice and induction programs, based on the New Teacher Center (Santa Cruz) standards. NYU has a strong commitment to early career support for graduates who teach in New York City.
- Candidates complete 100 hours of pre-student-teaching experiences. Student teaching is at least 70 days (and in two placements).
- School-based work begins immediately in the program.

Program Innovations:

- A set of partnership schools located in three low-SES New York City communities. Teachers from these schools are appointed as adjunct professors at NYU.
- Some candidate course work is provided in the K-12 schools.

Research Initiatives:

A longitudinal study of teacher education is now being considered by the NYU and NYC IRB. The study will feature surveys, focus groups, follow-up studies of impact on K-12 students' learning.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Candidates are assessed using certification exams and supervisory and cooperating teacher reports. In addition, a random sample of candidates are observed in their final student teaching semester using observation protocols linked to the UC/Santa Cruz teaching standards framework.
- Based on the Wyckoff/Grossman study, which is providing information on the retention of all NYU teachers who teach in New York, NYU teachers have a 50% retention rate. NYU is exploring other sources of data and is planning an annual survey.
- NYU is currently negotiating with the New York City Department of Education for access to K-12 student achievement data of NYU-trained teachers.

Partnerships Outside the Division of Education:

NYU science faculty and the Courant Institute for Mathematical Sciences

External Funding:

Teacher Quality Enhancement Grant (Title II, HEA); Petrie Foundation; Math for America

Contact Information:

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New York

State University of New York—Buffalo State College

STEM Field: Science

Candidates Enrolled in STEM Program: 50 graduate students in M.S.Ed. (physics) programs

Number of Graduates in 2007: 6

Description of Program:

Two unique, national-model master's degree programs lead to NYSED 7-12 physics teacher certification plus the M.S.Ed. in physics. Course work occurs on line, in the evening, and during the summer to accommodate full-time working candidates. One program includes alternative certification arrangements for career-changing STEM degree holders in other professions wishing to become teachers.⁹

Mentoring and Clinical Practice Dimensions:

Practice varies. Cross-certification candidates are already certified NYSED teachers in a subject other than physics. Alternative-certification candidates must complete 40 hours of field work early in the program, plus 2 years of college and mentored supervision in a local education setting (via PHY502) while working as fully paid professional teacher holding NYSED Transitional B Certification.

Program Innovations:

- Scheduling innovations
- On-line physics education research seminar
- Intensive summer academy for graduate credit
- All courses are physics-specific, combining research-based content and pedagogy
- The program employs research-based rubrics (Reformed Teaching Observation Protocol) and curricula (Modeling Physics) developed under NSF aegis for curricular material, reflection, and pedagogical content knowledge and to guide, assess, critique, and reflect upon candidates' pedagogical performance
- Capstone experience includes development of a master-teacher manuscript for teacher practitioner journals (resulting in a half dozen student peer-reviewed publications to date from PHY690).

Research Initiatives:

Program investigators and colleagues are active in scholarship and research on teaching and learning physics, NYSED Regents Physics and other standardized testing, instruction of physics by analogy, teaching via intensive student discourse, standardized testing, teacher reflection, and teacher change.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The programs have been in existence since 2002-2003; long-term retention studies are under way.
- Research is under way to measure effectiveness via student achievement.
- In-house, pre- and postinstruction standardized testing of teacher conceptual gains in physics is conducted via PCS, FCI, MBT, TUG-K, CSEM, DIRECT, physics pedagogy via RTOP, and nature of science/teacher self-efficacy via MCTP, STEBI, VNOS, and Lawson TST.

Partnerships Outside the Division of Education:

- Buffalo State College: Department of Physics, Department of Mathematics, Department of Earth Science and Science Education, Department of Elementary Education and Reading, Center for Excellence in Urban and Rural Education (CEURE)
- Community: Buffalo Public Schools, Niagara Falls School District, Erie1, Erie2, Genesee Valley, Orleans-Niagara Boards of Cooperative Educational Services (BOCES), SUNY-Jamestown Community College

⁹ c.f.: MacIsaac, D. L., Henry, D., Zawicki, J. L., Beery, D., & Falconer, K. (2004). A new model alternative certification program for high school physics teachers: New pathways to physics teacher certification at SUNY-Buffalo State College. *Journal of Physics Teacher Education Online*, 2(2), 10-16.



- Other: Other partnerships extant for proposals currently in review or declined (notably Cattaraugus –Allegany BOCES; Salamanca City SD, 20+ rural and private LEAs statewide in NYS)

External Funding:

National Science Foundation (NSF) Department of Undergraduate Education, Robert Noyce Scholarship Program DUE-0434103 (2004-2008; \$469,000); NSF Department of Undergraduate Education, STEM–Teacher Preparation Program DUE-0302097 (2003-2007; \$503,000)

Contact Information:

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New York

State University of New York at Plattsburgh

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 43

Description of Program:

The master of science degree for teachers in adolescence education has been a pilot program for 2 years and will admit its first freshman class in the fall of 2007. The program is designed for career changers who have a baccalaureate degree in one of nine fields including biology, chemistry, physics, geology, and mathematics. Content and pedagogy are merged in an undergraduate content-method course and graduate education courses, culminating in student teaching.

Mentoring and Clinical Practice Dimensions:

- Students are mentored throughout the program by both a liberal arts and an education supervisor.
- Candidates complete 100 hours of supervised classroom observation in a secondary setting prior to student teaching. These observation hours are supervised and mentored by both college faculty and classroom teachers and are part of a second-semester-sophomore or first-semester-junior undergraduate experience.
- Student teaching occurs in the last semester of the graduate program. Candidates have two 8-week placements—one in a middle school and one in a high school—in their discipline area. This semester of student teaching is supervised by both college faculty and classroom teachers.

Program Innovations:

- In the fall of 2007, students will begin being admitted to a combined B.A./M.S.T. program in adolescence education.
- The program combines a content-area B.A. (science or math) with a graduate degree in education.
- The program is designed to be completed in 5 years plus one summer.

Candidate Recruitment:

Students are recruited through the admissions office, departmental web site, arts and sciences advisers, and other college programs.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Data are collected and evaluated via employer surveys, alumni surveys, and teacher and principal surveys.
- Performance is assessed via GPA, performance on certification exams (CST, LAST, ATS-W), cooperating classroom teachers, and a learning experience portfolio.

Research Initiatives:

The effectiveness of a learning experience portfolio is being researched.

Partnerships Outside the Division of Education:

Partnerships with seven arts and sciences departments including mathematics, biology, chemistry, physics, and earth sciences at Plattsburgh State University.

Contact Information:

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North Carolina

Appalachian State University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 18 in math; 6 in science

Number of Graduates in 2007: 16 in math; 5 in science

Description of Program:

At present, undergraduate degree programs are available in biology, chemistry, physics and geology, and mathematics. These programs have been in place for more than 25 years and lead to North Carolina licensure. A comprehensive or general science licensure program for undergraduates is being developed. Career changers may access these programs as lateral-entry or licensure-only students. STEM content is integrated via a methods course.

Candidate Recruitment:

Candidates are recruited via a variety of methods including admissions visits to local high schools, distribution of brochures, contact through electronic communication, and recommendations by former students.

Mentoring and Clinical Practice Dimensions:

- Program-area coordinators are charged with advising/mentoring while students are enrolled in the programs.
- Candidates engage in 45 hours of observational tutoring at initial entrance to program.
- 45 hours are then spent in schools in conjunction with methods classes.
- Candidates must complete 15 weeks of full-time student teaching prior to being recommended for licensure.

Program Innovations:

- The program is part of the University of North Carolina (UNC) systemwide initiative that will provide on-line courses in mathematics and science and in core courses to make course work more accessible to place-bound students; faculty in education and mathematics and science from various UNC institutions are working on the development of the courses.
- These courses will be required for the appropriate major and will be made available to any institution in the UNC system to be used as on-line offerings that can lead to degrees or be used as a part of alternative licensure programs.

Research Initiatives:

Faculty members have carried out research on effective teaching strategies in math and science, but no research focused specifically on the programs has occurred.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Appalachian State is an NCATE-accredited institution and goes through regular accreditation cycles.
- Each program is reviewed every 5–7 years by an external evaluator for the state.
- Candidates are assessed in a variety of ways including their GPA in content courses, field experience assessments, PRAXIS II content scores, and evaluation by cooperating teachers and by employers.
- Follow-up surveys are used on a regular cycle with school personnel (principals and mentors) to determine the effectiveness of graduates.

Partnerships Outside the Division of Education:

All programs in science and mathematics education are housed in the College of Arts and Sciences with supporting professional education course work provided by the College of Education; degrees are granted by the College of Arts and Sciences.

Contact Information:

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North Dakota

Valley City State University

STEM Fields: Technology

Candidates Enrolled in STEM Program: Approximately 60

Number of Graduates in 2007: 10

Description of Program:

A fully on-line, ITEA standards-based, master of education in science technology education degree has been offered since 2005. The program can also provide initial North Dakota licensure in technology education by adding the required professional education sequence, student teaching, and additional technology education courses necessary for a major equivalent. Thus, the student may receive a master of education degree and his or her initial teaching license. Curriculum in this concentration provides students with an understanding of the standards of ITEA and the National Board for Professional Teaching Standards and meets the North Dakota Education Standards and Practices Board standards. While in the program, preservice and in-service graduate students gain an understanding of how to teach technology literacy to K-12 students via materials from the Boston Museum of Science's "Engineering is Elementary" series, among other resources.

Mentoring and Clinical Practice Dimensions:

- The program follows NCATE guidelines for field experience for advanced studies.
- Student graduates are primarily teachers in K-12 schools so their action research, etc. are all conducted in K-12 settings.
- Also required is additional field experience in another classroom or school. Candidates seeking initial licensure will spend the required practicum hours (30-45) and have 10-14 weeks of supervised student teaching.
- New teachers are guided by university faculty and in-school mentors, as determined by school districts or participating states.
- A mentoring program for first-year teachers is in a redesign phase to address the needs of students in other states.

Program Innovations:

- First fully on-line, ITEA standards-based master's program offering options for initial licensure.
- Three types of master's degrees available: a 36-credit master of education; a 39-credit master of education that provides licensure in technology education for teachers already licensed in North Dakota in another field; and a 70-credit master of education that provides initial licensure in technology education in North Dakota (states with interstate reciprocity are able to license these new teachers with little or no extra requirements).

Research Initiatives:

Students are involved in research on barriers to technology literacy, designing curriculum for young learners, and exploring integrated curriculum possibilities.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Praxis II data
- Supervisor and cooperating teacher evaluations in conjunction with student's portfolio of conceptual framework and capstone final exam
- State of North Dakota, Higher Learning Commission, and NCATE requirements
- Outside consultant evaluators for different aspects of the program
- Surveys at key transition points



Partnerships Outside the Division of Education:

International Technology Education Association Center to Advance the Teaching of Technology & Science (ITEA-CATTS) and the Valley City State University Department of Science. The partnership with the Department of Science is charged with designing hybrid programs in technology education and science to increase access to higher education for place- and time-bound students.

External Funding:

Valley City Development Group

Contact Information:

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Ohio

Capital University

STEM Field: Science

Candidates Enrolled in STEM Program: 12 secondary, 30 middle school

Number of Graduates in 2007: 2 secondary, 6 middle school

Description of Program:

Capital University's science education licensure program is designed for traditional undergraduates and postdegree students. Therefore, students range from 20 to 50 years old. Middle-childhood science courses have explicit ties to pedagogy. One course, Science by Inquiry, is cotaught by a scientist and a science educator. Two secondary science courses overtly model pedagogical content knowledge. The methods course addresses middle and secondary levels and includes science content activities that are discussed through a pedagogical lens.

Mentoring and Clinical Practice Dimensions:

- Science education specifically connects with recent graduates through phone calls two to three times during the next school year.
- The department works to stay connected with new teacher candidates through mailings and e-mails. Students return to departments for resources and advice. The science departments communicate through newsletters and e-mails.
- Observation classes: Sophomores (or 1st semester for postdegree students) complete 84 clinical practice hours (3 hours a day, 4 days a week, for 7 weeks). Methods classes: Juniors (2nd semester for postdegree students) complete 120 hours (4 hours a day, 5 days a week, for 5 weeks). Student teaching: Seniors (3rd or 4th semester for postdegree students) complete 480 hours (8 hours a day, for 5 days a week, for 12 weeks).

Program Innovations:

The science education program has a "nature of science" focus threaded throughout. Preservice teachers are expected to demonstrate evidence of middle and high school student learning.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program conducts surveys, and the state of Ohio is collecting value-added data in selected districts. This effort is slated to expand throughout the state in the next couple of years.
- The middle and secondary science education programs are recognized by the National Science Teachers Association as meeting the 2003 NSTA standards.
- The science education program has an assessment system built on eight assessments.
- The Science Teacher Education Portfolio (STEP) includes a series of requirements, reflections, and interviews at developmental points in the preservice program.
- The unit is nationally accredited by NCATE. The education department has an assessment system that is built around the NCATE requirements and is informed by all education programs.

Research Initiatives:

There are significant collaborative works developing preservice instruments for use by any institution. The next initiative is to have valid and reliable instruments for determining preservice teachers' performance.

Partnerships Outside the Division of Education:

The science department works collaboratively with the education department. The middle school science program is housed in the education department, and all secondary programs are housed in the science department. As needs and requirements change, the science and education departments work together to accommodate the preservice teachers.



External Funding:

The program is funded by a collaborative grant with central Ohio institutions of higher education and Columbus Public Schools geared toward working on middle childhood science and mathematics programs to meet the needs of urban learners.

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Ohio

University of Akron

STEM Fields: Science, Technology, and Engineering

Candidates Enrolled in STEM Program: 30 each year

Description of Program:

The Akron Global Polymer Academy (AGPA) Summer Institute has been in existence for 5 years. AGPA Summer Institute is a 2-week-long workshop for 25 Grade 4 and 5 in-service teachers, plus five AGPA Summer Institute alumni who provide leadership training. The workshop is administered by pedagogy and science content experts from the College of Education and the College of Polymer Science and Polymer Engineering at the University of Akron. The program consists of inquiry-based activities to build teachers' content knowledge of physical science and science and technology aligned with the Ohio science academic content standards. Discussions on teaching and assessment, best research-based teaching practices, and STEM content are held. The program also dedicates time to planning implementation activities and provides participants with kits of materials to assist them in the classroom. Participants tour the College of Polymer Science and Polymer Engineering to observe cutting-edge science and engineering research and go on field trips to local industries to see science and engineering in action in the community. The AGPA has a web site (www.agpa.uakron.edu/k12) with free resources for teachers in Grades K-12. The web site includes polymer content information under the "What Are Polymers?" section, lesson plans categorized by science content and grade level, video lessons, demonstrations for use in the classroom, and a listing of best research-based teaching practices of Ohio and national science standards.

Mentoring and Clinical Practice Dimensions:

During the Summer Institute, five Summer Institute alumni return for leadership training. They also plan professional development events for in-service teachers in their schools and/or districts.

Program Innovations:

- Teacher leadership component
- The "What Are Polymers?" section of the web site provides information for both students and teachers of K-12. The site will soon include cutting-edge science and engineering research from the College of Polymer Science and Polymer Engineering. The research will be related to the science/math course work of middle and high school students.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Program effectiveness is evaluated by the Center for Mathematics and Science Education, Teaching, and Technology, John Carroll University.
- Lesson plans generated during the workshop are peer reviewed.
- As a follow-up to the Summer Institute, a codirector visits each of the participants' classrooms to observe the delivery of an inquiry-based science lesson or a professional development event by a teacher leader. After the visit, a written evaluation is sent to the teacher.
- A final meeting for participants is held in May to enable them to report on the activities of the past school year.

Partnerships Outside the Division of Education:

One director from the College of Education and one director from the College of Polymer Science and Polymer Engineering

External Funding:

Ohio Board of Regents

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Ohio

University of Akron

STEM Fields: Science, Technology, Engineering, and Mathematics

Description of Program:

Scheduled to be implemented in the fall of 2007, STEM Education and Career Pathways is developing STEM strategies that link the University of Akron with PK-12 districts throughout Northeast Ohio to create PK-16 STEM initiatives that will inspire, attract, and begin training the next generation of innovators. Increased dual credit access and attainment will be assisted through educational delivery via interactive video distance learning between the University of Akron, Lorrain County Community College, and school districts throughout the Northwest Ohio Technology Corridor. The STEM content is developed by curriculum teams made up of high school, college, and industry experts. Summer STEM initiatives will engage businesses within the region by fostering industry mentorships that will extend through secondary and postsecondary education with eventual career placement.

Mentoring and Clinical Practice Dimensions:

- College of Education teacher preparation students and current middle and high school teachers who are engaged in STEM activities, especially the STEM research teams, are included in the STEM initiative.
- At the primary level:
 - Academic exposure and career exploration through experimentation
 - Hands-on learning via technology, lab resources, and specialized teacher resources
 - STEM awareness education, mentoring, and academic advising
- At the secondary level:
 - Applied learning with university faculty, STEM content secondary teachers, and industry experts
 - Internships and career exploration
 - STEM-related professional and academic networking opportunities
 - Residential summer STEM academies
 - STEM mentoring teams will be established during students' high school years and will follow students through undergraduate programs and internships with STEM industries
- At the collegiate level:
 - Accelerated degrees
 - STEM research teams in real-world laboratory environments on current industry issues and challenges supported by University of Akron faculty and industry experts
 - Internships in the final year of education that lead to a commitment upon graduation of employment for a minimum of 4 years within the host STEM company

Program Innovations:

- Career exploration, awareness, and fundamental skill development in STEM content areas at the primary level
- Career mentoring and laboratory research opportunities at the secondary level
- Internships, applied research, and transitional aid into STEM careers at the postgraduate level

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

The program is evaluated through beginning and ending assessments and participant evaluations.

Partnerships Outside the Division of Education:

Five of the University of Akron's colleges and regional industries

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Ohio

University of Cincinnati

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Education Programs: 48

Number of STEM Education Graduates in 2007: 8

Description of Program:

The College of Education, Criminal Justice, and Human Services (CECH) STEM education program goals are (a) to help science, engineering, and technology students bring their experiences and knowledge into the classroom to become educators; (b) to build on and expand its tradition of PK-16 STEM partnerships; and (c) to design and implement interrelated strategies to ensure every student can succeed in his or her PK-12 education and have the opportunity to pursue postsecondary education and training.

Mentoring and Clinical Practice Dimensions:

- The Science and Technology Enhancement Program (Project STEP), a partnership led by the College of Engineering, is designed to help science, engineering, and technology students bring their experiences and knowledge into the classroom to become educators.
- The African American Initiative in Mathematics and Science (AAIMS) is a model teacher preparation program that works to improve mathematics and science education opportunities for African American children in urban schools and to increase the number of African American mathematics and science teachers in these schools. AAIMS provides financial, academic, and emotional support to participants; daily and weekly academic activities; conferences; and mentoring with faculty and student advisers.

Program Innovations:

The Southwest Ohio STEM Secondary Teacher Academy, the Southwest Ohio Center for Excellence in Mathematics and Science Education, and the Evaluation and Assessment Center for Mathematics and Science Education are key components of Ohio's Centers of Excellence in Mathematics and Science Education. These programs work in conjunction with the Ohio Resource Center for Mathematics, Science, and Reading. Each of these programs represents partnerships that are comprised of regional higher education, K-12, informal science, and community partners.

Research Initiatives:

- The Evaluation and Assessment Center for Mathematics and Science Education has expertise in science and mathematics instruction (PK-20), in qualitative and quantitative evaluation and research, in web-based instruction and assessment, in the refinement and development of measurement instruments, and in translating research and evaluation findings for policy makers as well as the general public.
- The Teacher Quality Partnership is a research consortium of Ohio's 50 colleges and universities providing teacher preparation programs. There are currently four interrelated research components: teacher education graduate study, experienced teacher study, novice teacher study, and large-scale longitudinal study of novice teachers.

Teacher Retention and Assessing Teacher Effectiveness and Program Effectiveness:

The Teacher Quality Partnership is a comprehensive, longitudinal study of the preparation, in-school support, and effectiveness of Ohio teachers. The partnership is identifying how the preparation and development of new teachers affects their success in the classroom as measured by the academic performance of their students. (See also <http://www.teacherqualitypartnership.org/>)



Partnerships Outside the Division of Education:

University of Cincinnati McMicken College of Arts and Sciences; University of Cincinnati College of Engineering; Southwest Ohio Center for Excellence in Mathematics and Science Education; Evaluation and Assessment Center for Mathematics and Science Education; KnowledgeWorks Foundation; Cincinnati Federation of Teachers; Cincinnati Public Schools; Princeton Public Schools; Miami University of Ohio; Northern Kentucky University; Xavier University

External Funding:

Ohio Board of Regents, Ohio Department of Education, National Science Foundation, and the U.S. Department of Education

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Ohio

University of Toledo

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 35 during 2006-2007

Number of Graduates in 2007: 9

Description of Program:

UToledo UTeach UTouch the Future (UT3) is a 3-year old program developed at the University of Toledo. This Title II Teacher Quality Partnership project is designed to recruit and prepare students to become highly qualified urban science and mathematics teachers, and then support them in their first 3 years of teaching. UT3 is a partnership among University of Toledo colleges and several other organizations designed to create an institutionwide commitment to high-quality teacher preparation that includes significant policy and practice changes supported by key leaders, which will result in permanent changes making teacher education a central mission at the University of Toledo. The project is designed to create and sustain collaborative mechanisms to integrate professional teaching skills, including technology skills, with strong academic content from the arts and sciences. The goals of UT3 are to increase (a) the number of candidates who major in science and mathematics education, with emphasis on underrepresented groups; (b) the percentage of middle school and secondary school math and science classes taught by teachers with majors in math and science or equivalent knowledge; (c) the success in completion of licensure; (d) the number of teachers skilled in using technology; (e) teacher retention in the first 3 years of their career; (f) the number of science and mathematics teachers who pursue careers in urban settings; and (g) student achievement in science and mathematics.

Mentoring and Clinical Practice Dimensions:

- A mentoring course was developed for teachers who have UT3 students doing their methods course or student teaching. The goals were to provide mentors with the knowledge and tools to support preservice teachers in their development as professionals and experience growth as a professional science and mathematics educator.
- A principal course provides leadership training for principals so they can support and lead change in science and math education.
- An induction year program is being created for new teachers so that they will be successful their first years of teaching in high schools.

Program Innovations:

- Telementoring—Polycom cameras were placed in classrooms of the mentor teachers so that university faculty could view UT3 students teaching and provide immediate feedback to them.
- EXCEL (Office of EXCELlence) Summer Institute created a teaching career track to encourage and prepare 15-20 Toledo EXCEL precollege students to be successful in preservice and professional development as teachers of mathematics and science education. The students are exposed to various activities associated with science, mathematics, teaching, and associated learning processes.
- Professional development for faculty at the University of Toledo revolves around the research done on “lesson study.” A group of professors examine lessons and its impact on student learning and then revise and reteach the lesson.

Research Initiatives:

Research is being conducted on recruitment, mentoring, technology usage, lesson study, and role and impact of the executive board (see Partnerships, next page) for civic engagement.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Program graduates have high passage rates on Praxis II and III
- Increased student achievement for all students as measured by the partnership



- Increased teacher retention in the first 3 years of a teacher's career
- Increased success in the pass rate for initial state certification or licensure of teachers
- Increased percentage of secondary school classes taught in core academic subject areas by teachers (a) with academic majors in the areas or in a related field and (b) who can demonstrate a high level of performance in relevant content areas
- Increased the percentage of elementary school classes taught by teachers with academic majors in the arts and sciences or who demonstrate competence through a high level of performance in core academic subject areas
- Increased the number of teachers trained in technology
- An external evaluator for the University of Austin "UTeach" program evaluates UT3

Partnerships Outside the Division of Education:

UT3 is a partnership among UT Colleges (education, arts and sciences, engineering, and pharmacy); Toledo Public Schools and Central City Catholic Schools; research teams of science and mathematics educators, teachers, and scientists and mathematicians; UT centers on campus (SciMaTEC, the Urban Affairs Center, the Center of Reform in Education, EXCEL, Ritter Planetarium, Stranahan Arboretum, and Learning Enhancement Center); and supporting community partners (the Toledo Zoo, Center of Science and Industry (COSI), the Challenger Learning Center, and other agencies). An executive board consisting of community leaders from the university, K-12 schools, businesses, and elected officials has been formed to promote UT3, provide feedback and suggestions, and develop an urgently needed strategy for Northwest Ohio to enhance science and mathematics education.

External Funding:

\$6 million by a Title II Teacher Quality Enhancement Grant

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Ohio

Youngstown State University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 96 Adolescent/Young Adult (AYA)

Number of Graduates in 2007: 27 AYA

Description of Program:

The adolescent/young adult teacher licensure program at Youngstown State University (YSU) prepares teachers to teach learners in Grades 7-12. Specific programs offered include integrated mathematics, integrated sciences, life sciences, physical sciences, and earth sciences.

Mentoring and Clinical Practice Dimensions:

- Teacher candidates in the AYA licensure program participate in field experiences throughout their program.
- The first education course, FOUND 1501 Introduction to Education, requires a 15-hour tutoring placement in area schools. FOUND 3708 Education and Society requires teacher candidates to work with adolescents in a variety of community and agency settings. SEDUC 3706 Principles of Teaching Adolescents provides 5-week school placements wherein candidates plan and teach content lessons.
- AYA candidates student teach for 16 weeks.

Program Innovations:

YSU is working with the Ashtabula County Educational Service Center in its Ohio Department of Education grant funded for Ohio CORE: Supporting Student Learning with High Quality Teachers, House Bill 115, an alternative licensure pathway for 20 participants with baccalaureate degrees in mathematics, science, and engineering.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- During student teaching, teacher candidates complete a teacher work sample wherein they document their impact on P-12 learning. All math and science candidates have earned passing scores.
- Praxis III scores from 2002-2006: 19 mathematics teachers with 18 passing scores; 17 science teachers with 17 passing scores
- Overall 97% passage rate on Praxis III

External Funding/Partnerships:

YSU has several externally funded STEM teacher preparation initiatives:

- Through Ohio Department of Education funding (\$422,000) under the federal Math and Science Partnerships Program, eight STEM faculty developed curriculum with trained area teachers and facilitated four 80-hour professional development workshops under the Ohio Partnership for Far East Region Science Teachers. The workshops included 100 science teachers of Grades 5-10, ultimately improving science instruction for 8,000 area students. Second-year funding (\$683,000) will provide professional development for an additional 175 science teachers.
- The Far East Regional Partnership for Conceptually Based Mathematics was funded (\$510,000) to work with 135 area mathematics teachers of Grades 3-10. Faculty members David Pollack (project investigator and director, mathematics department) and Howard Pullman (assistant director and evaluation liaison, Beeghly College of Education) develop and utilize content-rich activities to build deep mathematics knowledge for teachers from 47 partnership districts. Continued funding of a second cohort of 135 teachers is expected in July 2007.



- The Northeast Ohio Center of Excellence project, a collaborative effort of YSU, Kent State, the University of Akron, and Cleveland State, improves the quality of mathematics and science teacher education by developing model lessons that are disseminated through the Ohio Resource Center web site. Faculty members David Pollack, Howard Pullman, and Anita Burris (mathematics/teacher education) led the YSU math team comprised of faculty and local teachers.
- Faculty members David Pollack, Anita Burris, and Howard Pullman secured a mini-grant from the Mathematical Association of America's Preparing Mathematicians to Educate Teachers initiative to work with mathematics faculty on integrating technology and manipulatives into courses for teacher candidates.
- Jay Kerns (mathematics department) is leading the Lake-to-River T4 (Teaching Tomorrow's Teachers Today) Summer STEM Academy, a partnership with Kent State University's regional campuses and Jefferson Community College. Funded by the Ohio Board of Regents (\$340,000), the Academy will bring 80 high school students to campus for courses and follow-up intended to encourage the students to enter STEM fields.

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Oklahoma

University of Central Oklahoma

STEM Field: Science

Candidates Enrolled in STEM Program: 48

Number of Graduates in 2007: 2

Description of Program:

This undergraduate degree program leading to teacher licensure is based in the College of Mathematics and Science. The primary population served is traditional undergraduate students. Career changers complete courses in the professional sequence for licensure. All candidates receive an in-depth curriculum with content and assignments developed for the secondary education major. The plant biology course has a research component that is designed to give teacher education candidates experiences with research. A course, History and Nature of Science, was developed to give candidates a clear understanding of the nature of science, and other content courses are delivered with the understanding that students in the course will use this information in public schools. The methods course is taught as a science course by a STEM faculty member with public school experience.

Mentoring and Clinical Practice Dimensions:

- The program has a dedicated program coordinator who meets individually with new teacher candidates and works closely with student advising to identify each new student expressing an interest in the program.
- Candidates have 60 clock hours in the field prior to student teaching beginning in their sophomore year.
- Clinical experiences include observation, instructional assistance, and teaching prior to student teaching. The student teaching experience is 16 weeks over 800 hours.
- At least two placements must be in an ethically and economically diverse setting.

Program Innovations:

- Candidates use electronic portfolios.
- The methods course is offered as a hybrid course with half of the material presented in an on-line format.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program has eight required assessments in place to determine teacher competency.
- State residency programs provided the opportunity for observations by university faculty as well as public school personnel. At the end of the residency year, observers make a recommendation as to whether the candidate continues as a teacher or is required to repeat the residency year.
- 100% of STEM candidates are recommended for full licensure.
- The College of Education is also recognized by NCATE.

Partnerships Outside the Division of Education:

This program is based in the College of Mathematics and Science.

External Funding:

There is currently no sustained external funding; however, there are periodic grants and sponsorships from local and state sources.

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Oklahoma

University of Oklahoma

STEM Fields: Science, Technology, Engineering, and Mathematics

Candidates Enrolled in STEM Program Areas: 155

Number of Graduates in 2007: 45

Description of Program:

This program prepares STEM teaching and supervisory personnel for kindergarten through the 12th grade for individual school systems, as well as county and state educational systems; prepares persons for college teaching responsibilities in undergraduate courses in STEM education as well as graduate and undergraduate work in STEM education; and provides an opportunity for classroom teachers to devote study time to a purposeful program while increasing their understandings in STEM education. There is a long history of interdisciplinary activities in STEM education involving the College of Education, the College of Arts and Sciences, the College of Engineering, the College of Atmospheric and Geographic Sciences, and the College of Earth and Energy. OU houses excellent library facilities in STEM education plus the world-famous De Golyer Collection in the History of Science and Technology. OU has developed an interdisciplinary STEM M.Ed. degree with a focus on preparing individuals in two areas: higher education and K-12 education.

Mentoring and Clinical Practice Dimensions:

A minimum of 240 hours of extensive classroom experience throughout all program areas

Program Innovations:

- Work in secondary school classrooms with experienced teachers as they expand the previously tested activities to incorporate the engineering method to solve local and global societal issues
- A community-wide systemic change model that focuses on increasing student learning in science and technology
- A professional development program and field experimental study that utilizes the K-20 science model and involves teachers in authentic research experience and inquiry pedagogy
- An elementary engineering and science after school program for Norman elementary schools
- A professional development continuum designed to introduce secondary science teachers in Oklahoma public schools to novel instructional approaches that can be used to acquaint students with the nature of science and scientific inquiry
- Development of teachers, principals, and superintendents to lead systemic change and technology integration in their schools and districts
- Development of advanced computer gaming and simulations delivered through hand-held computing devices used by students and teachers targeting math, science, and reading
- K-8 science teacher professional development institutes designed to improve and deepen science content knowledge and implement instructional strategies in classrooms that will improve science learning
- Increased interest and achievement in science, technology, and mathematics by connecting K-12 students and teachers with bioscientists and the biotechnology professions through research experiences, summer institutes, internships, and lesson study and by strengthening and expanding the existing curriculum in science, mathematics, and technology in Grades 5-12
- A funded workforce development partnership between K-12 and higher education (K-20) and the industries of biotechnology and climatology



Research Initiatives:

A Strategic Research Initiative is funded through the University of Oklahoma to bring together an interdisciplinary team of researchers in STEM areas. The focus of the initiative is on STEM learning communities and gaming.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- A “Resident Teacher” program involves mentoring and evaluation during the 1st year of teaching.
- Ongoing formative and summative evaluations of programs’ effectiveness include measures of candidates’ effect on K-12 students.

Partnerships Outside the Division of Education:

Departments of Engineering, Botany, Zoology, Geology, Weather, and Geographic Sciences

External Funding:

Over \$18 million in funding from the National Science Foundation, Presbyterian Health Foundation, U.S. Department of Educaiton, Oklahoma Commission for Teacher Preparation, Howard Hughes Medical Institute, and the Oklahoma Educational Technology Trust

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Oregon

Portland State University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 34

Number of Graduates in 2007: 25

Description of Program:

Developed in 2002, the program offers a graduate teacher education degree for prospective math and science teachers at the middle and high school levels. Key features of the program:

- All students must complete content prerequisites approved by designated faculty from mathematics and science departments in the College of Liberal Arts and Sciences.
- All students must pass teacher exams in their content areas prior to admission.
- All course work in the program focuses on the needs of mathematics and science teachers and stresses integration of these disciplines.
- The year-long program culminates with a teaching license and a master's degree in education.
- There is a technology focus supported by Boeing Corporation and Vernier Educational Technology.
- All students complete a full year of observations and student teaching in public schools, often at both high schools and middle schools.
- The focus on urban and high-need schools is supported in part by the NSF Noyce Scholarship Program and in collaboration with local school districts. All of the course work is geared toward mathematics and science teachers—including courses on multiculturalism, special education, reading and writing, classroom management, technology and instruction, teaching and learning, reflective practice, classroom research, and methods.
- The program also benefits from instructional collaboration with science and mathematics faculty through collaborative teaching and cross-numbering of course work.
- There are specially designed courses in the mathematics and science departments for prospective teachers that incorporate pedagogy as well as content.

Mentoring and Clinical Practice Dimensions:

- With NSF support and support from a local school district, those students who work in the district will have ongoing professional support and mentorship from both experienced teachers and university faculty in the sciences.
- As a graduate program, clinical requirements include the following: fall term—90 hours of observation minimum; winter term—spend one class student teaching throughout the term, 4 days a week; spring term—full-time student teaching.
- All students are supervised by a cooperating teacher and a university supervisor. They must complete two work samples (portfolios) documenting classroom and community environments and school demographics as well as all instruction and assessment for one classroom of students for one instructional unit.

Program Innovations:

- Integrated mathematics and science curriculum where feasible
- Incorporation of reading and literacy into the teaching of mathematics and science
- Extensive use of educational technology providing students with the materials to take with them when they leave the program
- Partnerships with mathematics and science faculty for program improvement, grant development, and recruitment



Research Initiatives:

At present, researchers are studying the success of curriculum and instruction for incorporating literacy into the mathematics and science cohort. Research is also under way on the success of the collaboration for the NSF Noyce Scholarship Program intended to promote master’s of science in teaching degrees and to improve content in teacher preparation. The program also promotes strategies for success with teaching low-SES and other at-risk students in mathematics and science classrooms.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Each year, nearly all graduates are hired by local school districts who regularly and actively recruit from the program’s cohort. Since the program’s inception, only two of its graduates have left teaching.
- There is currently a third-party evaluator from the NSF Noyce Program grant.
- Candidates are assessed by their instructors, teacher exams, cooperating teachers, and university supervisors.

Partnerships Outside the Division of Education:

The program has partnerships published in various university departments including the Mathematics and Statistics Department, Geology Department, Biology Department, Chemistry Department, Physics Department, and the Center for Science Education. The grant from Carnegie Foundation has enabled the program to infuse course work with an emphasis on the teaching of reading text to support math and science learning.

External Funding:

The National Science Foundation (NSF) Oregon Collaborative for Excellence in the Preparation of Teachers, NSF Center for Learning and Teaching in the West, Boeing Company, Vernier Software and Technology, and the Carnegie Foundation

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Pennsylvania

Pennsylvania State University

STEM Field: Mathematics

Candidates Enrolled in STEM Program: 90

Number of Graduates in 2007: 50

Description of Program:

The mathematics education program serves students in secondary education/mathematics and mathematics/teaching option majors as well as students who are seeking certification following a bachelor's degree. The program requires more than 56 credits in mathematics and mathematics education in addition to three field experiences and professional education courses outside of mathematics education.

Mentoring and Clinical Practice Dimensions:

- There is an open-door advising policy for all candidates in the certification program. An annual large-group advising session complements individual meetings with advisers and instructors.
- During the semester prior to student teaching, candidates spend 5 to 8 weeks in school in a pre-student-teaching experience. Student teaching is a 14-15 week placement. Supervision at these levels is subject-matter specific.
- In addition, candidates have early observational field experiences in an introductory course.

Program Innovations:

- A major focus during the past 4 years has been on connecting the field experiences to campus curriculum in more intricate ways. The connections among campus courses have been strengthened. A key to progress in this area was the institution of a professional development mechanism that involves instructors, supervisors, and doctoral students preparing to be mathematics teacher educators.
- The program also has an increased focus on developing candidates' understanding of data analysis and statistics through both the addition of formal course requirements and increased attention to this content area in mathematics education courses.
- The National Council of Teachers of Mathematics *Curriculum Focal Points for Prekindergarten Through Grade 8 Mathematics* (2006) and similar efforts at the high school level are used in a variety of ways, from enhancing preparation for mandated tests to teaching in ways that reflect a more focused and coherent mathematics curriculum.
- The program has a clear focus on personal reflection and analysis of evidence of K-12 student learning to improve classroom instruction.

Research Initiatives:

- A set of three courses focused on deepening candidates' understanding of key ideas in mathematics arose from research groups investigating how prospective teachers understand data analysis, function, and mathematical modeling. A current research project that seeks to develop a framework for mathematics knowledge for teaching at the secondary level will contribute two other courses. These emerging courses are unique in that they begin with events in teachers' work and connect to P-12 and collegiate mathematics.
- The Mid-Atlantic Center for Mathematics Teaching and Learning is following prospective teachers during their college courses, through student teaching, and into their first year of teaching mathematics at the secondary school level. The conceptualization, theoretical underpinnings, and emerging findings from that research inform the program.



Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Principals and superintendents complete annual surveys on the graduates' performance in the classroom.
- Candidates are assessed using exams, field experience evaluations, PRAXIS scores, and evaluations from mentor teachers.

Partnerships Outside the Division of Education:

Eberly College of Science (Mathematics and Statistics Departments)

External Funding:

No direct external funding. The program does benefit from having fellows from the Mid-Atlantic Center for Mathematics Teaching and Learning serve as instructors and supervisors.

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Tennessee

University of Memphis

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 26

Number of Graduates in 2007: 12

Description of Program:

The University of Memphis Colleges of Education and Arts and Sciences partnered with Memphis City Schools in a 9-month collaborative process to reinvent teacher preparation programs at the university, with an emphasis on recruiting highly qualified candidates with degrees and real-world experience in the areas of mathematics and science to teach in urban middle schools. The Three R's Project, funded by a Teacher Quality Enhancement Grant, is field testing this model with two cohorts of candidates with an emphasis on recruiting male participants. Key program elements are a commitment to redefining teacher preparation around six identified "Pillars of Practice" representing an agreed-upon set of common performance expectations; complete redesign of curricula and practice around performance standards tied to those pillars and applied through a developmentally based system of evidence and feedback; preparation for dual licensure in special education as a means of preparing teachers to effectively engage in teaching practice that is responsive to diverse student needs; emphasis on the use of technology for instructional delivery and student self-assessment; the reinvention of teaching experiences employing a medical model of clinical practice in which students complete increasingly intensive rotations with veteran teachers in school sites designated as specialty sites in content and/or cross-cutting areas of practice; incorporation of intensive mentoring beginning in preservice and extending through 2 years of induction; and systematic linkages between the arts and sciences, education, and school district personnel for ongoing teacher professional development. Although originally designed for career changers, the program has also attracted recent graduates.

Mentoring and Clinical Practice Dimensions:

- Three R's fellows are supported by clinical faculty at each school site who are full-time mentors trained through the College of Education's New Teacher Center in the Santa Cruz mentoring model. They will also receive the services of a full-time trained external mentor during their first full year of teaching.
- Candidates begin course work in May and are in schools for observation during that time. They share a teaching position as teacher of record for the school year that begins in August, with extensive support from university faculty teaching their courses and clinical faculty housed at their schools.

Program Innovations:

- Performance-based program and assessments with identified Pillars of Practice at the core
- Full-time clinical faculty at the clinical sites
- Shared teaching positions at half salary during the program

Research Initiatives:

Research initiatives are planned for the coming year.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Multiple evaluations are made by principals, clinical faculty, university personnel, and external evaluators; other evidence includes videotapes, reflective documents, and electronic portfolios.
- All fellows who began the program last year are still active and are completing their shared-teaching year. They must teach 2 additional years in a high-need school in a high-need district to fulfill federal service requirements; all are expected to continue teaching in Memphis City Schools.
- The program is being evaluated by the Collaborative for Teaching and Learning, Louisville, KY.



Partnerships Outside the Division of Education:

The program partners with the College of Arts and Sciences.

External Funding:

A federal Teacher Quality Enhancement Grant

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Texas

Lamar University

STEM Fields: Science, Technology, Engineering, and Mathematics

Candidates Enrolled in STEM Program: 12 seeking certification (undergraduate); 20 graduate

Number of Graduates in 2007: 5 undergraduate

Description of Programs:

- In the past 2 years, Lamar University has taken bold steps to develop a specific roadmap for dealing with STEM teacher deficits by developing a new, postbaccalaureate Master Science Teacher (MST) Certification program for Grades 4-8 and Grades 8-12. A Master Math Teacher (MMT) Certification program is currently in development. The MST and the MMT are collaborative programs between arts and sciences and education.
- The Scientists-in-the-Schools project, a U.S. Department of Education-funded project, is a collaborative effort of the College of Arts and Sciences, the College of Education, and the Beaumont Independent School District. The major goal is to provide teachers hands-on experiences in developing and using inquiry-based education in science with underrepresented students to increase student achievement.
- A Teacher Quality Grant provides teacher training to improve the teaching of science and identifies and provides enrichment for public school students who have an interest in science.
- The Mathematics for English Language Learners Initiative provides training for secondary mathematics teachers to enhance the effectiveness of mathematics instruction for English language learners.
- A Bernard Harris ExxonMobil/NASA/Bernard Harris Foundation Grant supports collaboration between the College of Education and the College of Engineering. The grant funds a 2-week residential camp for underrepresented, high-potential students and enhances their knowledge in STEM fields while encouraging youth to stay in school and fostering leadership and citizenship. This program will assist Lamar University in developing a rich pipeline for mentoring students at a very early age to encourage them to pursue a STEM career.

Mentoring and Clinical Practice Dimensions:

- Participants in the MST Certification program have extensive mentor training through the Texas Beginning Educators Support System (TxBESS). The MST-certified teachers train and mentor the supervising teachers for undergraduate students seeking science certification. MST certification includes clinical practice in inquiry methods of teaching science.
- The Scientists-in-the-Schools project provides teachers hands-on clinical practice with underrepresented students during Saturday classes.
- Teachers who participate in the Teacher Quality Grant experience inquiry-based lessons in Saturday sessions with Lamar University Scientists from the College of Arts and Science and the College of Engineering. Teachers who have participated in these trainings will mentor students attending the Bernard Harris Summer residential camp programs.
- Lamar University has a well-established method of student intern supervision in the field. Selected faculty from area schools complete Master Supervising Teacher (MaST) training through the College of Education and Human Development. Intern students are matched by certification area/content with MaST teachers with the same specialization. The role of the MaST teachers is to serve as mentors to intern students in the field.



Program Innovations:

- The most recent innovation in the STEM area is the submission of a proposal for funding for a UTeach Program that will provide Southeast Texas a highly innovative programmatic prescription to reverse the “educational deficit” for science, mathematics, and computer science teachers. Lamar University’s primary goal is to encourage STEM majors and to encourage these majors to pursue teacher certification.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Lamar University is engaged in continuous improvement through Southern Association Accreditation and the National Council for Accreditation of Teacher Education. These organizations assure assessment and program effectiveness.
- Undergraduate students seeking certification in STEM programs must complete benchmarks at each phase of the certification program. These benchmarks address candidate knowledge, skills, and dispositions in academic content and teaching. There are three phases, and candidates must meet the established criteria at each phase before moving to the next step. Candidates are evaluated by university faculty and by MaST teachers.
- To receive certification, candidates must pass the state certification tests in the academic content area and in pedagogy and professional responsibilities.
- The Scientists-in-the-Schools Program and the Teacher Quality Program are grants with program evaluation plans. Continued funding is dependent upon successful completion of the programs’ goals.
- 2007 will be the first summer of the Bernard Harris Summer Camp, and there is an extensive evaluation plan to determine whether the residential camp is successful in encouraging interest in STEM areas.

Partnerships Outside the Division of Education:

Beaumont Independent School District, College of Engineering, and College of Arts and Sciences

External Funding:

Summer 2007, Bernard Harris Science Summer Camp, \$85,000; Project Scientists-in-the-Schools (Department of Education—Jacob K. Javits program, 2003-2007), \$1,191,046; Quality Teacher Grant to Improve Science Teaching, 2007-2008, \$82,000; Mathematics for English Language Learner Initiative, 2004-2007, \$199,274

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Texas

Texas A&M University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 61

Number of Graduates in 2007: 30

Description of Program:

Accelerate Online is a statewide secondary certification program that has been in existence for 5 years. The Accelerate Online program provides those possessing degrees with a teacher certification program that can be completed in 18 months or upper division undergraduate students with a teacher certification program that can be completed in 18 to 24 months. The program consists of an on-line curriculum, an early field experience, and a year-long paid internship or student teaching experience. Fifteen participating high-need school districts located in 7 of the 20 Educational Service Centers (ESC) across Texas have joined the Accelerate Online Consortium. As the program implementation continues, high-need districts from all 20 ESCs will be recruited to join the Accelerate Online Consortium. The four project goals for this Accelerate Online application are based on the three Transition-to-Teach indicators: (a) the Accelerate Online curriculum and eZone support system will be 100% operational on the beginning day of the grant; (b) a consortium of high-need school districts will employ 205 Accelerate Online candidates across the 5-year period of the grant; (c) 185 Accelerate Online candidates will successfully complete the program and become certified secondary teachers across the period of this grant; and (d) 78 Accelerate Online program completers will continue to teach for 3 years or more in a high-need school district by the conclusion of the grant. Efforts will be directed to recruit midcareer professionals, recent graduates, and undergraduate students within one semester of graduating who desire to become secondary school teachers in Texas.

Candidate Recruitment:

- Classified newspaper ads placed in the campus newspaper, alumni association quarterly journal, local and Houston newspapers directed at soon-to-be graduates, recent graduates, and midcareer participants
- Career fairs and booths at professional conferences and personal visits with college and departmental academic advisers
- Direct communication (e-mail, telephone, cover letter, and brochure) with school district certification offices and secondary school principals; web site banner ads; program announcements provided on an intranet bulletin board; program description links on college homepage
- Another practice that will be continued is the use of Google search engine “Ad words” and URL advertising based on keyword selection by potential applicants with an opportunity to communicate their interest by completing a brief interest inventory that will prompt an immediate response to the potential applicant. These marketing efforts and personal contacts are expected to establish awareness about the program to the extent that 250 to 300 monthly inquiries will be received resulting in 3 to 6 new candidates per month.

Mentoring Dimensions:

- Interns’ ePortfolios are reviewed weekly by supervisors and mentor teachers.
- Supervisors observe interns during at least 6 classroom visits across the school year (and often do 9 observations).
- Supervisors and mentors receive extensive training through an annual workshop, through regular updates on the professional development experiences offered to interns in the program, and on state certification and teaching skill requirements.
- A digital learning community will be established among supervisors of interns for sharing ideas and digital resources.



Program Innovations:

- Short program length and low cost (\$4,200, which is 80% of the national average cost of alternative certification programs)
- On-line curriculum, an early field experience, and a year-long paid internship
- eZone support system
- Experienced and expert supervisors who work with the interns

Research Initiatives:

- Denton, J. J., Davis, T. J., Smith, B. L., Beason, L., Graham, B. D., & Strader, R. A. (2006). *Success Ratios for Accelerate Online/OPTIONS: An Online Alternative Certification Program*. Paper available at <http://education.tamu.edu/> under Reports and Publications.
- Denton, J. J., Davis, T. J., Capraro, R. M., Smith, B. L., Beason, L., Graham, B. D., & Strader, R. A. (2006). *Examination of Applicant Profiles for Admission into and Completion of an Online Secondary Teacher Certification Program*. Paper available at <http://education.tamu.edu/> under Reports and Publications.
- Roberts, K., Denton, J., Davis, T., Smith, B., Beason, L., & Graham, D. (2006). *Comparison of Factor Structure and Conceptual Structure of Intern Classroom Assessment Instrument*. Paper available at <http://education.tamu.edu/> under Reports and Publications.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- 81% (59 of 73) of the candidates who have completed certification are continuing to teach in Texas public schools.
- 107 individuals have participated in Accelerate Online/OPTIONS with 70% of the current participants completing secondary certification in science or mathematics.
- 63 school districts across the state have placed Accelerate Online/OPTIONS teaching candidates.
- 90% of candidates receive paid internships to complete teacher certification.
- Every Accelerate Online/OPTIONS candidate who has taken the state pedagogy certification examination has met the certification criterion score for certification.
- 35% (38 of 107) of program participants have completed or are completing certification in high-need placements.
- The program tracks graduates in their first 3 years of teaching through supervised classroom observations.
- Teacher candidates are evaluated through on-line assessments of 31 pedagogy modules, ePortfolios, supervisor midpoint and final evaluations, and performance on state content and pedagogy certification tests.
- The preparation program is evaluated through a third-party specialist supported by the TTT grant.

Partnerships Outside the Division of Education:

Baylor College of Medicine for the past 5 years

External Funding:

U.S. Department of Education Transition to Teaching Program and Houston Endowment Foundation

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Virginia

Old Dominion University

STEM Fields: Science, Technology, and Mathematics

Candidates Enrolled in STEM Program: 74

Number of Graduates in 2007: 34

Description of Program:

All programs lead to licensure in secondary and middle schools.

Mentoring and Clinical Practice Dimensions:

- 500 hours of clinical experience
- Mentoring by local schools according to approved Virginia standards for mentoring

Program Innovations:

Earth Science Collaborative Degree Program with Norfolk Public Schools—The earth science program is a mixture of programs: a traditional 4-year program, a postbaccalaureate track for those with a degree returning to school, and a master's of science in education with an emphasis in earth science. All three programs require an early field experience, a practicum, and student teaching. Students are required to complete content courses equivalent to those in a traditional earth science program. Students must complete 32 content hours across the curricula of earth science, geology, biology, physics, chemistry, and math. Students in this program must pass an entry test, Praxis I or a state-approved equivalent (SAT or ACT), a content exam (Praxis II), and the Virginia Communication and Literacy Assessment for licensure. Some courses are offered via the web; 3-10 students per year graduate in this area.

Research Initiatives:

Joint National Science Foundation project in technology education with J. Sargeant Reynolds Community College in Richmond, VA

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program has a 95% retention rate after 3 years (2003 to present).
- Candidates must pass a content test (Praxis II) prior to student teaching, and they may not earn a grade lower than a C- in any major course or professional education course.
- There are portfolio assessment pieces throughout the program.
- Clinical faculty assess candidates in their field experiences on dispositions and content.
- Student teaching evaluations are divided into disposition, skill, knowledge, and impact on student learning. Last is a licensure exam called the Virginia Communication and Literacy Assessment.
- The student teaching evaluation has several sections that assess individual student progress, departmental progress, and program issues.

Partnerships Outside the Division of Education:

Norfolk Public Schools, Newport News Public Schools, Mathematics Department, ODU

External Funding:

Virginia Department of Education, National Science Foundation, Virginia local education agencies

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Virginia

Virginia Commonwealth University

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 20

Number of Graduates in 2007: 10

Description of Program:

The master of teaching program can be entered by freshman with a 5-year curriculum leading to baccalaureate and master's degrees with licensure or at the postbaccalaureate level by those holding a baccalaureate degree in the content area or the equivalent of a content major in math or one of the sciences. The program serves a significant number of career switchers but is not specifically designed for them. Programs are offered in mathematics, biology, chemistry, and physics.

Mentoring and Clinical Practice Dimensions:

- The program has a close working relationship with the school division content specialists and master teachers who teach the candidates.
- Students have two practicum experiences with a total of approximately 150 hours of classroom time prior to the full-time internship. Practicum experiences include both observation and limited teaching assignments. At least one clinical experience must be in an urban setting.
- Practicum experiences begin in the 4th year for 5-year students and in the 1st year for master's-only students.
- The internship semester is a 15-week, full-time experience.

Program Innovations:

Extensive use of technology in the program delivery

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- VCU is beginning to collect data on the K-12 student achievement in its graduates' classrooms.
- Candidates are assessed through a clinical evaluation instrument that is completed by university supervisors and cooperating teachers.
- The program is assessed using surveys completed by employing K-12 schools.

Research Initiatives:

Research is under way on the content knowledge of the science majors.

Partnerships Outside the Division of Education:

College of Humanities and Sciences and the departments of mathematics, chemistry, biology, and physics

External Funding:

\$5.9 million Teacher Quality Enhancement Grant (Title II, HEA) to support the revision of the math and science methods courses

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Virginia

Virginia Polytechnic State University

STEM Fields: Science, Technology, Engineering, and Mathematics

Candidates Currently Enrolled in STEM Program: 80 master's, 20 doctoral students

Number of STEM Graduates in 2007: 7 bachelor's plus licensure, 27 master's plus licensure, 1 doctorate

Description of Program:

In addition to licensure programs in science, technology education, and mathematics, Virginia Tech has degree programs and outreach programs that provide continuing education for educators. These include a Mathematics Specialist Program for K-8 teachers, a STEM graduate program, an international program in science that focuses on sustainability, and Virginia Tech's First Robotics program. The Mathematics Specialist Program is a collaboration between the Department of Mathematics and the School of Education. The STEM graduate program offers master's, educational specialist, Ed.D., and Ph.D. degrees to prepare a new generation of leaders and scholars with a vision of integrated approaches to STEM education and research. The international science program has been based in Malawi, Africa, and has provided doctoral training for Malawian educators and study-abroad activities for U.S. students and teachers. The First Robotics program is a collaboration with Montgomery County Public Schools that involves graduate and undergraduate engineering students, graduate education students, high school students, and high school and university faculty. An on-line instructional technology master's program enrolls 300 students a semester in addition to the on-campus students.

Mentoring and Clinical Practice Dimensions:

The mentoring and clinical practice dimensions differ across programs and include content mentoring and coaching of teachers (for Mathematics Specialists), collaborative research projects with doctoral students and K-12 partners (in the STEM graduate program), and field inquiry in Africa (in the Malawi program). First Robotics is based on a strong mentoring model in which the engineering students mentor and coach the high school students. Across all programs is embedded a strong application strand that exemplifies the mission of a land-grant university.

Program Innovations:

In each of the sample programs outlined above, key features break the mold in terms of curricula and implementation. All are genuine partnerships with departments across the university and K-12 colleagues. Corporate partnerships are central to the First Robotics project. All programs are designed using a project- or problem-based approach.

Research Initiatives:

Each of the above-mentioned programs has a research and evaluation component. In addition, faculty in the School of Education are engaged in a myriad of research projects that include investigations of mathematics curricula and preservice teachers' content knowledge, recruitment and retention of underrepresented groups in the STEM fields, integrated STEM curricula in a higher education core curricula, the use of cell phone technology for networking, and variables influencing science and mathematics achievement and engagement.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

Data collection on teacher retention and teacher/program effectiveness is ongoing. The First Robotics project has had excellent results in ensuring that the high school students excel and move on to higher education programs that are nationally known.

Partnerships Outside the Division of Education:

Engineering Education, Mechanical Engineering, Civil Engineering, Biological Sciences, Chemistry, Geosciences, Physics, Mathematics, Veterinary Medicine, and VA Osteopathic School of Medicine plus K-12 partnerships



External Funding:

Approximately \$226.5K in STEM research funding

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Washington

Seattle Pacific University

STEM Fields: Science, Technology, Engineering, and Mathematics

Candidates Enrolled in STEM Program: 50

Number of Graduates in 2007: 10

Description of Program:

Developed in 1992, two programs at Seattle Pacific University (SPU) assist teacher candidates to obtain the skills necessary to be good math teachers. SPU also offers course work and assessment geared toward several areas of science, for traditional students as well as for career changers. SPU offers both field-based and university-based course work with activities designed to help candidates understand the pedagogical components of the competencies required to be a good STEM teacher. SPU also offers special sections of science and math courses to model the type of teaching most effective in K-12 settings.

Mentoring and Clinical Practice Dimensions:

- Mentoring:
 - A 1-year follow-up with teachers that focuses on their satisfaction with the work
 - Continuing consultation as requested by the teachers
 - Significant professional development opportunities with a variety of districts available to graduates
- Clinical Practice:
 - All programs have at least one early field experience in which candidates gain experience in a school and subject similar to where they would like to teach.
 - All programs include an internship or student teaching experience. The shortest is 14 weeks; the longest is 1 school year.

Program Innovations:

- Strong scholarship support in addition to cooperative relations between professors of science and math in the College of Arts and Sciences and the School of Education
- One faculty position jointly shared between School of Education and the Mathematics Department; another shared between the School of Education and the Physics Department
- Partnered with the science program directors for several of the larger school districts in Washington State in order to offer targeted professional development opportunities for science teachers in those districts
- Hired a teacher-in-residence with significant experience in science education at the elementary level and assembled an advisory group of highly qualified local science teachers with whom faculty meet regularly to discuss program initiatives and local teacher needs

Research Initiatives:

Faculty are in the 2nd year of a 5-year NSF research program on “Improving the Effectiveness of Teacher Diagnostic Skills and Tools.” This project includes the design of web-based diagnostic assessment instruments for secondary physical science teachers. As part of this project, faculty are designing content-rich professional development courses that explicitly identify the role of formative assessment in the learning cycle and provide teachers with effective strategies for using diagnostic assessment to enhance student learning.



Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The program has data from follow-up interviews and surveys with the candidates and with their administrators.
- SPU uses a variety of measures including performance assessments, portfolio assessment, and a full range of traditional university assessments. These assessments are aggregated yearly and reviewed by faculty.
- Program faculty are beginning to implement the Reformed Teaching Observation Protocol for preservice science teachers during their student teaching.

External Funding:

Funders include the NSF Robert Noyce Scholarship Program for preservice math and science teachers and the Boeing Corporation. SPU is supported as a Primary Program Institution in the APS/AAPT/AIP Physics Teacher Education Coalition (PhysTEC) project.

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Wisconsin

University of Wisconsin–Eau Claire

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 10

Number of Graduates in 2007: 10

Description of Program:

The UWEC Grades 6-12 education program prepares candidates in science, mathematics, and combined fields through cohort and noncohort approaches. The cohort model has existed for 3 years and the noncohort model for 20 years. Candidates must successfully complete three levels of field experience, professional development planning, and combined performance and portfolio assessments, and they must pass Praxis II in their content areas to be eligible for licensure. Career-changer students are accommodated if their science/mathematics background is appropriate to Wisconsin teacher license categories and content standards. The cohort model integrates all aspects of human relations, diversity, and assessment across the program through combined meetings of all discipline candidates using 3 to 4 hours per day with breakout sessions and discrete content methods. The noncohort model operates through discrete courses. The science methods courses in both approaches are team taught by science faculty and education faculty.

Mentoring and Clinical Practice Dimensions:

- Wisconsin licensure regulations require support seminars, mentors, and professional development planning for all initial educators.
- Cooperating teachers must complete mentoring and supervision training in order to be eligible for work with preservice candidates in field settings.
- Preprogram: 8 weeks in middle school and 8 weeks in high school for 4 hours each week. Methods semester: 6 weeks in either high school or middle school for 2 periods each day.
- Student teaching: Full days for a full semester based on K-12 calendar.

Program Innovations:

The UWEC cohort model offers theme-based preparation that integrates science and mathematics with other disciplines, blending diversity and human relations competencies and collaborative leadership competencies. Candidates participate in inquiry-based preparation guided by five essential questions that frame the entire program.

Research Initiatives:

Ongoing analyses of collaborative leadership knowledge, skills, and dispositions of cohort versus noncohort students

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Graduate follow-up surveys administered to former students at 3 and 10 years after graduation; employer surveys; focus group data
- State program approval every 7 years
- Observations during methods and student teaching; written assessments of knowledge, skills, and dispositions completed by cooperating teachers
- University supervisors and arts and sciences faculty; portfolios developed and reviewed at admission to program, admission to student teaching, and exit from program

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Wisconsin

University of Wisconsin–La Crosse

STEM Fields: Science, Technology, Engineering, and Mathematics

Candidates Enrolled in STEM Program: 30

Description of Program:

This program is a science, technology, engineering, and math professional development school (STEM-PDS) that will begin in 2008. During the early stages of this program, faculty will develop an instrument for and assess the effectiveness of the science program the district now uses for elementary science and the effect preservice PDS students have on the students in these classes; develop and assess the use of the web-based materials (in cooperation with the UWL Murphy Library Curriculum Center) needed for improving science teaching in the school district in general and use this resource for all UWL preservice teachers taking science methods courses; and work with PDS students and expand to include science PDS students in the science methods courses taught at the university. Internal and external funding will be sought to continue the work already begun with PDS students. Results of this collaboration will be presented at future annual PDS meetings. This program will also develop a model for cooperation among the multiple players (content area faculty, education faculty, preservice teachers, in-service teachers) needed to improve elementary/middle science education at the national, state, and local level and help to achieve the College of Science and Allied Health strategic directions using AAAS Project 2061 publications for the STEM framework.

Mentoring and Clinical Practice Dimensions:

Candidates' clinical experience includes 1 semester for science and 1 semester for math. PDS candidates will work with classroom teachers 4 days a week.

Program Innovations:

- Students will be part of a science, technology, engineering, and math professional development school (STEM-PDS).
- Science information will be integrated into the classroom using a STEM web site developed through the Alice Hagar Curriculum Center, Murphy Library, for teacher candidates.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- Elementary students are tested in science at the fourth-grade level using the Wisconsin Knowledge and Concepts Exam; summary grade level data are provided.
- Tentative plans are being discussed to annually test third, fourth, and fifth graders using the Measured Academic Progress test; data for individual students are provided.
- PDS students will be assessed as part of their university math and science methods courses; a standardized classroom observation protocol is planned.
- The UWL School of Education plans to track PDS students to assess teacher retention.

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Wyoming

University of Wyoming

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 45 in science education and 45 in mathematics education

Number of Graduates in 2007: 15 in science education and 16 in mathematics education

Description of Program:

A relatively new program, the concurrent major program for mathematics and science majors allows students interested in teaching to complete a degree in science or mathematics and in science or mathematics education. Students complete both majors in 4 years and are prepared to teach at the secondary level. Science majors can earn degrees in biological sciences, chemistry, earth sciences/geology, earth sciences/earth system science, or physics. There is also a postbaccalaureate program for science or mathematics majors who decide they would like to teach at the secondary level after they have earned their degree. These students can complete their credential program in 1 year and will have work started toward a master's degree.

Mentoring and Clinical Practice Dimensions:

- Candidates spend 1 semester as a resident in a school setting.
- Mentor teachers in the professional learning communities are teamed with candidates during the residency semester.
- Students are observing in schools at a minimum by their sophomore year in the concurrent major program.

Program Innovations:

- Students have majors in either mathematics or science and in education.
- All secondary students have concurrent content majors that were agreed upon by the arts and sciences, agriculture, and education colleges. They take the same courses as majors in the fields.
- Postbaccalaureate students can complete their master's program after they earn their credential and at a distance while teaching in a Wyoming school.
- Teachers are enticed to stay in Wyoming, as they can have their loans forgiven if they teach in the state for a set length of time.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

Several different forms of assessment are used including national exams, residency evaluation forms from mentor teachers, unit plan assessments, disposition rubrics from multiple sources, and other assessments that are standard across courses and sections.

Partnerships Outside the Division of Education:

Through the undergraduate concurrent majors programs, partnerships are developed with the University of Wyoming's STEM departments. Faculty from the mathematics and science departments, the Science and Mathematics Teaching Center, and secondary education mathematics and science faculty work together to create programs for students.

External Funding:

There is no external funding available, although students training in high-need fields may have their loans repaid by the state under the Student Loan Forgiveness Program.

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Wyoming

University of Wyoming

STEM Fields: Science and Mathematics

Candidates Enrolled in STEM Program: 25 in science and 32 in mathematics

Number of Graduates in 2007: 3 in science and 3 in mathematics

Description of Program:

The middle-level mathematics and middle-level science programs in the Science and Mathematics Teaching Center (SMTC) serve in-service teachers. The science program has been in existence for 10 years, while the mathematics program is 5 years old. The programs are designed for elementary teachers seeking to move to middle school math or science education or for middle school teachers changing subjects to math or science. Strong integration of content and pedagogy define these programs. The programs are offered through summer institutes and academic-year distance-education courses. Teachers can complete 24 hours of courses for a state endorsement in middle-level science or mathematics. They can earn a master's degree with the completion of 6 more hours of graduate-level mathematics, science, mathematics education, or science education. Students are required to complete a thesis in the area of science education or mathematics education. These theses often take the form of an action research project for which teachers study student learning or the impact of teaching initiatives within their own classroom or school. The science program consists of three summer institutes, each 4 weeks in length: an earth sciences summer, life sciences summer, and physical science summer. The mathematics institutes include a geometry and assessment summer followed by distance courses in mathematics of change and numbers and operations, paired with a data in the media and technology summer followed by distance courses in social-historical issues and middle school methods.

Mentoring and Clinical Practice Dimensions:

- The students are in-service teachers who must have at least 1 year of experience.
- Students remain in their teaching positions throughout the program.
- The program is actively integrated into their classroom experience and provide content and pedagogy opportunities for in-service teachers without requiring them to leave their jobs.

Program Innovations:

- Teacher tuition and fees paid by scholarships provided through an endowment
- Courses developed from STEM content through collaboration of arts and sciences and education faculty
- Strong content focus by arts and sciences faculty

Research Initiatives:

Action-research projects are conducted by every candidate. A research initiative is being developed for the 2007-2008 school year that would study the impact of the programs' effectiveness.

Evidence of Teacher Effectiveness, Program Effectiveness, and Teacher Retention:

- The programs were created through National Science Foundation funding and were evaluated during that period.
- An evaluation is being planned for both programs to be conducted during 2007-2008.

Partnerships Outside the Division of Education:

The program was developed and offered through the SMTC, which is a department within both the College of Arts and Sciences and the College of Education. There are 50 affiliate faculty members in the SMTC from both colleges, as well as the College of Engineering and Agriculture.

External Funding:

Endowment for teacher tuition and fees ensures that courses are free to Wyoming in-service teachers.

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Index of Institutions by STEM Field

Science

CA	California Polytechnic State University	4
	California State University, Fullerton	5
	San Jose State University	7
	Sonoma State University	8
	University of San Diego	9
	University of Southern California	11
FL	Florida State University	13
	University of Central Florida	14
	University of Florida	17
	University of South Florida	19
GA	University of Georgia	21
IL	Bradley University	23
	DePaul University	24
	Northeastern Illinois University	25
	Northern Illinois University	28
IN	Ball State University	29
	Indiana University–Northwest	30
	Indiana University–Purdue University	
	Indianapolis	31
	University of Indianapolis	33
	University of Notre Dame	34
LA	Louisiana State University	35
ME	University of Maine	37
MD	University of Maryland–Eastern Shore	38
MA	Bridgewater State College	39
MN	University of Minnesota	42
	University of St. Thomas	43
NE	Creighton University	44
NH	Plymouth State University	46
NJ	William Paterson University	47
NM	University of New Mexico	49
NY	Binghamton University,	
	State University of New York	51
	Lehman College	53
	New York University	55
	State University of New York–	
	Buffalo State College	56
	State University of New York at Plattsburgh	58
NC	Appalachian State University	59
OH	Capital University	62
	University of Akron	64, 65
	University of Cincinnati	66
	University of Toledo	68
	Youngstown State University	70
OK	University of Central Oklahoma	72
	University of Oklahoma	73
OR	Portland State University	75
TN	University of Memphis	79
TX	Lamar University	81
	Texas A&M University	83

VA	Old Dominion University	85
	Virginia Commonwealth University	86
	Virginia Polytechnic State University	87
WA	Seattle Pacific University	89
WI	University of Wisconsin–Eau Claire	91
	University of Wisconsin–La Crosse	92
WY	University of Wyoming	93, 94

Technology

CA	University of San Diego	9
FL	University of Central Florida	14
	University of Florida	17
	University of South Florida	19
IL	DePaul University	24
IN	Ball State University	29
	Purdue University	32
	University of Indianapolis	33
MD	University of Maryland–Eastern Shore	38
NY	Lehman College	53
ND	Valley City State University	60
OH	University of Akron	64, 65
OK	University of Oklahoma	73
TX	Lamar University	81
VA	Old Dominion University	85
	Virginia Polytechnic State University	87
WA	Seattle Pacific University	89
WI	University of Wisconsin–La Crosse	92

Engineering

IL	Bradley University	23
IN	Purdue University	32
	University of Notre Dame	34
OH	University of Akron	64, 65
OK	University of Oklahoma	73
TX	Lamar University	81
VA	Virginia Polytechnic State University	87
WA	Seattle Pacific University	89
WI	University of Wisconsin–La Crosse	92

Mathematics

CA	California Polytechnic State University	4
	California State University, Fullerton	5
	Sonoma State University	8
	University of San Diego	9
	University of Southern California	11
FL	Florida State University	13
	University of Central Florida	14
	University of Florida	17



Mathematics (continued)

FL	University of South Florida	19	NY	Binghamton University, State University of New York	51
GA	Georgia State University	20		Lehman College.....	53
	University of Georgia	22		New York University	55
IL	Bradley University	23		State University of New York at Plattsburgh	58
	DePaul University.....	24	NC	Appalachian State University	59
	Northeastern Illinois University.....	25	OH	University of Akron.....	65
	Northern Illinois University.....	27		University of Cincinnati.....	66
IN	Ball State University.....	29		University of Toledo	68
	Indiana University–Northwest.....	30		Youngstown State University	70
	Indiana University–Purdue University Indianapolis.....	31	OK	University of Oklahoma	73
	University of Indianapolis	33	OR	Portland State University	75
	University of Notre Dame	34	PA	Pennsylvania State University	77
LA	Louisiana State University	35	TN	University of Memphis	79
ME	University of Maine	37	TX	Lamar University	81
MD	University of Maryland–Eastern Shore	38		Texas A&M University	83
MA	Bridgewater State College	39	VA	Old Dominion University.....	85
MI	Wayne State University.....	40		Virginia Commonwealth University	86
MN	University of Minnesota	42		Virginia Polytechnic State University.....	87
NH	Plymouth State University	46	WA	Seattle Pacific University	89
NJ	William Paterson University	47	WI	University of Wisconsin–Eau Claire	91
NM	University of New Mexico.....	49		University of Wisconsin–La Crosse.....	92
			WY	University of Wyoming.....	93, 94



AACTE Member Institutions

Alabama

Alabama A&M University
Alabama State University
Athens State University
Auburn University
Auburn University, Montgomery
Birmingham Southern College
Jacksonville State University
Miles College
Oakwood College
Samford University
Spring Hill College
Troy State University
Troy University Dothan Campus
Tuskegee University
University of Alabama
University of Alabama, Birmingham
University of Alabama, Huntsville
University of Mobile
University of Montevallo
University of North Alabama
University of South Alabama
University of West Alabama

Alaska

Alaska Pacific University
University of Alaska, Anchorage
University of Alaska, Fairbanks
University of Alaska, Southeast

Arizona

Arizona State University, West
Maricopa Community Colleges*
Northern Arizona University
Pima Community College*
University of Arizona
University of Phoenix

Arkansas

Arkansas State University
Arkansas Tech University
Harding University
Henderson State University
John Brown University
Lyon College
Ouachita Baptist University
Southern Arkansas University
University of Arkansas

University of Arkansas at Little Rock
University of Arkansas at Monticello
University of Arkansas at Fort Smith
University of Central Arkansas
University of the Ozarks

California

Alliant International University
Buck Institute for Education*
California Commission on Teacher Credentialing*
California Lutheran University
California Polytechnic State University
California State University Chico
California State University, Dominguez Hills
California State University, East Bay
California State University, Fresno
California State University, Fullerton
California State University, Long Beach
California State University, Los Angeles
California State University, Northridge
California State University, Stanislaus
California State University, Sacramento
California State University, San Bernardino
California State University, San Marcos
Carnegie Foundation for the
Advancement of Teaching*
Chapman University
Loyola Marymount University
National University
Pepperdine University
Point Loma Nazarene University
Saint Mary's College of California
San Diego State University
San Jose State University
Sonoma State University
Stanford University
University of San Diego
University of San Francisco
University of Southern California
University of the Pacific

Colorado

Colorado College
Colorado State University
Fort Lewis College
Metropolitan State College
University of Colorado at Boulder
University of Colorado at Colorado Springs
University of Colorado at Denver

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University of Northern Colorado
 University of Phoenix, Colorado

Connecticut

Central Connecticut State University
 Connecticut State Department of Education*
 Eastern Connecticut State University
 Fairfield University
 Quinnipiac University
 Southern Connecticut State University
 University of Connecticut
 University of Hartford
 Western Connecticut State University

Delaware

Delaware State University
 University of Delaware
 Wesley College
 Wilmington College

District of Columbia

American University
 Gallaudet University
 George Washington University
 Howard University
 Peace Corps Fellows/USA Programs*
 Trinity University
 University of the District of Columbia

Florida

Bethune Cookman University
 Florida Atlantic University
 Florida Community College at Jacksonville*
 Florida Gulf Coast University
 Florida International University
 Florida State University
 Gulf Coast Community College*
 Nova Southeastern University
 Southeastern University
 University of Central Florida
 University of Florida
 University of Miami
 University of North Florida
 University of South Florida
 University of South Florida, St. Petersburg

Georgia

Albany State University
 Armstrong Atlantic State University
 Augusta State University

Berry College
 Brenau University
 Brewton Parker College
 Clark Atlanta University
 Clayton State University
 Columbus State University
 Dalton State College
 Fort Valley State University
 Georgia College & State University
 Georgia Professional Standards Commission*
 Georgia Southern University
 Georgia Southwestern State University
 Georgia State University
 Kennesaw State University
 Macon State College
 Mercer University
 North Georgia College & State University
 Paine College
 State of Georgia, Department of Education*
 University of Georgia
 University of West Georgia
 Valdosta State University

Guam

Guam Community College*

Hawaii

Leeward Community College*
 Pacific Resources for Education and Learning*
 University of Hawaii at Manoa
 University of Phoenix, Hawaii

Idaho

Albertson College of Idaho
 Boise State University
 College of Southern Idaho*
 Idaho State University
 Lewis Clark State College
 Northwest Nazarene University
 University of Idaho

Illinois

Augustana College
 Aurora University
 Bradley University
 Chicago State University
 Concordia University
 DePaul University
 Dominican University
 Eastern Illinois University
 Elmhurst College

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Governors State University
 Greenville College
 Illinois State University
 Illinois Wesleyan University
 Lewis University
 Loyola University Chicago
 MacMurray College
 McKendree College
 Millikin University
 National Louis University
 Northeastern Illinois University
 Northern Illinois University
 Olivet Nazarene University
 Roosevelt University
 Southern Illinois University, Carbondale
 Southern Illinois University, Edwardsville
 University of Illinois at Chicago
 University of Illinois at Urbana-Champaign
 Western Illinois University
 Wheaton College

Indiana

Anderson University
 Ball State University
 Butler University
 DePauw University
 Franklin College
 Goshen College
 Grace College
 Huntington University
 Indiana State University
 Indiana University
 Indiana University, East
 Indiana University, Kokomo
 Indiana University, Northwest
 Indiana University-Purdue University Fort Wayne
 Indiana University-Purdue University Indianapolis
 Indiana University, South Bend
 Indiana University, Southeast
 Manchester College
 Marian College
 Oakland City University
 Purdue University
 Purdue University, Calumet
 Purdue University, North Central
 Saint Joseph's College
 Saint Mary of the Woods College
 Saint Mary's College
 Taylor University
 University of Evansville
 University of Indianapolis
 University of Notre Dame

University of Southern Indiana
 Valparaiso University
 Wabash College

Iowa

Central College
 Clarke College
 Drake University
 Graceland University
 Iowa State University of Science and Technology
 Loras College
 Morningside College
 Northwestern College
 Saint Ambrose University
 Simpson College
 University of Northern Iowa
 Wartburg College

Kansas

Baker University
 Benedictine College
 Emporia State University
 Fort Hays State University
 Kansas State Department of Education*
 Kansas State University
 McPherson College
 MidAmerica Nazarene University
 Ottawa University
 Pittsburg State University
 University of Kansas
 University of Saint Mary
 Washburn University
 Wichita State University

Kentucky

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 Berea College
 Brescia University
 Campbellsville University
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 Louisiana College
 Louisiana State University and A&M College
 Louisiana State University-Alexandria
 Louisiana State University-Shreveport
 Louisiana Tech University
 McNeese State University
 Nicholls State University
 Northwestern State University
 Southern University and A&M College at Baton Rouge
 Southern University at New Orleans
 University of Louisiana at Lafayette
 University of Louisiana at Monroe
 University of New Orleans

Maine

University of Maine
 University of Maine at Farmington
 University of Southern Maine

Maryland

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 Frostburg State University
 Harford Community College*
 Hood College
 Howard Community College*
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 Loyola College in Maryland
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 Montgomery College*
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 Mount Saint Mary's University
 Salisbury University
 Towson University
 University of Maryland, Baltimore County
 University of Maryland, College Park
 University of Maryland, Eastern Shore
 University of Maryland, University College
 Villa Julie College

Massachusetts

Boston College

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 Eastern Nazarene University
 Fitchburg State College
 Framingham State College
 Lesley University
 Recruiting New Teachers, Inc.*
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 Suffolk University
 University of Massachusetts, Amherst
 University of Massachusetts, Lowell
 Westfield State College
 Wheelock College

Michigan

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 Madonna University
 Michigan State University
 Northern Michigan University
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 Saginaw Valley State University
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 University of Detroit, Mercy
 University of Michigan
 University of Michigan, Flint
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Missouri

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Walsh University
Wittenberg University
Wright State University
Xavier University
Youngstown State University

Oklahoma

Cameron University
East Central University
Langston University
Northeastern State University
Northwestern Oklahoma State University
Oklahoma Baptist University
Oklahoma Christian University
Oklahoma Commission for Teacher Preparation*
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Oklahoma Wesleyan University
Oral Roberts University
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Oregon

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Southern Oregon University
University of Oregon
University of Portland
Western Oregon University

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Gannon University
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 Texas State University, San Marcos
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 Weber State University
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Vermont

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 Virginia Union University

Virgin Islands

University of the Virgin Islands

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 Eastern Washington University
 Evergreen State College
 Gonzaga University
 Heritage University
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 Pacific Lutheran University
 Saint Martin's University
 Seattle Pacific University
 Seattle University
 University of Puget Sound
 University of Washington
 Washington State University
 Western Washington University
 Whitworth College

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 Concord University
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 Fairmont State University
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Marshall University
 Shepherd University
 West Liberty State College
 West Virginia State University
 West Virginia University
 West Virginia University at Parkersburg
 West Virginia Wesleyan College

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