

UF Teach: *Mathematics and Science Teacher Preparation Program*



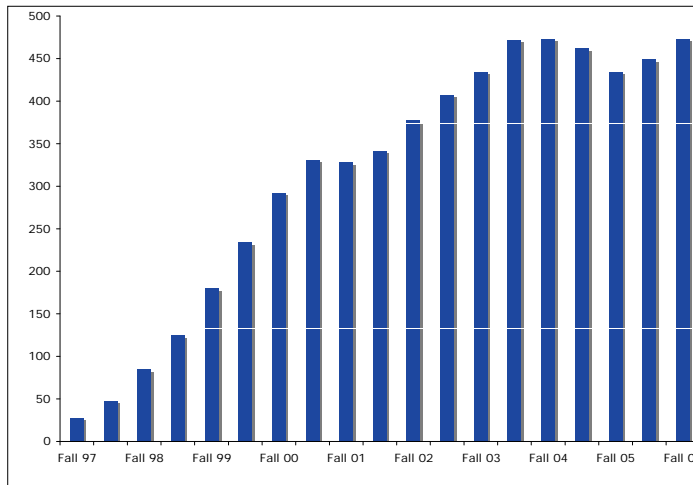
What is the problem?

- In the global competition to educate students in math and science, Americans are losing ground
 - Fewer than one-third of US 4th grade and 8th grade students performed at or above a level called “proficient” in mathematics
 - U.S. 12th graders recently performed below the international average for 21 countries on a test of general knowledge of math and science
 - Poor student performance threatens our country’s long-term competitiveness
 - Problem is compounded by chronic shortage of highly qualified K-12 teachers of mathematics and science
 - Identified as a critical state workforce need by FL BOG.

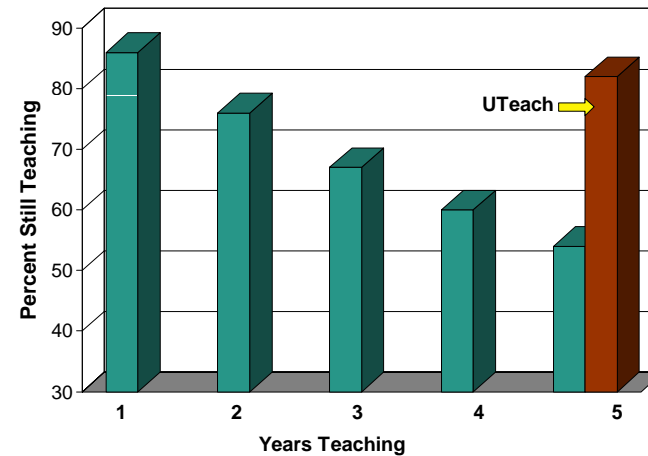
A solution: UTeach @ UT Austin

- Developed in 1997 at The University of Texas at Austin to help address disturbing shortage of qualified/certified math and science teachers
- Collaboration between Colleges of Natural Sciences, Liberal Arts and Education
- Integrates a rigorous math or science major, research experience, acquisition of effective teaching techniques, field experience, and certification in a 4-year program
- Measures indicate success

Data from UTeach



From pilot project of 28 students in fall of 1997, UTeach has matured to more than 450 students per year and over 70 graduates per year.



Approximately 82% of UTeach graduates who entered teaching 4 years ago are still in the classroom, compared with 60% four-year retention nationally.

National recognition

PREPARING TEACHERS | NEWSFOCUS

UTEXAS TELLS SCIENCE MAJORS: WE WANT U (TO) TEACH

AUSTIN, TEXAS—The University of Texas's UTeach is the most visible of the new waves of teacher-preparation programs. It earned an accolade in an influential 2005 National Academies' report on U.S. competitiveness, and this spring, the ExxonMobil Foundation created a National Math and Science Initiative to replicate it. Its 10-year track record is impressive: From a pool of highly qualified students, the university has more than tripled its annual production of STEM (science, technology, engineering and mathematics) teachers and kept most of them in the classroom.

But its success was far from preordained. In 1987, Texas changed its school certification laws to require future secondary school teachers to earn a degree in a disciplinary field. Designed to make sure that teachers acquired more content knowledge in science and math, the law was actually driving students away from those fields because of its stiffer requirements. At the same time, the state's flagship university was a bit of a laggard in STEM teacher training: Out of some 12,000 students in the UT graduating class of 1996,

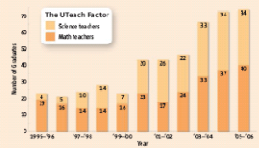
only five were certified to teach secondary science and only 16 in math. Mary Ann Rankin, dean of UT's College of Natural Sciences, decided that something had to be done to get more STEM majors into teaching. So in the summer of 1997 she asked a group of master teachers from the area's public schools to design a curriculum that could be ready to go by fall. "The dean told us to assume that nothing would remain the same and not to worry about the cost," recalls Mary Long, the program's first master teacher, who remains a guiding light. "And a month later we enrolled the first students."

What Long and her colleagues drew up remains the basis for the current UTeach program. Its essential elements include aggressive recruitment of potential teaching candidates, an early exposure to the classroom as part of two tuition-free courses, a strong network of teachers in local schools who mentor UT trainees in field placements, a new sequence of pedagogy classes taught by master teachers in STEM fields, and disciplinary classes with faculty members modeling best teaching practices. Joe Confey, a prominent math educator who helped create the curriculum before moving 4 years ago to Washington University in St. Louis, Missouri, says that one key change was linking each of the three new pedagogy courses—knowledge and learning, classroom interactions, and project-based instruction—to the subject matter, namely, math and science. "Non-content-based methods courses are silly," she explains.

The program acquired "instant credibility" among the faculty when UT physicist Michael Marder agreed to sign on as director, says Rankin. "He's also absorbed an incredible amount about the world of education that has been extremely valuable." Forging a partnership between the College of Natural Sciences and the School of Education, says Rankin, was another critical element. "Previously, a STEM major who wanted to be a teacher would get their major in our college and

then take their general education requirements, which, to be honest, were not the most exciting courses." The new courses, she says, "are relevant to what they need to know to teach science, and they get to use their knowledge in the classroom."

In addition to an enrollment of nearly 500, UTeach officials are especially proud of what happens once students graduate from the program. More than



Positive trend: Texas's output of science teachers has soared since UTeach began in 1997.

80% actually go into teaching, and since 2000, some 92% of that pool have remained in the classroom. That's an impressive retention rate for a profession in which 40% of teachers leave within their first 5 years. From the beginning, Rankin and Marder have sought to make the program self-sustaining without cutting back on elements—such as the tuition reimbursement for the initial field experience courses, called Step 1 and 2; internships, so that students can pursue education-related summer jobs rather than work at the mall; and stipends to mentor teachers—that could not be funded by the state. The solution, they decided, was an endowment. That's how Jeff Kodosky became the program's financial godfather. "I was on the dean's advisory council when she first talked about it, and I was intrigued by the idea," says Kodosky, a New York native who moved to Austin for graduate school and in 1976 co-founded National Instruments, which provides measurement and automation software. "It was clear we weren't producing many science and math teachers. And having an education major decide to teach science always seemed backward to me. Why not start with someone who loves science?" After providing seed money for the initial curriculum, Kodosky and his wife, April, agreed in 1999 to donate \$5 million. The endowment has grown to \$9 million, with a goal of \$15 million. —JEFFREY MERVIS



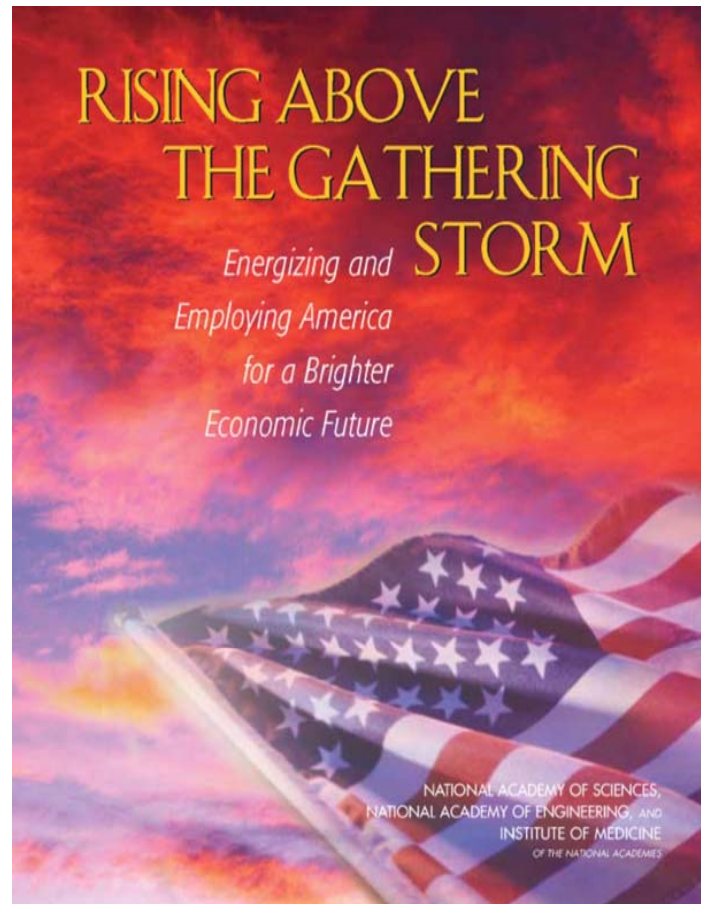
Team player: Rankin with UT mascot.

Prime Mover: Mary Ann Rankin

Mary Ann Rankin launched the UTeach program because she believed that the College of Natural Sciences, of which she is dean, needed to become more involved in preparing secondary school science and math teachers. But it wasn't just an academic exercise. Rankin's daughter, then in fourth grade and attending a suburban school district with an excellent reputation, suddenly went from loving school to refusing to do her homework. An uninspired teacher, she recalls, had made math "boring and repetitive, ... and the science program was nonexistent." With a twinge of guilt, Rankin says she transferred her to a private school, where she resumed her stellar academic career.

This fall, her daughter will start college (at UT, as it happens). But elementary school science and math are still on Rankin's mind. She's thinking about jetisoning the two current science courses for elementary education majors and replacing them with a three-course sequence that would begin with a research methods course, "tailored to their level," followed by a science component in the early classroom experience all UTeach students get. "They would learn so much more, and we would be reinforcing the importance of science in the elementary grades," she explains. "So many elementary school teachers shy away from science because they don't like it or don't understand it, and it turns off the kids at a young age."

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SOURCE: UTEACH COURTESY OF THE UNIVERSITY OF TEXAS, AUSTIN

UTeach as a national model

- ExxonMobil Foundation launches the National Math and Science Initiative (NMSI) in 2007 with \$125M commitment
 - Additional support from the Michael and Susan Dell Foundation (\$5M) and the Bill and Melinda Gates Foundation (\$10M).

- UF is named as one of thirteen UTeach replication sites in November 2007
 - NMSI provides \$1.4M over five years for operating expenses (with matching support from UF), another \$1M endowment gift at the end
 - Helios Education Foundation has provided a \$1M each to UF and FSU in support of the programs. Endowment gifts are eligible for state matching support of \$1.5M.

UTeach replication sites

- teachHouston - University of Houston
- UFTeach - University of Florida
- FSUTeach - Florida State University
- CUTeach - University of Colorado at Boulder
- SKyTeach - Western Kentucky University
- TUTeach - Temple University
- UKanTeach - The University of Kansas
- Cal Teach - The University of California Berkeley
- Cal Teach - The University of California Irvine
- UTeach Dallas - The University of Texas At Dallas
- Geaux Teach - Louisiana State University
- NAUTeach - Northern Arizona University
- Teach North Texas - The University of North Texas

UTeach “Elements of Success”

- Active recruitment of science and math majors to take the two initial one-hour UTeach courses free of charge
- Early and intensive field experiences
- Compact degree plans that allow students to graduate with both a degree and teacher certification in four years
- A focus on developing deep understanding of the subject and incorporating effective teaching approaches
- Guidance and inspiration provided by experienced public school teachers who serve as *master teachers*
- Student benefits, such as paid internships that offer opportunities for community outreach in education

FAQs from UTeach

- Elite science and math students are not interested in teaching careers.
 - *When UT surveyed science and math students, 25% had seriously considered teaching as a career but had been discouraged by parents, classmates or professors.*
- Training teachers is the responsibility of Colleges of Education and/or second tier institutions. Science and math students and faculty at research universities have more important things to do.
 - *Colleges of Science have a responsibility to lead the way to solutions in math/science education and will directly benefit from that solution.*
- Collaborating across colleges to create a joint program is difficult, so why should we bother.
 - *Inventive programs can create a win/win situation that will elicit cooperation.*

FAQs from UTeach

- Science/Math faculty do not value and would not/could not participate in a teacher training program.
 - *Science/Math faculty are full and proud participants in UTeach at UT Austin. Some extremely strong faculty chose UT over competing offers because of UTeach participation.*
- All you really need to be a great teacher is knowledge of your discipline. Education courses are a waste of time.
 - *Pedagogy training is very important but it needs to be relevant to the discipline and focused on student learning.*
- University professors know how to teach high school students.
 - *No, they don't.*

Benefits of UFTeach

- ❑ Provides visible leadership in an area of national concern
- ❑ Helps to meet critical state needs, concerns of statewide businesses, and serves as model for other universities
- ❑ Politically appealing at state level
- ❑ Attractive to potential private, corporate, and foundation donors
- ❑ Provides a benefit to local school districts, strengthening UF-community relations
- ❑ Could increase student diversity at UF

UFTeach Courses

- College of Education
 - Introductory Courses: STEP 1**, 2**
 - Knowing & Learning
 - Classroom Interactions**
 - Project-Based Instruction**
 - Practicum**
- CLAS
 - Research Methods (science majors)
 - Perspectives in Math & Science
 - Functions and Modeling (math majors)

**includes a field experience

Curriculum

	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Freshman pathway	STEP 1	STEP 2	Knowing & Learning	Classroom Interactions	Perspectives	Research Methods	Project-Based Instruction	Practicum
Sophomore pathway			STEP 1	STEP 2 Knowing & Learning	Classroom Interactions	Perspectives	Research Methods Project-Based Instruction	Practicum
Junior or senior pathway					STEP 1 Knowing & Learning	STEP 2 Classroom Interactions	Research methods Perspectives Project-Based Instruction	Practicum
Postbacc pathway							STEP 1&2 Knowing & Learning Project Based Instruction Classroom Interactions	Practicum Research Methods Perspectives

STEP 1 course – 1 credit

- ❑ Four field experiences in elementary school classrooms
- ❑ Taught and supervised by master teachers
- ❑ Using research-based science or mathematics curriculum materials
- ❑ Written and oral feedback from classroom teacher
- ❑ UTeach pays tuition

STEP 2 course – 2 credits

- Three field experiences in middle school classrooms
- Taught and supervised by master teachers
- Use research-based curriculum materials and inquiry-based lesson plans
- Written and oral feedback from classroom teacher
- UTeach pays tuition

Roles for CLAS faculty

- Continue to teach content courses
- Review degree plans and make adjustments to accommodate UFTeach
- Teach new UFTeach courses:
 - Research Methods: cross listed among chemistry, physics, and biological sciences
 - Functions and Modeling: for math majors
 - Perspectives in Mathematics and Science: taught by faculty in history and philosophy
- Offer undergraduate research experiences
- Serve as role models
- Support the program!

Roles for CoEd faculty

- Develop and support field experiences
- Develop and teach new UFTeach courses
 - STEP 1, STEP 2
 - Knowing & Learning
 - Classroom Interactions
 - Project-Based Instruction
 - Student Teaching
- Serve as role models
- Support the program!

Roles of administrators

- Resource development and commitment
- Student recruiting and advising (e.g., Preview)
- Facilitate collaborations between colleges
- Assist with curricular issues
- Development officers:
 - Private gifts to sustain the program
 - Student scholarships or internships
 - Funding for mentor teachers
- Support the program!

Role of local schools

- Support field experiences placements:
 - STEP 1 & 2
 - Classroom Interactions
 - Project-Based Instruction
 - Student Teaching
- Provide excellent mentor teachers
- Support the program!

Further information

- Program staff:
 - Co-Directors:
 - College of Education: Tom Dana tdana@coe.ufl.edu
 - CLAS: Alan Dorsey chair@phys.ufl.edu
 - Program Associate: Dimple Flesner
 - Web support: Pam Marlin
 - Master teachers: Griff Jones and Gloria Weber
 - Web: <http://ufteach.clas.ufl.edu/> (under construction!)
- Related material:
 - UTeach at UT Austin <http://www.uteach.utexas.edu>
 - The UTeach Institute <http://www.uteach-institute.org>
 - The National Math and Science Initiative <http://www.nationalmathandscience.org>