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Subject: Improving Teacher Quality

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Organization Represented: UTeach, a program to prepare secondary mathematics, science and computer science teachers.

Summary: The University of Texas at Austin has found how to prepare hundreds of its best and brightest students in mathematics and science to become secondary teachers. I will discuss steps The University took to make the program possible, features of the program, and qualities of the teachers we produce.

My name is Michael Marder, and I am a professor of physics at The University of Texas at Austin. Since 1998, I have been responsible for overseeing the preparation of secondary teachers in mathematics, science, and computer science on behalf of the College of Natural Sciences. I am glad to have the opportunity to speak before you today on the question of improving teacher quality.

A Shift of Responsibility—In 1987, the State of Texas shifted the burden of preparing secondary teachers from College of Education to Colleges of Arts and Sciences. Education majors were abolished, and prospective secondary teachers had to major in the subjects they intended to teach. Arguments for and against this change were heated. Both sides claimed that they wanted the best and the brightest to go into teaching, and that the policy of their opponents would prevent this from happening.

For many years after Texas rules changed for the preparation of secondary teachers, the numbers of mathematics and science majors to choose this career at my institution remained small. In 1997, the year we started UTeach, 16 math majors and 6 science majors were certified, out of a college population of over 5000. Today, we have over 400 math and science majors preparing to be secondary teachers, and this academic year we will graduate approximately 70 certified teachers. My aim today is to discuss the features of the program we created to make this change possible, and to describe some of the consequences of having a major university become a major player in the supply of teachers.

I should first emphasize that this program has been developed at a major research university, in a college where teacher training was previously considered to be someone else's job, and where students chose this career path only as a last resort. All of us who developed UTeach feel strongly that research universities have a responsibility to lead in developing a solution to the current critical shortage of qualified math and science teachers. Research universities are the repositories of scientific knowledge. They are the institutions capable of identifying new ideas that future educated citizens should know. They are the institutions capable of making sure that development of skills in public students across the country is done correctly and completely. We believe that preparation of teachers provides the best way to engage the nation's universities and their faculty in the improvement of the public schools.

Elements of Success— The single most important factor in the development of UTeach was the decision that teacher preparation would assume the level of importance, and receive the level of internal funding, typically associated with research initiatives. The

President of the University, Larry Faulkner, and Provost of the University, Sheldon Ekland-Olson provided crucial support. I also must single out the Dean of Natural Sciences, Mary Ann Rankin who initiated UTeach, and the Dean of Education, Manuel Justiz, who put the full support of his College behind it shortly after inception.

UTeach was initially designed by a team of Master Teachers -- award-winning secondary teachers brought to the College of Natural Sciences as consultants to outline the teacher preparation program they wished they could have had. We now employ seven master teachers within the College of Natural Sciences full-time to teach and support teacher preparation courses.

One of the most important elements of UTeach success is early field experience. The entire College of Natural Sciences freshman class is invited to explore the possibility of teaching by taking two initial UTeach courses. Students who accept this invitation begin classroom teaching in Austin elementary schools almost immediately. They are carefully supervised by exemplary classroom teachers who agree to coach the UTeach students. In a second semester, we take students into middle school classrooms, again under careful guidance. Private gift funds pay the tuition for these two courses and provide a stipend to the hundreds of supervising classroom teachers. The opportunity to try teaching at no cost and the positive experiences our students have in public school classrooms are major factors in the rapid growth of the program. The best way to convince talented young people to teach, very simply, is to give them a successful opportunity to teach.

UTeach offers students many benefits. They are eligible for numerous scholarships. They can earn money and develop their skills through paid internships that offer opportunities for community outreach, mentoring, and informal science teaching. Many students report that these experiences, again supported by gift funds, are just as influential as their courses in leading to the decision to teach.

All the courses taught to UTeach students in the College of Education were completely redesigned to focus upon the special demands of secondary science and mathematics teaching. UTeach features a technology-rich curriculum that emphasizes the use of new educational tools in instruction, and special courses on research and on inquiry skills that we hope can help transfer the thrill of new discovery to the public school classroom. Nevertheless, we have succeeded in creating compact degree plans that allow almost all students to graduate in four years having completed both their content courses and the requirements for teacher certification. Obtaining teacher certification through UTeach

does not cost our undergraduates any extra money, and in most cases it takes them no extra time.

Growth and success of the program—Students at UT Austin have responded enthusiastically to the creation of UTeach, and the program has grown rapidly. From a pilot project with 28 students in the fall of 1997 it has now matured to a high-profile, well-respected program with an enrollment of more than 400. Over 150 students have now graduated, and nearly 90% are teaching, planning to teach, or actively searching for teaching positions. This semester, 52 new teachers are preparing to graduate.

The quality of UTeach students is very high. As a group they have high SAT scores, and higher-than-average grades in comparison to their College of Natural Sciences undergraduate peer group. Approximately one-third of UTeach students are traditionally underrepresented minorities—twice as many as in the overall UT undergraduate population. Students and faculty alike are proud of the program and the positive attention it has received. Although UTeach is very young, many of our graduates have already won awards, been named department chairs, or been charged with developing challenging new courses.

Beyond its ability to attract top students into math and science education, the success of UTeach can be measured in its increasing stature as a model program for teacher preparation in which colleges of arts and sciences and colleges of education work together with public schools. On our own campus, the College of Liberal Arts has implemented its own version of UTeach, now entering its second year. Texas A&M has implemented a program similar to UTeach after several discussions with us. Many other Texas institutions as well as institutions in Louisiana and Colorado are exploring ways to create similar programs. The UT System has declared UTeach to be a part of the *Every Child Every Advantage* initiative^[1], and the National Research Council has cited it as a model program^[2]. We believe the UTeach model has tremendous potential to address the shortage of highest-quality teachers that is a growing national crisis.

New Challenges—Two years ago Texas changed the structure of teaching certification to three categories, K-4, 4-8, and 8-12. UTeach thus finds itself responsible for the preparation of teachers in grades 4-12. We welcome this change because we believe that strong science and math in the primary and middle grades is essential for later success.

Another critical concern of UTeach is support for our graduates and other novice science and math teachers. The first three years are critical for new teachers; more than 30% of Texas teachers leave the profession within their first two years of service. By three years that number has climbed to an appalling 55% in math and science. Thus, no matter how successful we are at inducing students to enter the teaching profession, until we find ways to support them once they begin teaching professionally, we are not going to make much progress in solving the teacher shortage. Next fall, we will inaugurate a regional support center for new mathematics and science teachers in the Central Texas region. It will provide skilled professional mentors to travel to new teachers' classrooms whenever needed. Simultaneously, we are starting a new Master's degree option, offered in summers, for experienced teachers ready to come back school to enhance their content and teaching knowledge. The close involvement of our College of Science in these activities would have been very difficult without the experience we gained through preparing teachers.

Funding Challenges and Goals—Core funding for UTeach faculty salaries and course development has been provided by the Colleges of Natural Sciences and Education—a current investment from The University of Texas of over \$1,000,000 per year. However, many of the special features of the program that have made it a success cannot be funded from state appropriations. Grants from several Texas foundations have enabled us to pay tuition for the initial courses, to pay master and mentor teachers, to support student internships, and to purchase essential equipment, kits and software for use in public school classrooms. We have also received National Science Foundation support. But seed funding cannot sustain the program indefinitely. We are working to raise a \$15 million endowment whose earnings will support UTeach for the long term. Institutions interested in replicating UTeach need to be aware of these funding issues.

Final Thoughts— Thus, some of the main lessons we have learned through UTeach are

1. Substantial numbers of the nation's best students are willing to become teachers.
2. Recruiting these students into the teaching profession requires a shift in attitude from the nation's universities, so that preparation of teachers is viewed as one of the highest missions of every college and every department, and resources comparable to those given to traditional departments are available to support prospective teachers.
3. Universities that learn to prepare teachers well will also be in a position to provide many additional forms of support to the public schools. Helping great teachers stay in the profession will be just as significant as helping new ones enter.

4. However, success requires effort and time, and some of the resources needed for State universities fully to support teachers can only be obtained through foundation or gift funding.

Thank you for your interest in UTeach.

[1] <http://www.utsystem.edu/EveryChild/K16PrgDes-Initiative1.html>

[2] *Educating Teachers of Science, Mathematics, and Technology: New Practices for the New Millennium*, National Academy of Sciences Press, (2000)