

# TEACHER PREPARATION REFORM CONSORTIUM

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## PROJECT NARRATIVE

In his April address to the National Academies, President Obama urged, “We cannot start soon enough. We know that the quality of math and science teachers is the most influential single factor in determining whether a student will succeed or fail in these subjects. Yet... there is a projected shortfall of more than 280,000 math and science teachers across the country by 2015...I am challenging states to enhance teacher preparation and training, and to attract new and qualified math and science teachers to better engage students and reinvigorate these subjects in our schools.” The President continued his plea in his July remarks on education that we must “foster the next generation of math and science teachers. And by the way, everyone has a role to play in training these teachers. So universities and nonprofit organizations can launch programs like UTeach at UT Austin that allows aspiring teachers to get a math or science degree and teaching certificate at the same time.”

## EXECUTIVE SUMMARY

The **Teacher Preparation Reform Consortium** (the Consortium) is a unique collaboration among Institutions of Higher Education (IHEs), high-need LEAs and the non-profit sector designed specifically to fundamentally transform teacher preparation, beginning with the preparation of STEM teachers through UTeach program expansion.

The Consortium is applying to the Department of Education (the Department) for \$11,656,570 under Absolute Priority One of the Teacher Quality Partnership Grants Program and in compliance with the Department’s June 30th statement that “An eligible partnership may chose to begin its efforts in the early year(s) of its project by improving teacher preparation in one or more specific pre-baccalaureate subject area(s) and/or grade level(s).” The Consortium partners include: The National Math and Science Initiative (NMSI) as the managing partner, the

UTeach Institute (the Institute) as the fiscal agent, The University of Texas at Austin (UT Austin) as the lead university partner, Cleveland State University (CSU) and Middle Tennessee State University (MTSU), the colleges of education (or the equivalent) and the colleges of arts and sciences (or the equivalent) within each IHE, and the high-need LEAs and high-need schools with whom each IHE partners. This Consortium is unique among IHEs in that it is a coordinated effort guided by a successful model and a tested management plan delivered by experienced developers.

Through this proposal, the Consortium will accomplish two significant goals: (1) improving the quality of teacher preparation immediately at two distinct types of universities by implementing the UTeach model – an evidence-based program that combines content knowledge and pedagogy in a four-year plan for preparation of STEM teachers, and (2) per the Department’s published guidance as noted above, extending the reach of the reform to other teacher preparation programs based on lessons learned from the UTeach program, which has a history of producing significant and lasting impact in teacher preparation, professional development and retention of teachers. For example, graduates of the UTeach program have an 82% retention rate after five years of teaching and nearly half of these graduates teach in schools where a majority of the students receive free or reduced-price lunch.

The Consortium will provide significant benefits to the Department as it advances the Department’s goal of improving the quality of teacher preparation nationwide. It will: (1) leverage significant, existing private sector investment in teacher preparation reform; (2) provide real-time, objective data reporting from partners to the Department; (3) implement the program immediately; and (4) provide efficiency by expanding successful, evidence-based reform efforts to a wide range of institutions of higher education.

Finally, the Consortium will respond not only to the President’s challenge to produce significantly more and better prepared math and science teachers and to the mounting evidence in recent years that American students are falling far behind international standards in math and science, but also to the greater need recognized in the Teacher Quality Partnership Grant application for broad and systemic teacher preparation reform.

**I. SIGNIFICANCE (Selection Criteria – 20 Points)**

**A. BENEFITS OF A CONSORTIUM APPLICATION**

The Consortium provides a unique collaboration and management structure that will allow the Department to expand its reach beyond what its limited resources might otherwise allow. As partners, NMSI and the Institute propose to fulfill the Teacher Quality Partnership Grants Program requirements in two steps: (1) monitor and support implementation at partner universities of the UTeach program, an innovative, compact four-year plan for students to obtain secondary teaching certification while earning a mathematics or science degree and (2) expand teacher preparation reform at UT Austin, which will then serve as a model for broader teacher preparation reform at the Consortium universities. NMSI and the Institute complement one another so that together, they provide comprehensive oversight and support to the Consortium partners. NMSI serves as the managing partner and point of reference for data reporting while the Institute provides implementation support and program evaluation.<sup>1</sup>

If this Consortium proposal is funded, the Department will benefit, both programmatically and fiscally, by leveraging scarce federal dollars with reforms currently being undertaken by NMSI and the Institute. With significant fiscal support (totaling approximately \$40 million) provided for this purpose by various private partners, any funding provided by the

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<sup>1</sup> See *below*, Section III, Quality of the Management Plan, page 69.

Department to expand these reform efforts will be greatly enhanced by these existing investments. This public-private partnership allows federal support to generate significant and sustainable reform: Encouraging a new method of preparing teachers based on proven success in preparing highly qualified STEM teachers.

In addition to cost-effectiveness, NMSI and the Institute bring the unique and significant advantage of documented experience in providing implementation expertise through well-established tools and services. NMSI's web-based financial data management system provides real-time monitoring and reporting at both the individual university program level as well as across all universities. At the individual program level, immediate feedback is available to help guide planning and implementation decisions. From a management standpoint, technical assistance is immediately deployed when problems are detected. Perhaps most useful, however, is the potential to perform analyses across all partner universities and LEAs to identify trends and generate statistics on teacher preparation programs across the country. NMSI's financial data monitoring works hand-in-hand with the program evaluation conducted by the Institute both through PEARS (a Web-based data collection and reporting system focusing on university, program, and LEA demographic data) and ongoing program implementation data collection and analyses. The UTeach Institute prepares regular individual progress reports as well as cross-site analyses to: (1) assist with identifying local program technical assistance needs; (2) document implementation progress; and (3) identify trends related to program implementation across all universities. These reports are used by NMSI to assess progress on established benchmarks. Our combined efforts and expertise ensure successful program implementation and measureable results.

Finally, NMSI and the Institute are already successfully implementing the UTeach program at 13 universities,<sup>2</sup> allowing the Consortium to be “shovel ready.” The current group of UTeach partner universities began revising their teacher preparation programs upon receiving their grants and held classes within eight months of being funded. Likewise, immediately upon receiving this grant, the Consortium universities will begin revising their existing teacher preparation program and will offer the first UTeach course in Fall 2010. UT Austin will then serve as a model for extending teacher preparation reform efforts at each Consortium partner university in the latter years of the grant.

Three university partners who represent a diverse set of IHEs all devoted to reforming teacher preparation using a common, content-driven approach have joined NMSI and the Institute in the Consortium. As the lead university in this Consortium, the University of Texas at Austin plays a dual role: (1) it is host for the UTeach Institute, which provides developer support for the partner sites engaged in UTeach replication, and (2) it will undertake additional reform of teacher preparation at UT Austin and will provide a model for similar reform efforts at each Consortium partner university. The other two university partners will initially focus on implementing the UTeach program and will look to UT Austin as a model for broadly targeted teacher preparation. Each university partner brings unique strengths to the Consortium:

- The University of Texas at Austin is the largest public institution of higher education in Texas and one of the nation’s top research universities. As the lead university in the Consortium, UT Austin plays a different role than other members. Having implemented many UTeach-related changes already, UT Austin will pursue ***additional improvements in other areas of teacher preparation*** that, if successful, can serve as models for our partner

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<sup>2</sup> See *below* at page 25.

sites. These advantages cannot be realized in a partnership involving just one university experimenting with a pilot program in just one school district. This Consortium uniquely offers the experience, capacity, and economy of implementing a proven teacher preparation program across multiple universities and LEAs in a cost-effective and proven-effective manner.

- Cleveland State University is an *urban state university* that, by implementing the UTeach program, will increase the influx of highly qualified teachers to the Cleveland Municipal School District, a large urban system composed entirely of students from economically disadvantaged families, all of whom participate in Universal Meals.
- Middle Tennessee State University is a *research university well regarded for teacher preparation* and has the largest undergraduate population in the state. Despite MTSU's emphasis on preparing teachers, the university's *production of certified math and science teachers remains extremely low*. By implementing UTeach, MTSU hopes to increase the number of undergraduates obtaining teacher certification in math and science. MTSU will partner with two high-need LEAs, Bedford County and Metro Nashville Public Schools.

## **B. NEEDS ASSESSMENT (General Program Requirement)**

### *i. Current Practices and Current Weaknesses*

The need for the Teacher Preparation Reform Consortium is clear. The United States led the world in high school and college graduation rates 25 years ago. Today, U.S. students at age 15 fell well below average in the 2007 international rankings by the Organization for Economic Cooperation and Development – 15<sup>th</sup> in reading, 19<sup>th</sup> in math, and 14<sup>th</sup> in science – behind emerging countries such as Slovenia, Estonia, and even Liechtenstein. Our country scored ahead of only a handful of others, including Greece, Turkey, and Mexico.

While the National Assessment of Educational Progress (NAEP) figures released in spring 2009 indicate that we are seeing better performance in math and reading by our nation's younger students, our high school students have not improved in almost 40 years. As a consequence American students still trail their counterparts overseas. We must develop a 21<sup>st</sup> century education engine to provide **rapid response and large-scale application** of proven innovative approaches to this problem; we must allow our students to achieve at the high levels demanded by the international community.

The problem is urgent and complex. First, we are failing to produce and retain sufficient numbers of qualified math and science teachers to keep America internationally competitive. (See National Academy of Sciences' report, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Future*). The situation will only get worse if we stay on this course. According to the Business-Higher Education Forum's Report: *An American Imperative: Transforming the Recruitment, Retention, and Renewal of Our Nation's Mathematics and Science Teaching Workforce*, there will be a shortfall of more than 280,000 highly qualified math and science teachers by 2015. This dearth of teachers to nurture future generations of science, technology, engineering, and mathematics (STEM) students and cultivate forthcoming STEM specialists will exacerbate already troubling trends: While American demand for scientists and engineers is expected to grow four times faster than all other professions in the next decade, according to the Bureau of Labor Statistics, a mere five percent of U.S. college students graduate from college in math and science fields, compared to 42% in China. (The Academy of Medicine, Engineering and Science of Texas).

The 2005 congressionally-requested report produced by the National Academy of Sciences, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter*

*Future*, proposed a clear solution to the problem: The United States needs to significantly increase its talent pool. The report recommends that the U.S. “annually recruit 10,000 mathematics and science teachers,” and “strengthen the skills of 250,000 teachers through training and education programs [...]” The National Science Foundation estimates that 80% of the jobs in the next decade will require some form of math and science skills. Unless the country reverses the status quo, America’s labor supply will not be adequate to meet its own demand. Infusing our education system with highly-qualified teachers who can educate and train the scientists and engineers of tomorrow is the key to producing that workforce supply.

Second, many observers would agree that a significant number of our teachers in all subject areas are not sufficiently prepared with strong content knowledge in the subjects they teach. As recently noted, “teachers reported that their knowledge and skills grew and their practice changed when they received professional development that was coherent, focused on content knowledge, and involved active learning.” (Darling-Hammond, L. & Richardson, N. (2009, February)). In addition, Linda Darling-Hammond’s analysis of data from the National Assessment of Educational Progress found “that the effects of well-prepared teachers on student achievement can be stronger than the influences of student background factors, such as poverty, language background, and minority status” (2000). Thus, preparing a highly qualified workforce steeped in content knowledge and clinical experience is critical to overcoming factors outside of a student’s control, such as their poverty level, and to providing American students with the education they need, but are not currently receiving. This Consortium can begin that task.

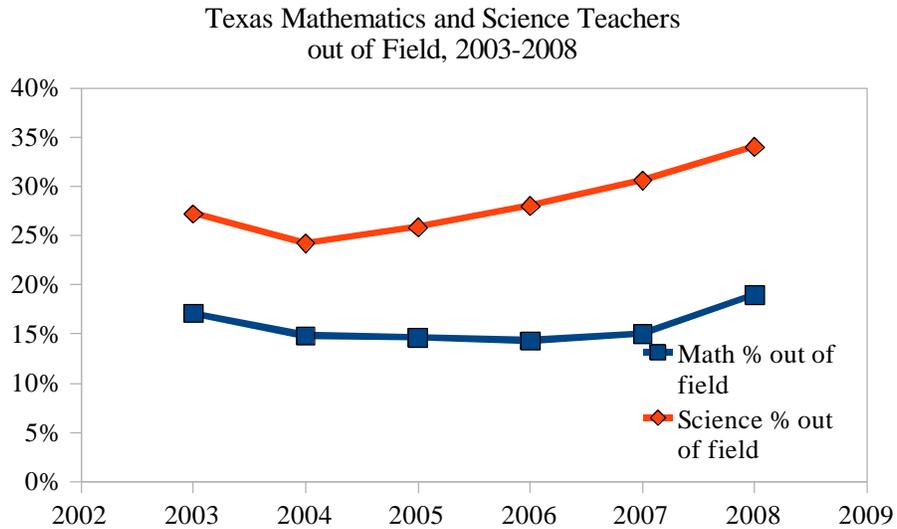
## ***ii. Partner Institution/LEA Needs Assessments***

### **1. The University of Texas at Austin**

The University of Texas at Austin is the largest public institution of higher education in Texas and one of the nation’s top research universities. The University is fully engaged in the preparation of teachers at every level and in all subject areas. As lead university in this consortium, UT Austin plays a dual role: (1) it is host for the UTeach Institute and will provide support for our partner sites engaged in UTeach implementation, and (2) it will undertake additional reform of teacher preparation at UT Austin.

**Teacher Shortages.** Texas, like most states, faces a severe shortage of mathematics and science teachers. Indeed, as shown in Table 1, the shortage has been growing since 2006. Although all sources of teachers, both university-based and alternative, have increased production overall, they have not kept pace with the increasing demand for teachers. This demand will continue to increase because of the 4x4 graduation plan, which calls for high school students on the recommended graduation plan to complete four years of mathematics and four years of science.

<b>Table 1: Shows estimates of the teacher shortage by discipline, assuming 20 students per class on average and attempting to teach one class each of Physics, Chemistry, and Biology to each high school</b>				
	Physics	Chemistry	Biology	Mathematics
Total individuals teaching	1852	3657	4967	10262
Number individuals out of field	524	1069	1588	1539
Teachers required to teach one of each science and 4 math courses to each high school student, with 20 students per class.	2889	2889	2889	12165
Actual FTEs assigned	813	2195	2926	
<b>Shortage</b>	<b>1561</b>	<b>301</b>	<b>None</b>	<b>3442</b>



**Figure 1:** *percentage of Texas mathematics and science teachers teaching out of field.*

*Source: Texas Education Agency Data from 2007. Data interpretation, Michael P. Marder, UT*

The teacher shortage is acutely felt at the school district level as well. The Del Valle Independent School District (DVISD), one of the partner LEAs in the University of Texas eligible partnership, suffered a 19.8% teacher turnover this year, which was 4.6% higher than the state's teacher turnover rate. In an exit interview poll, 12.04% of DVISD teachers stated they were leaving for a career change in a non-education field, while 18.52% accepted a teaching job in a different school district. 17.5% rated their job orientation and training in the district as fair to poor. Finally, over half of the teachers in DVISD (52.7 %) have 0-5 years of teaching experience. This data indicates that current systems are not supporting teacher retention and student achievement in DVISD. The programs presently serving the school district have not provided adequate support to keep teachers in the district or in the field of education and have not created the necessary conditions to improve student achievement.

The Austin Independent School District faces a similar crisis. In Austin Independent School District, the overall teacher turnover rate is 13%, as of January 2009. Especially at the secondary level, math and science teachers continue to be a critical need area. For example, in Fall 2009, 80 new secondary math and science teachers were hired. These included 16 middle school and 28 high school math teachers and 12 middle school and 24 high school science teachers. These numbers are substantially lower than in previous years. Further, conditions for closing the achievement gap and increasing general student achievement levels are simply inadequate. While 94% of white students met the standard in the Texas Assessment of Knowledge and Skills (TAKS) Test in math and science, that percentage drops dramatically for economically disadvantaged students, with only 69% passing math and only 64% passing science. The achievement gap between white and African-American students is even wider, with only 63% passing math and only 59% passing science. Finally, although the percentages themselves are higher, the achievement gap remains in social studies, reading, and writing, with white students passing at 99%, 98%, and 97% respectively, while African-American and economically disadvantaged students passed at a rate roughly 15% lower. Given the high teacher turnover rate and the wide achievement gap, the need for highly qualified teachers who have the knowledge and skills necessary to close this achievement gap is unequivocal.

**Low Academic Achievement.** The Austin and Del Valle Independent School Districts reflect the same challenges faced by the State of Texas. According to the Texas Education Agency (TEA) 2007-2008 Academic Excellence Indicator System Report, only 70% of all students taking the Texas Assessment of Knowledge and Skills examinations passed them, with Science (74%) and Mathematics (78%) having the lowest passage rates of all content areas. Austin ISD's passage rate falls beneath the state average, with a 65% passage rate overall, 70%

passage rate in Science and 75% in Mathematics. Passage rates for at-risk students dropped to 56% in Mathematics and 45% in Science. Del Valle's overall passage rate on the 2007-2008 TAKS exams was 59%, with only 68% passing in Mathematics and 66% passing in Science. At-risk students passed at the 45% rate overall, with 56% passing Mathematics and 51% in Science.

As indicated in Appendix A, the 14 AISD schools participating in this study and the seven DVISD schools meet the Department's qualifications as high-need.

**High-Need LEA Partners.** UT Austin will partner with the Austin Independent School District (AISD) and Del Valle Independent School District (DVISD). Both remain high-need districts with substantial achievement gaps in the diverse population. *Austin Independent School District* – AISD currently serves 82,181 students in 78 elementary schools, 17 middle schools, 13 high schools, and 12 special campuses. Over 60% (60.8%) of students are classified as economically disadvantaged. *Del Valle Independent School District* – Del Valle ISD, located near Austin, currently serves approximately 9,159 students. DVISD has seven elementary schools, two middle schools, and one high school. The district will open a new middle school in August 2010 and a new elementary campus in August 2011. Nearly 28% of the students have limited English proficiency (LEP). The TEA confirms that 79.2% of the students have a low socioeconomic status and 64.1% are considered at-risk.

## 2. Cleveland State University

**University Profile.** Cleveland State University was established as an urban, state university in 1964 and has continued to grow since. Today, more than 1,000 courses support 200 major fields of study at the bachelor, master, doctoral, and law degree levels, as well as professional certificate and continuing education programs. Of Cleveland State's 16,000 students, approximately one-third are enrolled in graduate-level programs and about half attend

on a part-time basis. The College of Science at CSU was founded in 2004 when it became a separate entity from the College of Arts and Sciences. Since then, CSU has seen an increase in the number of undergraduate students enrolled in STEM majors; between 2003 and 2007 there was an increase of nearly 300 STEM majors in the College of Science. However, the number of these undergraduate majors who are also securing a teaching license is too low. In 2007-2008, there were no students receiving a high school science license and only five students received a high school mathematics license; 10 received a middle childhood science license; and 15 received a middle childhood mathematics license.

**Teacher Shortage.** Ohio faces severe teacher shortages in STEM fields and requires many more highly qualified mathematics and science teachers than is currently being produced, as shown in Table 2. Nearly 16% of secondary science teachers and 13% of secondary math teachers in the state are teaching with an emergency/nonstandard certificate or teaching out-of-field.

<b>Table 2: State Teacher Shortage in Secondary Math, Science and Computer Science 2005-06</b>				
	Number Certified	Emergency Permit	No standard certificate	out-of-field **
Secondary Science Teachers	6,910	164	853	255
Secondary Math Teachers	8,424	173	848	287
Secondary Computer Science Teachers	1,208	36	317	205
<b>2005-06 New Certificates in Mathematics, Science, and Computer Science</b>				
Number of Teachers awarded secondary certification	Math	Science	Computer Science	
	1,232	1,086	178	

\*\* Ohio districts do not report “primary” teaching assignments. The number of teachers teaching out of field-regardless of primary assignment-was substituted.

**Low Academic Achievement.** Student achievement in the Cleveland school district is in equally dire straits. In 2005-2006, Cleveland met zero out of 25 report card indicators. At this

time, a quarter of Cleveland District teachers are not highly-qualified in core subject elementary and secondary school classes. Student achievement data, including Ohio proficiency and achievement testing through the Ohio Department of Education Report Card Data show that math and science education in Ohio need urgent attention. Near or less than half of all African Americans, Hispanics, American Indian/Alaskan Natives, multi-racial students, LEP students, and students with disabilities scored proficient or above in mathematics in the 2007-2008 school year. During the 2007-2008 school year at the tenth grade level, 55.2% of students passed the Ohio Graduation Test in Mathematics and only 43.7% passed the science portion.

**High-need LEA Partners.** CSU's partnering LEA is the Cleveland Municipal School District (CMSD), a large urban system with a student population of 57,698, all of whom come from economically disadvantaged families and participate in Universal Meals. Approximately 79% receive some form of public assistance. Table 2 further illustrates the need for highly qualified teachers in CMSD. Within the subgroups, the majority of percentages reported for reading, mathematics, and science are near or less than 50%, which means that 50% or less of students in CMSD are proficient in those subjects in their grade level. During the 2007-2008 school year at the tenth grade level, only 55.2% of students in the CMSD passed the Ohio Graduation Test in Mathematics and only 43.7% passed the science portion of the Ohio Graduation Test. As discussed above, because teacher quality can be the most determinative factor in student achievement, CMSD is clearly in need of highly qualified teachers who can help lift the student achievement rates in reading, mathematics, and science.

<b>Table 3: Percentage of students scoring at or above proficient in 07-08</b>									
	Black, non-Hispanic	American Indian or Nat. Alaskan	Asian or Pacific Islander	Hispanic	Multi-Racial	White, non-Hispanic	Students with Disabilities	Econ. Disadvtdgd	Limited English Proficient
Reading	50.1	67.8	75.6	53.5	62.9	68	35.9	52.2	39.6
Math	36.5	64.5	73.2	41.4	50.3	59.1	30.3	39.7	30.1
Science	28	37.5	47.3	34.4	37.8	52.1	32.3	30.9	22.2

### 3. Middle Tennessee State University

**University Profile.** Founded in 1909, Middle Tennessee State University (MTSU) has grown into a comprehensive doctoral university of more than 23,000 students, the largest undergraduate population in the state. Even so, MTSU’s production of certified math and science teachers is extremely low. In 2006-2007, only seven MTSU undergraduates were certified in mathematics and three undergraduates were certified in science. In 2007-2008, those numbers were six and four, respectively.

**Teacher Shortage.** The state of Tennessee is facing a crisis in terms of the number of teachers certified to teach 7-12 math and science courses. In 2005-2006, a total of 208 students in the state sought initial teacher licensure in 7-12 math and science. Less than half of these were in math, 69 were in biology, 17 in chemistry, six in physics, five in earth science, and 12 in agriscience. The state’s recent adoption of the American Diploma Project, which increases the number of math and science credits required to graduate from high school, has heightened the need for qualified teachers. A study published by the Center for Regional Economic Competitiveness in 2007 found that the middle Tennessee region is experiencing an annual shortfall of almost 1,700 graduates in the areas of mathematics, science and engineering at the collegiate level. This further impacts the secondary teacher shortage since graduates with majors

in these areas are lured into non-teaching jobs where the demand and pay are higher. This creates a vicious cycle where under-qualified science and math teachers fill our classrooms and not only fail to adequately educate students but fail to inspire further study in these critical areas at the college level.

The achievement gap between present in the Bedford County School district demonstrates the need for more highly qualified teachers at the local level. While an average of 80% of students in Bedford tested proficient in science, only 69% of African-Americans, 71% of Hispanic, and 72% of economically disadvantaged students reached that same level of proficiency. As described in the above-mentioned Darling-Hammond study, strong teachers can have more influence in closing the achievement gap than any other factor. Bedford County School District is clearly in need of those highly-qualified teachers.

**Low Academic Achievement.** The State of Tennessee is facing a significant challenge in educating its citizens. At every level of the education spectrum, the State must improve quality and attainment to become competitive in the global economy. For the 2007 administration of the National Assessment of Educational Progress, only 23% of Tennessee's 8<sup>th</sup> grade students scored at or above proficient, while the national rate is 64%. Tennessee's student achievement in science is similar: 25% of 8<sup>th</sup> graders are at or above proficient as compared to 55% nationally.

This low academic achievement at a young age has led to poor high school graduation rates, college going rates, and educational attainment rates. Only 85% of Tennesseans aged 25-64 have a high school diploma, ranking Tennessee at 38<sup>th</sup> in the nation on this assessment. Tennessee is 48<sup>th</sup> in the nation in the number of Tennessee residents aged 25-64 holding an associate's degree or above. Tennessee must move forward to improve the education of its students and increase the educational attainment level of its citizens.

**High-need LEA Partners.** MTSU will partner with two high-need LEAs: Bedford County and Metro Nashville Public Schools. Bedford County has experienced a 20% increase in its population in the past decade, which is double the amount of the previous ten years, and a 13% growth in Hispanics in the past two years. Additionally, the number of students who qualify for free and reduced lunches has increased by 15.5% over the last five years, to 52.5%.

MTSU will also work with Metro Nashville Public Schools. While 20% of students in this district are from families at the poverty level, the numbers of economically disadvantaged students at the individual schools are even more telling: Antioch High School (61.7% poverty), Antioch Middle School (83% poverty), Apollo Middle School (91.7% poverty), JFK Middle School (68.4% poverty), Mt. View Elementary School (67.4% poverty), and Lakeview Elementary School (72.1% poverty).

### **C. STEP ONE: THE UTEACH MODEL**

The UTeach program offers an innovative and compact four-year plan for students to obtain secondary teaching certification while concurrently earning a mathematics or science degree. As UTeach program students complete the requirements for their math or science major, they also enroll in classes that prepare them as exceptional teachers and participate in early and intensive pre-service clinical experiences in high-need schools. Thus, UTeach program graduates have both the skills of highly-qualified teachers as well as a thorough content knowledge in their math or science majors. This curriculum replaces more generic education courses and instead focuses on how to teach mathematics and science. By requiring both subject matter expertise and comprehensive teacher preparation that is keyed to that subject, the UTeach program sets a new standard in teacher preparation and lays the foundation for the expanded teacher preparation reform discussed in Step Two below.

*i. Expanding the UTeach Model*

The original UTeach program replication announcement in March 2007 received applications from 52 universities. This is an impressive response to an RFP that required proposal submissions in just two months. The university partners selected to join this Consortium application were either finalists in the 2007 competition or have since diligently prepared for and developed strong institutional commitment to faithfully replicate the UTeach program. These universities realize that the traditional means of preparing STEM teachers is not only failing to attract students, but is failing to give them a strong content background. They stand ready to “hit the ground running” to make significant progress in STEM teacher preparation, professional development, and teacher induction/retention.

NMSI provided private sector funds to replicate the UTeach program in ten universities outside of Texas, and, with the help of in-state donors, three additional universities are funded in Texas, for a total of 13 current implementation sites. These include: University of California at Berkeley, University of California at Irvine, University of Kansas, University of Houston, Florida State University, University of Florida, University of Colorado at Boulder, Louisiana State University, Temple University, Western Kentucky University, Northern Arizona University, University of Texas at Dallas, and University of North Texas. NMSI, through private donations, funds much of the Institute support services necessary for and creative implementation of the model.

To be eligible as a UTeach implementation site per NMSI’s and the Institute’s standards, universities must meet rigorous selection requirements including:

- Commitment to make significant systemic change in STEM teacher preparation;

- Adoption of UTeach as the only undergraduate STEM teacher preparation program in the university;
- Demonstration of substantive faculty commitment to UTeach implementation;
- Commitment to matching the grant award to replicate UTeach;
- Commitment to sustain the program beyond the grant period; and
- Consent to providing fiscal and program data that verify performance.

These commitments **align perfectly** with those sought by the Department in this grant. Because these commitments are closely monitored and strictly required by NMSI and the Institute,<sup>3</sup> the Department can depend on the Consortium's faithful implementation of these shared and essential prerequisites.

The Institute also evaluates the prospective university's willingness to partner with high-need and/or underserved urban school districts during both the clinical experience and as UTeach graduates become first-year teachers. As discussed below, almost half of the UTeach program graduates from the University of Texas at Austin teach in schools where a majority of the students receive free or reduced-price lunch. Similarly, 11 out of 13 of the universities currently replicating UTeach have applied for and received Noyce Scholarship grants, which fund a portion of students' UTeach courses on the condition that those students enter high-need schools upon graduation. NMSI and the Institute find it critical to emulate and improve upon this trend at future expansion sites and to endorse further linkages between producing qualified teachers and promoting equity and excellence in math and science education at the K-12 level.

In sum, the core of the UTeach program is to serve as a catalyst for systemic change at partner universities such that they not only produce an increased number of high quality STEM

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<sup>3</sup> See *below* Section III, Quality of Management Plan, page 69.

teachers, but that they play a role in advancing broad reforms in STEM education at both the university and secondary levels. Above all, these university partners have provided a convincing case that a team of scientists and mathematicians, education researchers, and master teachers will come together to transform teacher preparation at their institution, and science and mathematics teaching in their region.

***ii. UTeach is a Proven Program – Major Accomplishments***

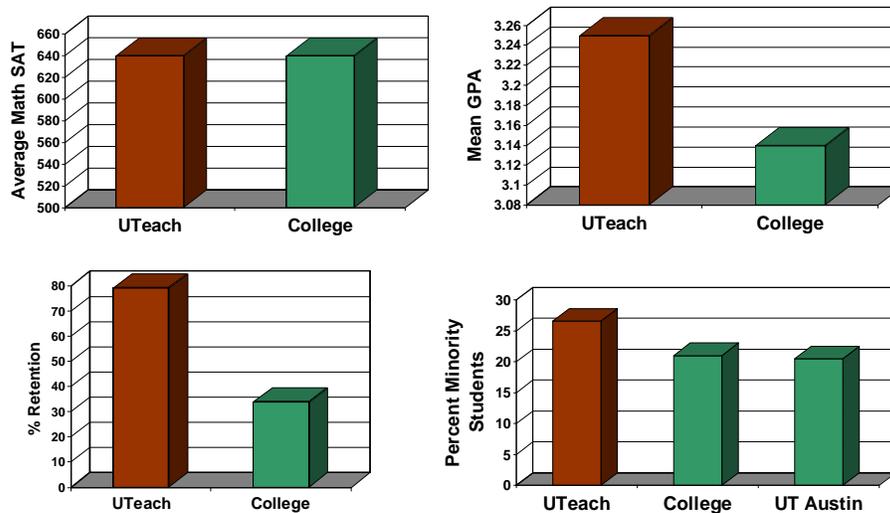
Since its inception, the UTeach program has significantly increased the number of highly-qualified STEM teachers. For example, 92% of UTeach program graduates go on to teach immediately, all of them in the high-need math and science fields. Further, 82% of graduates of the UTeach program are still teaching after five years, compared to a national average retention rate of only 65% (Schools and Staffing Survey, 2004). Importantly, approximately half of these UTeach program graduates teach in schools where a majority of the students receive free or reduced-price lunch.

Not only does the UTeach program have a proven track record of increasing the number of math and science teachers who graduate, the UTeach program heightens the quality of math and science teachers, as demonstrated by Figures 2 and 3 and the bullets below:

- When compared to other students enrolled in the College of Science and the university as a whole, UTeach students tend to have higher than average GPAs, are retained in the College of Science longer, and include a higher percentage of minority students.
- 85% of UTeach graduates earn mathematics or science majors, and all have taken at least 24 hours of mathematics or science content.
- 92% of those certified go on to teach immediately.

- UTeach graduates stay in teaching longer than other teachers: 82% are still in teaching five years after entering the field, compared with fewer than 70% nationally. Figure 3.
- 45% of UTeach graduates teach in schools where 40% or more of the students qualify for free or reduced-price lunches.

**Figure 2:** Data describing UTeach students at UT Austin, FY 2008-09

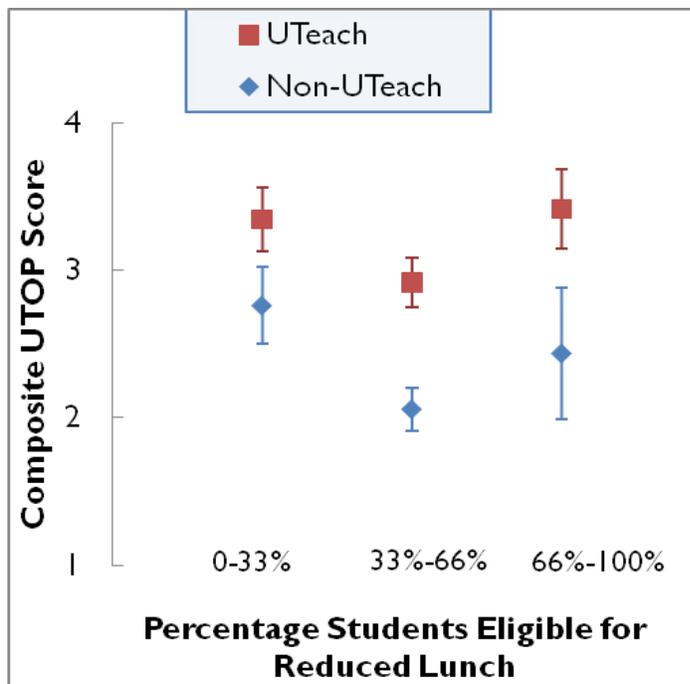


College = College of Natural Sciences

A final and very important point to make is that, as Figure 3 below illustrates, UTeach graduates teaching in public schools have been shown to out-perform non-UTeach teachers on selected measures in observations performed over a three-year period using a classroom observation instrument that measures quality of instruction. The 83 observations used to generate the results depicted in Figure 3 were conducted over three years in the Austin and Manor Independent School Districts in and near Austin, Texas. Sixteen novice secondary mathematics and science teachers who did not graduate from the UTeach program and 22 UTeach graduate novice secondary mathematics and science teachers were observed. Note that because participation in these observations was voluntary, the teachers do not represent a random representative sample; however, it is most likely that the non-UTeach teachers who agreed to be The Teacher Preparation Reform Consortium Teacher Quality Partnership Grant Application

observed were more prepared and confident than average. This study provides strong preliminary evidence that UTeach graduates are some of the most effective and well-prepared teachers in classrooms today, and they outperform other teachers of comparable experience with all types of students.

**Figure 3:** Composite classroom observation score for UTeach and non-UTeach students



grouped by level of economic need in school. Observations were conducted using the UTeach Observation Protocol (UTOP), which measures content knowledge, classroom environment, lesson structure, and lesson implementation. Error bars indicate 1 standard error. Work supported by the National Science Foundation, PI Michael Marder.

Given this history of producing significant and lasting impact in teacher preparation, professional development, and retention of STEM teachers, the UTeach program is primed for national expansion. In fact, as discussed in further detail below, NMSI and the Institute have a strong track record of successfully scaling the UTeach program with fidelity to the original program design and are fully prepared to continue expanding this proven program. Furthermore, many elements that generate such successful results in STEM teacher preparation are transferable to other areas of teacher preparation. Accordingly, and in compliance with the grant requirements, the Consortium will also apply funds received through this grant to build on

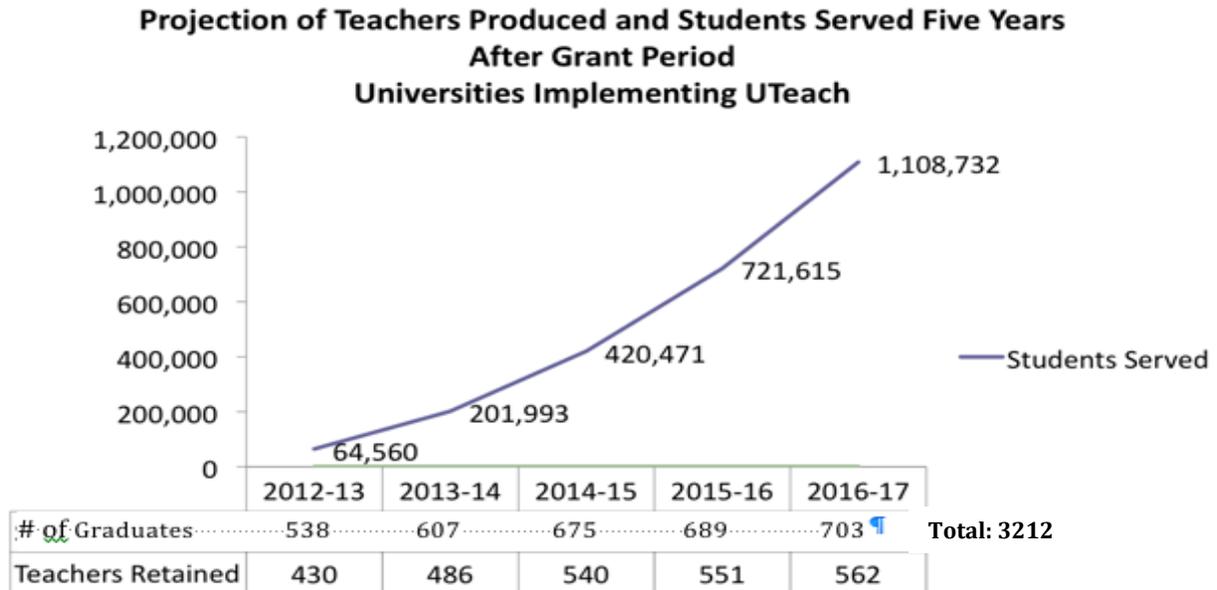
lessons learned from the UTeach program, thereby initiating broader teacher preparation reform at each partner institution.

Preliminary results demonstrate that the NMSI/UTeach Institute strategies are working and that the UTeach program model translates well to other universities. As the enrollment numbers below demonstrate, this first cohort of expansion sites have already made significant progress attracting new students into teacher preparation:

<b>Replicating University</b>	<b>Number of Students Enrolled in year 1</b>
Northern Arizona University	78
University of California at Berkeley	28
University of California at Irvine	70
University of Colorado at Boulder	97
Florida State University	79
University of Florida at Gainesville	70
University of Kansas	100
Western Kentucky University	41
Louisiana State University	138
Temple University	62
University of Houston	120
University of North Texas	89
University of Texas at Dallas	42
<b>Total Number Of Students Enrolled</b>	<b>1,104</b>

By implementing UTeach at 13 universities, NMSI and the Institute project that this first cohort of sites will produce more than 700 math and science teachers, serving over one million students by 2016 (See Figure 4 below). Each teacher is expected to reach over 4,000 students during the course of his or her teaching career. Given the existing and growing demand for the UTeach program growing at other universities and states, expansion of program strategies will continue to increase the number of qualified STEM teachers produced each year.

**Figure 4.**



**II. QUALITY OF PROGRAM DESIGN (Selection Criteria – 40 Points)**

**A. DESCRIPTION OF THE PROJECT: UTEACH PROGRAM REPLICATION**

**(General Program Requirement, as applied to the Consortium’s first goal of increasing the quantity and quality of STEM teachers)**

***i. Preparing New, Highly-Qualified Teachers with Strong Teaching Skills***

***(Checklist Requirement)***

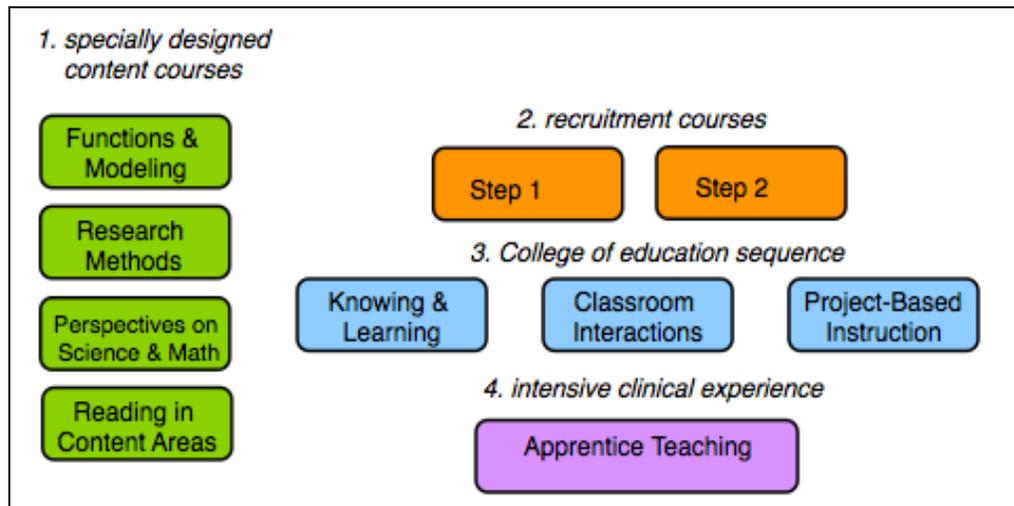
**a. Program Design and Curriculum Overview**

The UTeach courses meet the required reform outlined in the TQP Grants Program RFP. The UTeach curriculum is designed to ensure that prospective teachers (1) understand and can implement research-based instructional strategies; (2) have knowledge of a variety of student learning methods; (3) possess skills to analyze assessment results and evidence of student learning in order to improve classroom instruction; (4) possess teaching skills and understanding of effective instructional strategies across all applicable content areas; (5) meet the needs of all students, including students with disabilities, English Language Learners, cultural issues, The Teacher Preparation Reform Consortium  
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bilingual education, gender issues, gifted and talented, and low literacy levels; (6) can employ effective reading strategies using the essential components of reading instruction; and (7) have the requisite content knowledge, preparation, and degree to teach Advanced Placement or International Baccalaureate courses successfully. The UTeach program curriculum is designed to provide high quality preparation for teaching while also presenting an attractive option to the widest range of high-achieving STEM students.

The UTeach program philosophy is that combining extensive individualized coaching, intensive teaching opportunities and relevant content develops students’ knowledge and skills at an accelerated rate. This approach generates a streamlined, field-intensive curriculum that does not require students to spend additional time or incur additional expense at their universities.

**Figure 5: UTeach Program Courses**



The UTeach curriculum is a streamlined, tightly-articulated sequence of professional development courses with a focus on the development and integration of deep content knowledge and pedagogical content knowledge in a highly-supported field environment. As depicted in Figure 5, the UTeach program curriculum is a unique combination of (1) rigorous content courses required of disciplinary majors, (2) additional rigorous content courses designed

specifically for future teachers, (3) early recruitment courses that provide students with immediate classroom teaching experience, (4) domain-specific education courses that firmly situate pedagogical instruction within the STEM disciplines, and (5) an intensive final clinical teaching experience paired with a weekly seminar. This curriculum further reflects the strong partnerships that exist between the College of Natural Sciences, the College of Liberal Arts, and the College of Education.

An essential feature of the UTeach program is the active recruitment of all students who have declared an interest in mathematics or science. The first two introductory UTeach courses are offered free of tuition so that students get immediate field experience in elementary and middle school classrooms at no cost to them. Because the UTeach program has a flexible curriculum, it is even possible for students to enter the program at later stages and, in most cases, still graduate on time. For example, a junior who decides to explore teaching has options available that allow flexible entry, with suggested paths for completing all courses and apprentice teaching in the minimum amount of time. The compact UTeach degree plan is especially important to students who have limited financial resources. The design promotes several financial aid options, including scholarships and paid internships at schools, museums, and other education-related organizations.

***ii. Clinical Teaching Program (Checklist Requirement)***

All clinical teaching experiences embedded in the UTeach curriculum meet the required reforms outlined in the TQP Grants Program RFP. As described immediately below, this field-intensive curriculum includes: (1) the equivalent of a year-long teaching component; (2) opportunities to teach in high-need schools, (3) close supervision and extensive coaching by experienced teachers and faculty, (4) mentoring by high-quality teachers, (5) integration of

pedagogy, classroom practices, and effective teaching skills, (6) alignment with relevant content in the UTeach curriculum, and (7) experiences teaching in LEAs where they are likely to teach in the future.

The pre-service clinical teaching component is the foundation of an effective UTeach program. Students are required to teach lessons in high-need schools early and throughout the UTeach program. These clinical teaching experiences are aligned with math and science content course work and conducted under the supervision of experienced, cooperating mentor teachers who provide support and feedback. Clinical faculty/master teachers, who are university employees, observe and provide coaching to UTeach program pre-service students as they develop their professional expertise during their undergraduate years. The final clinical teaching requirement, known as Apprentice Teaching, integrates pedagogy, classroom practices, and effective teaching skills. UTeach program pre-service students are mentored, observed, provided feedback, and coached by three professionals – the experienced and successful teacher in whose classroom they teach, a University Facilitator who visits them a minimum of 10 times during the Apprentice Teaching semester, and the Master Teacher (full-time, UTeach Clinical Faculty) who instructs them in the seminar class that meets weekly. This intensive, focused and individualized support system has proven successful at preparing UTeach graduates to enter the classroom as competent and qualified first-year teachers.

UTeach programs pay a stipend to each mentor teacher who works with UTeach students in a field placement, determined by the extent of a teacher's involvement in different courses. Mentor teachers are paid at the end of each semester, when they have completed copies of the final evaluations for each student assigned to him or her. In addition, the UTeach programs at each university will support their mentor teachers by providing training sessions each semester

for both new and experienced teachers who work with our pre-service students in all field-based clinical courses. These sessions are focused on the specific goals and objectives of each clinical course and train our mentors (1) in the essential elements of the UTeach model for inquiry-based instruction; (2) how to assist our students in the development and implementation of UTeach model lessons; and (3) how to provide constructive feedback to the UTeach student teachers.

The link between theory and practice is another consistently prominent feature of the UTeach program, and the design of the UTeach program field component provides students with early and ongoing opportunities to implement and reflect on instructional strategies about which they are learning. Field experiences are tightly coupled with course content and in-class instruction. Course assignments and projects involve detailed analysis of student field experiences and significant class time is devoted to preparing for, practicing, debriefing, and reflecting on those teaching experiences.

*iii. Bringing Empirically-Based Practice and Scientifically Valid Research into Teaching and Learning (Checklist Requirement)*

UTeach courses provide **rigorous instruction based on current empirically-based practices and scientifically valid research** and emphasize the development of deep-level understanding of both subject material and pedagogy. There are no generic education courses in the UTeach course sequence. All courses are designed with a focus on **integrating content and pedagogy**. Starting with the first two courses designed to introduce students to teaching, the UTeach program emphasizes research-based, nationally recognized curricula and materials including FOSS and GEMS kits. Students are immediately introduced to the 5E Instructional Model developed by BSCS, an inquiry-based sequence of instruction that exposes students to problem situations (i.e., engage their thinking) and then provides opportunities to *explore*,

*explain, extend, and evaluate* their learning. Students develop 5E lessons around well-tested science and math activities from FOSS, GEMS, etc.

Likewise, education courses in the sequence focus on current empirically-based practices and scientifically valid research in teaching and learning within the STEM domains. In the UTeach course *Knowing and Learning in Mathematics and Science*, not only do students study current learning theory and gain knowledge of student learning methods, they also explore domain-specific understanding in mathematics and science. The *Classroom Interactions* course provides students with opportunities to see how theories explored in *Knowing and Learning* play out in instructional settings, continually applying and evaluating the research on a variety of instructional models in math and science classrooms. During *Project-Based Instruction*, competency is continually built as students study and discuss the research basis for project-based instruction; implement and reflect on the problem and project-based activities; and incorporate what they learn into the design of an entire project-based unit of instruction.

Students begin the program designing, implementing, and reflecting on a series of 5E inquiry-based lessons, focusing initially on the development of effective questioning strategies. The instructional focus in *Step 2: Inquiry-Based Lesson Design* broadens to include attributes of adolescent learners and formal and informal assessment strategies. Students design lessons that include pre- and post-assessments, implement them in middle school classrooms, analyze assessment results and student work, and revise them based on evidence of student learning. A full 75% of both introductory Step courses is devoted to field activities. In the *Knowing and Learning in Mathematics and Science* course, students apply what they are learning in class to a series of one-on-one, field-based clinical interviews designed to elicit learners' various approaches to and reasoning about solving mathematics and science problems. These activities

comprise approximately 15% of the course. During *Classroom Interactions*, students design and implement multi-day, connected activities and lessons based on various instructional models introduced in class. They conduct a series of analyses of these videotaped teaching events for evidence of effective instructional strategies and student learning; 50% of the course is devoted to field-based activities.

Next, during *Project-Based Instruction (PBI)*, students apply principles of PBI in the design and implementation of project-based lessons with students both in the classroom and in an out-of-school field setting. These and related activities comprise 50% of the PBI course. Students go on to apply this experience to the design of a complete instructional unit. Even in the *Perspectives on Science and Mathematics* course, a required history course, 15% of the course is devoted to developing and teaching lessons that incorporate historical content.

*iv. Preparing Teachers to Use Research and Data to Modify and Improve Instruction (Checklist Requirement)*

**a. Integration of Technology and Assessment**

The streamlined UTeach curriculum is made possible in part by the integration of a number of themes into all UTeach courses. Rather than require separate, stand-alone courses on technology, equity or assessment, UTeach students are continually engaged in these topics in all of their UTeach courses.

**Technology.** In all UTeach courses, students are required to use basic productivity tools to complete and present work, to access course materials and for communication with instructors, Teaching Assistants, etc. As early as Step 2, students are required to develop lessons that integrate technology instructionally. Particular emphasis is placed on data collection technologies early in the curriculum. Throughout the program, students learn to use an array of

technologies necessary to do the work of scientists and mathematicians. Beyond that, the curriculum devotes special attention to the influence of particular technologies on the advancement of the STEM disciplines and its implications for teaching and learning. Additionally, UTeach courses dedicate time to providing students with experience using the same instructional technology tools that are available in secondary classrooms. Finally, the course structure continually focuses on analyzing instructional technologies for appropriate use in teaching and learning STEM content and skills. UTeach students are required to provide multiple examples of how they are able to effectively integrate technology instructionally as part of a final program portfolio.

**Assessment** is another prominent theme across all UTeach courses. In addition to identifying measurable objectives for all lessons they develop, students must also generate both formative and summative assessment strategies based on these objectives. Students are required, at a number of stages in the program and with increasing complexity, to analyze student academic achievement data and other measures of student learning in order to adjust teaching strategies, revise lessons, and improve classroom instruction:

- During the Step courses, emphasis is placed on teaching UTeach students to ask effective questions throughout their lessons so that they can assess the progress their students are making in understanding lesson concepts. UTeach students also use pre- and post-assessments to evaluate student learning, to provide instructive feedback to middle school students, and as a basis for revising a lesson plan.
- *Knowing and Learning in Mathematics and Science* explicitly raises issues related to the application of measurement theory, as first developed in the natural sciences, to psychology and, in particular, to characterizing the development of knowing in

mathematics and science. Topics related to classical measurement theory and item response theory are addressed in the context of assessment in general and in the context of high-stakes testing in particular.

- During *Classroom Interactions*, students analyze state standardized test scores within the context of such factors as ethnicity, funding, and teacher preparation.
- In *Research Methods*, students use statistics to interpret experimental results and deal with sampling error. They practice using statistics to make sense of data sets, a necessary skill for analyzing data from high stakes tests.
- During the *Apprentice Teaching* semester, students participate in all school-based activities related to interpreting test scores and developing related instructional strategies. UTeach students are required to provide multiple examples of how they are able to effectively design, implement, and analyze assessment data in order to improve instruction as part of a final program portfolio.

***v. Teaching Students with Disabilities and Limited English Proficiency***

***(Checklist Requirement)***

Equity is a persistent and inextricable component of UTeach, from the design of the program, to the support that students receive, to the curricular content and instruction. A primary tenet of the program design is recruitment of and support for a wide-ranging and diverse group of students in the teaching field. Course content continually addresses relevant issues of equity and focuses on developing students' abilities to prepare and deliver instruction in ways that meet individual student needs, facilitate learning for all students, and differentiate instruction for students as needed. From the very beginning of the program, inquiry-based instruction is promoted as a tool for promoting equitable instruction so that all students are allowed to not only

build on their own unique knowledge and background, but are also engaged in a common experience that becomes the context for instruction and further development of content knowledge and skills.

Also, from the very beginning and throughout the program, UTeach students are placed in diverse classrooms in high-need schools for field experiences. Interactions with diverse students provide a rich source for personal reflection and classroom discussion that is naturally integrated into class meetings. UTeach students also read research and discuss issues arising from particular equity topics, including students with low literacy levels, English Language Learners, Learning Disabilities, Cultural Issues, Bilingual Education, Gender Issues, Teacher Expectations and Stereotype Threat, Deficit Models of Instruction, and Classification and Legal Rights of Special Education (IDEA, IDEIA, Section 504 accommodations, Gifted and Talented, IEP and ARD regulations). UTeach students are prepared to effectively participate as a member of the individualized education program team, as defined in Section 614(d)(1)(B).

***vi. Literacy Training (Checklist Requirement)***

Literacy training and instruction is also distributed as a strand across the UTeach curriculum. In addition to a stand-alone course, *Reading in the Content Areas*, which is required of middle school certifiers, all UTeach students receive instruction on the essential components of reading instruction in all UTeach courses. This instruction prepares UTeach students to provide individualized, intensive, and targeted literacy instruction for students with deficiencies in literacy skills. The contents of the text *Content Area Reading and Literacy: Succeeding in Today's Diverse Classrooms* by Alvermann, Phelps, and Ridgeway (5th edition, Pearson, 2007) has been mapped to the UTeach course curriculum in order to ensure conceptual development as students progress through the program. This content includes basic literacy concepts in

curriculum and instruction as well as strategies for use by content teachers in promoting literacy development.

***vii. Teacher Recruitment (Checklist Requirement)***

The critical shortage of STEM teachers demands a vibrant recruitment agenda. The UTeach model targets a new pool of potential teachers; students who are declared majors in math, science and computer science programs. The UTeach program currently employs a variety of strategies to recruit students, including:

- Presentations in freshman orientation programs;
- Emails and letters to freshman math and science majors;
- Development of a unique program name and identity (e. g. UKanTeach at University of Kansas or GeauxTeach at Louisiana State University);
- Give-aways of cups, buttons, pens, etc. to promote program name recognition;
- Program presentations by faculty in mathematics, science and computer science introductory courses;
- Personal contact between current UTeach students and incoming freshmen;
- Announcements in student newspapers and other student publications; and
- Listings on the institution’s website.

The Consortium universities also have locally-tailored recruitment plans that each will implement based on the needs and opportunities available. For example, Cleveland State University plans to work with its local public television (PBS) and radio (NPR) station collaboration—*ideastream*—to develop audio and visual public service announcements about CSUTeach. Similarly, MTeach staff at Middle Tennessee State University will film an informational video that will feature program participants working with students and teachers at

the partner LEA and will air this video on the MTSU television channel that is viewed by students and community members throughout the area. Experience from the 13 universities currently implementing UTeach clearly demonstrates that, with these and other recruitment strategies, the university partners can attract many students majoring in math and science who will enroll in a program that allows them to continue their major and acquire teaching competencies within a four year period.

***viii. Professional Development (Checklist Requirement)***

Professional development and teacher induction are critically important components of the UTeach program. The Consortium proposes to devote a portion of this grant to the development of an Induction and Professional Development program for all partner universities and partner LEAs based on key features of the UTeach Austin Induction program, as described below in part B of this section. In order to ensure coordination between all entities in the partnership, these programs will be cooperatively developed by the UTeach Institute and the partner universities and LEAs. The Consortium anticipates that these professional development and induction programs will build on key features of the induction program, the existing efforts of the IHE and LEA partners, and the results of an assessment to determine specific partner needs at the IHEs and within the LEAs.

Professional development programs implemented in the local high-need school districts through the UTeach program are based on the goals of those high-need LEAs and the UTeach program philosophy and capacities. Professional development opportunities often are created on-demand in addition to those provided to teachers in the LEA throughout the academic year, on local campuses and at the universities. A small sample of professional development support services that would be provided to the partner high-need schools include:

- Developing and co-teaching inquiry-based lessons, integrating technology, meeting the needs of diverse learners, and training on the essential components of reading instruction;
- Assistance with analysis of student test data from teacher-developed and district and state standardized tests;
- Meeting the requirements of Individualized Education Plans (IEPs) and developing methods for individualized instruction for all students, especially those with special needs;
- Developing strategies and ideas to create collaborative classrooms that provide buy-in and opportunity for all students;
- Co-teaching and modeling strategies that demonstrate how to shift from a teacher centered classroom to one that is student centered;
- Strengthening content knowledge and skills; and
- Partnering in grant writing to acquire funds for professional development, equipment, supplies and new technologies for effective instruction.

UT Austin, in its role as the Consortium’s lead university, will further enhance the UTeach professional development model by incorporating a summer session professional development program for teachers in its high-need LEA partners, the UTeach Natural Sciences Summer Masters program (the Summer Masters program). This will help retain teachers in the high-need school partners’ classrooms and create new teacher leaders out of both novice and experienced mathematics and science teachers at these high-need school partners. The Summer Masters Program will include upper elementary and middle school (grades 4 – 8) science and mathematics teachers/instructional specialists and will create a cohort of upper elementary/middle school teacher leaders in the discipline-specific areas of physical science

(physics and chemistry) and mathematics. These teachers will enter the UTeach Summer Masters Program and receive coursework specially developed for them, based on the content knowledge required for teaching grades 4 through 8, based on NSES and NCTM standards and elaborated to convey this content at the post-secondary level. This new cohort, along with existing and past cohorts, will generate a pool of exceptionally qualified mathematics and science teachers and instructional specialists.

UTeach Austin will continue to develop vital capacity for model lesson/project-based unit development and testing in real classrooms by offering two sessions each summer. UT Austin resources and an active fund-raising campaign will create an endowment to establish the UTeach Summer Masters program beyond the grant funding period so that additional cohorts of exceptionally qualified master teacher leaders can be produced. This will increase the rigor and challenge offered in the high-need schools and districts as well as provide the teachers with the practical experience necessary for their continued development of well-crafted, well-vetted lessons and project-based units for national dissemination through the Web-based UTeach Professional Development Application (see below in part B.ii of this Section).

The professional development aspect of the UTeach program is further enhanced and complemented by the induction program that accompanies UTeach program.

**B. DESCRIPTION OF INDUCTION ACTIVITIES (General Program Requirement)**

*i. The UTeach Induction Program*

The UTeach induction program developed as a natural outgrowth of the services and support provided to pre-service students. As discussed above, the UTeach program requires clinical teaching experiences in public school classrooms throughout the four years of the

UTeach program. During their final clinical teaching requirement, known as Apprentice Teaching, UTeach pre-service students are mentored, observed, provided with feedback and coached by three professionals: (1) the experienced and successful teacher in whose classroom they teach; (2) a University Facilitator who visits them a minimum of 10 times during the Apprentice Training semester; and (3) the Master Teacher who is a full-time member of the UTeach faculty and who instructs them in the weekly Apprentice Teaching seminar class. This intensive, focused and individualized support system has proven successful at preparing UTeach graduates to enter the classroom as competent and qualified first year teachers. We recognize, however, that as first year teachers, graduates need ongoing and continued support. Therefore, upon graduation, Induction Coordinators and Master Teachers provide ongoing individualized support to UTeach program graduates throughout their first two years in the classroom.

The major objectives of the UTeach induction program are:

1. To guide and transform new teachers into expert teachers through individualized and continuous professional development, enabling them to reach their full potential as well-prepared, highly-qualified, and highly-effective teachers;
2. To help new teachers assess and interpret student achievement data in mathematics and science – supporting these graduates as they reflect on multiple data sources in order to evaluate the effectiveness of their teaching and modify instruction to meet the needs of their students;
3. To encourage the development of leadership among new teachers by providing opportunities to attend and present at local, regional, and state conferences; and
4. To provide the appropriate induction support needed by each new teacher in order to assure success and retention in the teaching profession.

The induction program provides support to the UTeach program first and second year teachers not only per a pre-determined and regular schedule, but also as needed, on-demand and on-site. Master Teachers who function as induction coordinators travel to the schools where the UTeach program graduates teach. Services and support are determined by data gathered through observation and interview and then customized to meet the needs of each teacher. Typically, new teachers are visited two times a month, but this schedule can be adjusted depending on their needs. The team of UTeach Master Teachers and Clinical Faculty have experience teaching all levels of secondary mathematics and science courses and are always available as a resource.

Before they begin teaching their first year, UTeach program graduates are provided with New Teacher Starter Kits containing material resources needed to set up their new classrooms. At any time during the school year, all UTeach graduates have access to and can check-out equipment and resources available in the UTeach program inventory. Resources include lab equipment, manipulatives, science or mathematics kits, and books that will be delivered to the UTeach graduate's teacher classroom by the UTeach induction coordinators.

Additionally, in Fall 2010 - Spring 2011 the Institute will coordinate with each University and partnering LEAs to conduct local needs assessments on specific induction and professional development services requested by all the teachers at each school. During Summer of 2011, the results of this needs assessment will be analyzed and used by the Consortium to develop collaboratively a set of professional development sessions that will be piloted during the Spring and Summer semesters 2012. These sessions will be offered to all new *and* experienced teachers employed in the partnering high-need districts.

Thus, while these induction and professional development plans will be based on the UTeach program model, each plan will also be customized for each university and its partnering

LEAs based on the results of the needs assessment. For example, one site might propose to offer regular, monthly training sessions on Saturdays, while another site might propose to develop and implement more extended trainings and workshops during the summer. All professional development opportunities will incorporate the principles that define the UTeach program, blending empirically-based effective teaching practices with scientifically valid research on teaching and learning. By the end of year four of the grant, when new graduates from the UTeach program universities are entering the classroom for the first time, the induction and professional development programs will be well tested, refined, and fully implemented.

*ii. Creating Online Dissemination of UTeach Induction and Professional Development Materials*

UT Austin, in its role as the Consortium's lead university, will further enhance the UTeach induction and professional development model by creating an interactive, efficient and responsive induction/continuing professional development model that can be delivered online. For example, graduates located in Central Texas benefit from individualized, face-to-face support from UTeach's induction coordinators, as discussed above. However, this personalized support cannot be offered to those graduates who work in urban or rural school districts across the State of Texas or nationwide. Many UTeach graduates have therefore requested that UTeach develop a Web-based set of instructional resources for lessons, project-based units and other forms of pedagogical support, particularly addressing students with special needs and English Language Learners. UT Austin will implement this Web-based collection of instructional support tools – The UTeach Professional Development Application (UTeach PDA) - with funds from this grant. This Web-based application will also be shared with and implemented in the UTeach expansion sites funded from this grant.

Through UTeach PDA, UTeach will deliver a Web-based, publically available repository of EC-12 lesson content and instructional support resources devoted to the development of best practices in teaching at all levels and across the country. The goals of this system include:

- Improving high-quality induction support for all new UTeach graduates as well as other novice science and mathematics teachers in high-need/partnering school districts;
- Providing a repository of high-quality resources targeting math and science instruction that address issues of equity and diverse learners (literacy development, Special Education and differentiated instruction, ELL strategies);
- Facilitating personalized, on-demand instructional support for teachers of math and science at all levels;
- Expanding the network of expertise available to provide support to teachers by connecting with other new UTeach graduates, other master teachers and induction coordinators at our other UTeach adoption universities, and other mentor teachers working with UTeach graduates in high-need/partnering school districts.

Features of the UTeach PDA that demonstrate its necessity include:

- A reach beyond lesson content; model lessons will typify rigor and quality by publishing sample student work, instructor notes, and data-driven analyses on teaching effectiveness. This is provided in addition to instructional content and steps;
- Practitioners who provide thoughtful feedback for improvement by sharing student achievement data and modifications created to meet local circumstances;
- UTeach reviewers' selection of lessons to be further developed as "model lessons." Using Master Teacher Leaders prepared at the UTeach Summer Masters Program,<sup>4</sup> the "model

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<sup>4</sup> See *above*, Section II.A.viii., page 38-39.

lessons” will be taught in multiple classrooms by these Master Teacher Leaders, and data on effectiveness will be collected through observations and interviews using the UTOP – the UTeach Observation Protocol (DiBiano, et. al., 2009). Graduate student observers and UTeach faculty will then help to analyze the data gathered after the “model lesson” teaching cycle, debriefings and discussions with Master Teachers/instructors. This data will inform further refinement of high-quality, well-vetted lessons and project-based units that can be published for broader dissemination on the UTeach PDA. Over time, this process will generate a bank of these model lessons for a variety of STEM disciplines at all levels.

- Solicitation of input from UTeach graduates on topics of interest to the community of practitioners. Topics that have been requested by our own UTeach graduates in the past include classroom management and moderating classroom interactions with diverse student populations and strategies to use with English Language Learners and students with special needs.

### **C. DESCRIPTION OF COORDINATION STRATEGIES (General Program Requirement)**

Each university partner will coordinate any activities implemented under the UTeach program with other teacher preparation or professional development programs and will ensure the program is consistent with State, local, and other education reform activities that promote teacher quality and student academic achievement, as demonstrated below:

#### **1. University of Texas at Austin**

The UTeach program at UT Austin coordinates its strategies and activities with several National Science Foundation grants including a Math and Science Partnership to expand UTeach into Engineering and Noyce Scholarship grants. UT Austin has also worked in close partnership

with the Texas High School project, a major effort supported by multiple partners, including the Bill and Melinda Gates Foundation, to reform high schools in Texas. This coordination includes professional development and induction programs in partnerships with LEAs.

## **2. Cleveland State University**

Cleveland State University is vigorously pursuing the development of the UTeach model on campus. The University has been awarded the National Science Foundation Noyce Program Scholarship Grant that will help support the UTeach model at Cleveland State. Because of limitations on the National Science Foundation (NSF) budget (i.e., the majority of the grant provides scholarship support for the students), only a small portion of students can be fully served. Funding under this grant will complement NSF funding and allow Cleveland State to fully employ the UTeach model and grow it to the appropriate size as expected by the Institute.

Cleveland State will also use this grant to build upon the already strong collaborative partnership it enjoys with the Cleveland Municipal School District (CMSD). Cleveland State has provided extensive professional development to almost 300 of the middle school and high school teachers in the CMSD over the past 7 years through two Mathematics and Science Partnership grants, one through NSF and the other through the Ohio Department of Education, as passed through from the Federal Department of Education. These CMSD teachers will provide an excellent pool of strong mentors for the field components of CSUTeach.

On the state level, Ohio is also a partner with Battelle and The Bill and Melinda Gates Foundation on the Ohio STEM Learning Network (OSLN), a unique statewide partnership of K-12, higher education, and business partners to advance STEM education through a diverse portfolio of pre-college, undergraduate and graduate programming. In Northeast Ohio, the work of the OSLN is being carried out by the Metropolitan Cleveland Consortium for STEM, an entity

of 54 local partners from industry, K-12, higher education, and philanthropy all supporting STEM education efforts, including CSU. To date CSU's senior administration, faculty, and staff from the colleges of engineering, sciences, and education have supported or been involved in K-12 curriculum development and design, professional development and conferences for teachers, and in-kind contribution of facilities and human resources.

A major component of this effort is the redesign of the CSU teacher preparation program with the potential to impact the statewide network of 17 college and universities. The redesigned teacher education program would provide a content degree and licensure for secondary mathematics and science, internships for teacher candidates in STEM industry and innovative schools, and modeling and support from STEM mentor and master teachers.

CSU will also integrate the UTeach program with the following existing state and local education reform activities:

- **Ohio Board of Regents Summer Academies:** CSU is hosting one of 10 Ohio state-sponsored summer mathematics and science academies for junior and senior students. All students participating in these academies will receive information about the CSUTeach and Noyce Scholars programs, thereby leveraging state-sponsored activities to build the pipeline for future CSUTeach participants.
- **Cleveland Metropolitan School District students:** The University has partnered with the Cleveland schools to offer mathematics and science course work to high school juniors and seniors during the summers. These students will be better prepared for math, science, and engineering curricula when they enter college which will also add to the pool of potential CSUTeach students. In addition, we will work specifically

to reach individual students through the specialized STEM schools that are currently being developed by the Cleveland District.

- **Summer Scholars:** This summer program offers six weeks of intensive academic instruction and cultural enrichment activities for high school juniors and seniors who are capable of handling a high school honors curriculum, but who are not academically prepared to enter CSU's Honors Program. Led by Cleveland State faculty, the program eases the transition from honors-level high school work to honors-level college work and increases the number of students from Cleveland and targeted urban high schools who enter and excel in CSU's Honors Program. For those Summer Scholars who show an interest and promise in STEM, appropriate advising will be offered which will include an introduction to CSU Teach.

### **3. Middle Tennessee State University**

MTSU faculty from education and the sciences have a long history of coordinating with its high-need LEA partners. Several Improving Teacher Quality initiatives have brought math, science, and education together and produced teacher workshops for many of the preK-12 school districts that will be partners in MTeach. A current collaboration on an NSF Academies for Young Scientists grant involves working with students in afterschool science programs the districts. A recently-funded U.S. Dept. of Education grant to improve the quality of middle school math and science pre-service teachers involves math, science, and education faculty with the districts. An on-going \$3 million Math and Science Partnership (MSP) grant focusing on teacher development is being implemented by the science and education faculties.

MTSU has a particularly strong partnership with Bedford County, a primary partner in the Middle Tennessee P-16 Council that MTSU anchors. As a result, Bedford has formed its

own local P-16 Council. Bedford County has strengthened this partnership by developing public service announcements with MTSU regarding high school graduation and literacy for the P-16 Council, partnering with Bedford to assist with its youth leadership training, and designing its Coordinated School Health Program. Not only will these prior experiences facilitate smooth implementation of the MTeach program in the local LEAs, these grants will help generate a pipeline of students who could potentially join the MTeach program.

In addition, MTSU has provided staff development to teachers through five state-funded MSP grants, laboratory experiences for teacher education candidates, and assistance to high-need students through the Talent Search Program. The 2008-2009 Teachers Now program, funded by a U.S. Department of Education grant, has allowed MTSU to implement field experiences for middle school math and science pre-service teachers in a way that will pave the road for the MTeach partnerships. Thus, a strong foundation of partnership between MTSU and the local school districts will support effective application of grant funds for implementing MTeach.

Finally, MTeach will support state education reform activities. The State of Tennessee has a Hope Lottery Scholarship program available to new freshmen who have a weighted minimum high school GPA of 2.75 and a minimum ACT of 18-20. The state also has a loan forgiveness program for students enrolled in a math or science teacher certification program; \$2,000 per year is available up to a maximum of \$10,000. Upon graduation, the loan is forgiven at the rate of two years of teaching for each year of the loan. MTeach staff will mentor participants through the application process for these loans starting after STEP II.

**D. ALIGNMENT WITH STATE AND STUDENT ACADEMIC  
ACHIEVEMENT STANDARDS (General Program Requirement)**

The Consortium will ensure that all partner institutions align with state and student academic achievement standards. From the very first UTeach program course that students take, there is an emphasis on state academic achievement standards. Instructional support materials are selected on the basis of compatibility with state standards and district curriculum. Student-developed lessons include measurable performance objectives aligned with state content standards. All field-based lessons are aligned with state standards and district curriculum. Furthermore, the UTeach program focuses on the development of content expertise and ensures teacher development consistent with a wide range of rigorous state standards as the program is replicated.

Because the school districts, by necessity, have a deeper working knowledge than universities regarding issues relating to the alignment of curriculum, instruction, and materials with state academic standards, the Consortium's partner LEAs will be integrally involved in ensuring such alignment in the preparation of prospective teachers. The close, collaborative relationships between Consortium partners and the LEAs' Master Teachers will facilitate incorporation of state standards into clinical experiences as lessons are developed, student assessments are produced, and instruction is refined.

Also, the UT Austin College of Education, the EC-6 ESL, EC-6 Bilingual and All-Level Special Education degrees all follow the guidelines set forth by the Texas Education Agency, the State Board for Educator Certification, and the Higher Education Coordinating Board. Content area standards from IRA/NCTE, NCSS, and NCTM; ISTE Standards and National Standards for Elementary Teacher Preparation are also aligned across the curriculum.

**E. STEP TWO: UT AUSTIN EXPANDED TEACHER PREPARATION REFORM  
(General Program Requirement, as applied to the Consortium’s goal of translating  
lessons learned from the UTeach program to other areas of teacher preparation)**

As lead university partner in this Consortium, UT Austin plays a dual role: (1) it is host for the Institute and will provide support for the Consortium’s partner sites engaged in UTeach replication; and (2) it will undertake expanded teacher preparation reform at UT Austin so that it may serve as a model for teacher preparation reform in other areas at the partner universities.

The stated intent of the Teacher Quality Partnership Grant Program is to support change across the spectrum of teacher preparation programs with each partnership. Perhaps in light of the difficulties present in undertaking reform at all levels and across all disciplines at once, the Department has determined that a “partnership may chose to begin its efforts in the early year(s) of its project by improving teacher preparation in one or more specific pre-baccalaureate subject area(s) and/or grade level(s)” with the understanding that “at the end of the five-year project period an eligible partnership will have extended the reach of the reform and other pre-baccalaureate program activities to all of its teacher preparation programs.” Thus, the Consortium proposes a process by which UT Austin, having implemented many UTeach-related changes already, can pursue additional improvements in other areas of teacher preparation that can then serve as models for further teacher preparation reform at the partner replication sites.

UT Austin began with reform of secondary math and science teacher preparation because that was an area of urgent need and intense local interest. However, a number of the strategies that have proven effective in the UTeach program are highly transferrable across other subjects and levels of teacher preparation. Strategies such as early clinical field experiences, greater integration with expert faculty in other fields of study within the colleges of arts and sciences,

inquiry based instructional strategies, utilization of master teachers along with university faculty in co-teaching, reflection and guided self assessment throughout the preparation program, and stronger induction programs will serve as a basis for expanding the reach of the initial reform efforts.

Having learned much from this work, UT Austin is now anxious to apply these lessons to other areas of teacher preparation and intends to engage the Consortium partners in planning and evaluating these additional reforms. The partners will participate in developing the methods of the reform project at UT Austin, and they will be part of the team of evaluators who will assess the effectiveness of the pilot programs implemented at UT Austin. Thus, once the UTeach program curricula and strategies become established at our partner sites, they will be in an ideal position to join UT Austin in additional program reform.

The next steps for expanding teacher preparation reforms at UT Austin, will be: (1) strengthening instruction of diverse learners by reforming elementary pre-service preparation, induction, and in-service professional development (TDL) and (2) reforming elementary pre-service content preparation (Discovering Science).

***i. Components of Expanded Teacher Preparation Reform at UT Austin***

**a. Strengthening Instruction of Diverse Learners by Reforming Elementary Pre-Service Preparation, Induction, and In-Service Professional Development**

As evidenced by the requirements for this grant application, the growing need for well-qualified, effective teachers in urban schools is well documented. This is especially true in Texas where the K-12 population is increasingly diverse in terms of culture, language, and socioeconomic status. In order to address this growing need, the UT teacher preparation reform

program will build upon the core UTeach concepts of providing content-learning experiences and urban field experiences to pre-service teachers, content-intensive induction support to new teachers, and meaningful professional development to current in-service teachers in order to transform elementary (Early Childhood-Grade 6) teacher preparation in partnership with UT Austin's Colleges of Education and of Natural Sciences, UT Elementary School, Austin Independent School District (AISD), and Del Valle Independent School District (DVISD).

This elementary teacher preparation reform will require: (1) rigorous content preparation in Mathematics, Science, Literacy, and Social Studies; (2) teaching English Language Learners; (3) differentiated instruction (Response to Intervention-RTI); and (4) assessment and data driven decision-making. Additionally, this teacher reform preparation program will also focus on Social-Emotional Learning (SEL). Through these efforts, our elementary pre-service teachers will align pedagogy with content and be better prepared to teach diverse learners in urban settings.

Building upon lessons learned through both the UTeach program implementation and the Urban Education Pilot Project, described below in this section and in Appendix D, part 2, UT Austin will restructure the Elementary EC-4 degree through significant course revision, realignment with state and national standards, and the addition of several new courses or modules of courses in ESL (English as a Second Language), Science for Life (developed by the College of Natural Sciences), and assessment and data-driven decision-making (in collaboration with the Department of Educational Administration). When revised, ALL elementary pre-service teachers at the UT Austin will be prepared for EC-6 ESL or EC-6 Bilingual certification.

Just as UTeach emphasizes professional development and induction services, this Teaching Diverse Learners (UT-TDL) component will promote scholarly consideration of the

needs faced by (1) pre-service teachers in urban elementary schools, (2) cooperating teachers requiring essential professional development related to core themes of the program, and (3) induction teachers seeking high-quality professional development intended to enhance content knowledge and pedagogy. Induction teachers will benefit from a sustained mentoring program, which will include training for the school mentors and mentees and additional, sustained feedback on inductee's teaching by university-trained facilitators. A Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching (TRC) induction teacher cohort will be established each summer with sustained outreach during the school year, described in Appendix D, part 2. Both induction and in-service teachers will participate in professional development workshops on English Language Learners, Response to Intervention, Social Emotional Learning and Data Driven Decision Making. Summer Institutes on Science and Mathematics Teaching, English Language Learners, Heart of Texas Writing Project, 21st Century Learning, and Pre-Kindergarten Circle Training professional development are also planned.

The UT-TDL project will build on UTeach's emphasis on differentiated learning by expanding the College of Education's Urban Education Pilot Project. Through this pilot program, three urban high-need elementary schools (UT Elementary School, Govalle, and Metz Elementary Schools) and the College of Education collaborate to prepare elementary pre-service teachers and train university faculty and cooperating teachers in critical components of Response to Intervention (differentiated instruction) and Social Emotional Learning. The UT-TDL project will reform teaching and teacher preparation in urban elementary schools with a revised degree plan and targeted mentoring and professional development for induction and in-service teachers in partner schools. Preparation of a new cohort of pre-service teachers will begin during the

initial year of the project and will grow to 12 completed cohorts (with 4 cohorts in progress from three participating urban elementary schools) to 13 AISD elementary schools, UT Elementary School, and all seven DVISD elementary schools, for a total of 21 high-need elementary school partners in successive years.

The UT Austin teacher preparation reform program seeks outcomes similar to the UTeach program: content-infused pedagogy, increased numbers of highly-qualified teachers, strong professional development and induction programs, and increased student achievement. In particular, the expected outcomes for pre-service, induction, and in-service teachers resulting from training and increased content and pedagogical knowledge will include: (1) developing a new course of study for elementary teacher candidates; (2) preparing at least 12 cohorts of pre-service teachers (6 EC-6 ESL cohorts of 20-25 students and 6 EC-6 Bilingual cohorts of 10-15 students) for a total of 180-240 new teachers over the course of the grant; (3) mentoring and training approximately 150 induction and 300 (120 mentors, 180 cooperating teachers) in-service teachers in participating schools through targeted mentoring and professional development workshops; and (4) reaching an estimated 1,200 school children the first year and 9,928 students by the last year of the project.

When translated to pre-service, induction, and in-service teachers in this study, the lessons-learned from the UTeach program will help strengthen the preparation of future teachers through UT Austin's teacher preparation reform and will sustain them during induction and as career teachers. Furthermore, UT Austin's program will enhance the field's understanding of factors influencing pre-service teachers' content area preparation, decisions about where they ultimately choose to teach, and how knowledge of those factors can help increase teacher

preparation programs' effectiveness in preparing quality teachers for successful and long-term work in urban schools.

**b. Reforming Elementary Pre-Service Content Preparation:  
Discovering Science**

Astronomer Carl Sagan noted, “[i]t is suicidal to create a society dependent on science and technology in which hardly anybody knows anything about science and technology.” Even students graduating from MIT or Harvard can, as documented in the Annenberg Foundation movie “Minds of Our Own,” leave the university without knowing the origins of the seasons or understanding photosynthesis. When such graduates become educators charged with the responsibility for teaching science, this lack of understanding of even basic science concepts has consequences that profoundly impact the next generation. If students are “turned off” to science in elementary school or enter middle or high school unprepared to appreciate or learn science, they seldom recover from this early handicap. In other words, they are lost to science forever.

With this proposal, the College of Natural Sciences and the College of Education plan to adopt the best pedagogy practices in hands-on instruction, as developed in the UTeach program, and simultaneously offer an integrated science curriculum to ensure that pre-service elementary teachers graduate with the tools and confidence they need to be effective, highly-qualified science teachers. Like the UTeach program, this teacher preparation reform program will ensure that future teachers possess the content knowledge and experience with proven methods of instruction to deliver authentic, hands-on inquiry teaching to their own students. To do this we plan to transform the current approach to science content courses for future elementary school teachers.

While the colleges of Natural Science and Education at UT Austin collaborate significantly, especially for the UTeach program, elementary and secondary teacher preparation have developed quite separately over the past decade. For example, Texas State law mandates that students seeking secondary teacher certification major in the core discipline they plan to teach, but students seeking elementary education certification primarily major in education, i.e., they are non-content majors. The UT Austin teacher preparation reform program will initiate reform to include content-based teacher preparation at the elementary level.

To expand the best practices of the UTeach program to our pre-service elementary teachers, the UT Austin program will replace the core science courses currently required for elementary certification with more rigorous and comprehensive courses. At present, the science courses that students enroll in are scaled-down versions of majors' classes offered to non-majors in large classes. Students are required to take two courses in one area of science, which may give future elementary teachers in-depth knowledge of one branch of science (such as astronomy or environmental biology) but very little broad science content knowledge and virtually no context for the specialized knowledge they have acquired in a single field. This system guarantees that pre-service teachers receive an incomplete and often intimidating understanding of science that can confirm a dislike or discomfort with the entire discipline.

In contrast, the UT Austin teacher preparation reform program will deliver a curriculum created collaboratively by faculty from four basic science departments and the College of Education that emphasizes the use of inquiry in teaching and learning and that provides instructional tools targeted for elementary school classrooms. The courses will be organized in modules, with each module using the tools of all the disciplines. The module format conforms to some of the best research on project-based instruction used to engage student interest. The first

semester, focusing on energy and atomic theory, is the foundation for the curriculum that will emphasize core principles that connect all of the sciences (see Appendix D, part 2 for program details).

A secondary and supporting goal of this proposal is to train current faculty to provide inquiry-based curriculum. The College of Natural sciences will invest in a significant redirection of pre-service elementary teachers toward the new integrated science curriculum. This redirection will require training the faculty through workshops offered in part by the PIs and through enrollment in inquiry instruction workshops.

**F. ASSESSMENT OF RESOURCES AVAILABLE (General Program Requirement)**

*i. The National Math and Science Initiative*

NMSI was formed in 2007 with a mission to take successful STEM programs to national scale. Tom Luce, Chief Executive Officer, is a nationally recognized education reformer and expert on education law and finance. He became involved in education reform in 1983 leading the effort to implement recommendations of the landmark report, “*A Nation at Risk*.” He has published two books on education reform, developed the groundbreaking *Just for the Kids* school performance transparency tool currently in use in 40 states, and has served as Assistant Secretary of Education for the Department. Tom Luce has built a team of nationally respected professionals in the areas of education reform, math and science curriculum and instruction, program scale-up, law, finance, and communications.

Additionally, NMSI will devote new human resources to support the management of the consortium proposal. NMSI anticipates hiring two new staff under the direction of the Chief

Program Officer, John L. Winn (former Commissioner of Education in Florida), a Program Director and an external contract evaluator. These professionals will:

- Produce semi-annual consortium progress reports to the Department;
- Produce an annual report to the Department with recommendations for grant disbursements based on partner institution performance;
- Provide Consortium institutions with an array of consultative assistance on areas of communications, fundraising, networking, and sustainability of reforms;
- Collect and analyze program data from Consortium institutions;
- Collect and analyze financial reporting data;
- Develop networks among universities to promote the successful adoption of UTeach;
- Participate in site visits and review resulting reports; and
- Organize a national UTeach alumni network.

In addition to human resources, NMSI intends to provide services valued at \$2.3 million<sup>5</sup> for the management of the Consortium. NMSI has raised over \$40 million from the private sector to support the current 13-university expansion of the UTeach program. The private sector partners have supported NMSI's response to the national crisis in STEM education as well as the NMSI scaling model and professional staff. NMSI has developed relationships with many national organizations working to improve education and is currently participating in joint ventures with a number of them, including the Carnegie Corporation - Institute for Advanced Studies Math and Science Commission, Association of Public and Land Grant Universities

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<sup>5</sup> This amount represents NMSI's incremental costs for management of the consortium over the five-year project period, including internal NMSI direct and indirect program costs, the match for the Institute's support services, and is increased by a 3% inflation factor each year.

(APLU), the Data Quality Campaign, the National Research Council, the Business Roundtable, and the National Academies.

*ii. The UTeach Institute*

The UTeach Institute's mission is to support expansion of the highly successful UTeach Austin teacher preparation program at universities across the United States and to lead efforts toward continuous improvement of the program model. The goal of the Institute's work is to increase the number of highly qualified and certified STEM teachers nationwide.

The principle founder of the Institute is Mary Ann Rankin, Ph.D., who, as dean of UT-Austin's College of Natural Sciences since 1994, launched the UTeach program in 1996. The College includes 15 academic units and 34 organized research units that range from an astronomical observatory with the world's third largest telescope, to a marine science institute, to the Ladybird Johnson Wildflower Center, to the Charles A. Dana Center for Educational Reform. Under her leadership, the College has raised nearly \$700 million in private gifts, developed several major organizational and educational reforms in addition to UTeach, nearly doubled research funding to over \$110 million per year, and increased undergraduate enrollment to approximately 9,000 and graduate enrollment to about 1,800 students. As Executive Director of the Institute, she provides active leadership and vision to shape its mission and ensure its sustainability.

As administrative director of the Institute, Tracy LaQuey Parker draws on a wide range of leadership skills and experiences. She founded Cisco Systems' Worldwide Education Market Group, as well as its Advanced Internet Initiatives team in the mid 1990's and is the author of two bestselling books about technology and the Internet. Additionally, a team of support specialists, site coordinators and program evaluators at the Institute work closely with UTeach

Austin to ensure successful implementation of UTeach at partner universities. These include the Co-Directors, Professor Larry Abraham, College of Education, and Michael Marder, College of Natural Sciences, with assistance from: Clinical Associate Professors and UTeach Master Teachers Mary Walker and Mark Daniels, Associate Professor Walter Stroup, Chair, STEM Education Graduate Studies Committee and Associate Professor Taylor Martin, STEM Education Graduate Adviser.

The UTeach Institute is currently funded through its partnerships with NMSI and other public and private sector supporters. UT Austin also provides approximately \$1 million of in-kind support annually, thereby allowing the Institute to affordably provide high quality products and services designed to ensure program model fidelity, success, and sustainability.

The following products outline the foundational program components, provide operational guidelines, and centralize program content and implementation data:

- the UTeach Program Elements of Success;
- the UTeach Operations Manual;
- the UTeach program curriculum; and
- the Progress Evaluation and Reporting System (PEARS).

Professional services provided by Institute staff include:

- pre-implementation planning and program design consultation;
- scheduled online and face-to-face instructional content seminars;
- on-demand operational and instructional consultation;
- program evaluation and support through site visits and regular collection and sharing of implementation data;

- centralized support for community-building among master teachers, co-directors, faculty, and students at sites across the country; and
- coordination of partner universities’ induction and professional development efforts.

*iii. The University Partners*

**1. The University of Texas at Austin**

Manuel J. Justiz, Dean of the College of Education and Mary Ann Rankin, Dean of the College of Natural Sciences will provide the overall direction for the reform activities proposed in this grant. Professor Sherry Field for the College of Education and Professor and Associate Dean Michal Marder for the College of Natural Sciences will ensure regular coordination between the Colleges.

**EC-6 Program Revision**

The College of Education has committed personnel resources at every level to successfully implement the reforms. At the leadership level, a steering committee consisting of senior faculty and administrators will provide guidance and oversight to the project. Their contributions will be in-kind and will provide a value of \$132,914 to the project over five years, per Table 4 below.

<b>Table 4: Faculty Contribution to Steering Committee</b>			
<b>Name</b>	<b>Title</b>	<b>Percentage time Yrs 1-3</b>	<b>Percentage time Yrs 4-5</b>
Dr. Sherry Field	Associate Dean for Teacher Education	5%	2.5%
Dr. Randy Bomer	Associate Chair - Curriculum & Instruction	5%	2.5%
Dr. Paul Resta	Director - Learning Technology Center	5%	2.5%
Dr. Norma Cantu	Chair - Curriculum & Instruction	2.5%	2.5%

Tenure track, non-tenure track, and adjunct faculty will provide instruction within the teacher-preparation program. Over the span of five years, these faculty members will teach a total of 119 courses. Their time will be provided as in-kind support and will provide a value of \$1,224,673 to the project.

Additional support will be provided by 18 cohort coordinators who manage the placements and the field experiences of the pre-service teachers. The effort on the part of these coordinators will be provided as in-kind support and will provide a value of \$137,151 to the project.

A number of graduate students will provide essential support for the program by acting as graders, acting as facilitators supporting the field experiences of the pre-service teachers, or by providing technology training to both students and faculty. The effort on the part of these graduate students will be in the form of in-kind support and will provide a value of \$341,224 to the project.

Two additional members of the Learning Technology Center will provide direct support to the program. Dr. Karen French, coordinator of the IDEA Studio, will consult with the instructional team and with project leadership regarding the effective integration of technology into teacher preparation and ultimately into the EC-6 classroom. Mr. Chad Fulton will coordinate the program's immersive technology environment, within which each teacher preparation student is required to have a specifically configured laptop computer and required technology competencies are integrated into all courses in the program. Their contributions will be in-kind and will provide a value of \$37,468 to the project, per Table 5 below.

<b>Table 5: Faculty Contribution to Immersive Technology Environment</b>		
<b>Name</b>	<b>Title</b>	<b>Percentage of time</b>
Dr. Karen French	Coordinator – IDEA Studio	5%
Mr. Chad Fulton	Coordinator – LIFE (Laptop Initiative for Future Educators) Program	5%

Finally, the Austin Independent School District (AISD) will support the program by providing professional development for teachers within the fourteen AISD elementary schools participating in the program. The value of this professional development will be \$230,000 for each of the five program years for a total of \$1,150,000.

In addition, UT Austin provides an exceptional environment within which to conduct a teacher preparation program. The wireless network within the main College of Education building was recently upgraded with 117 new 802.11n wireless access points. Facilities include a series of technology-rich classrooms as well as areas designed to support student collaboration. Labs and facilities are available to support high-demand technology activities such as video editing and audio recording.

The total value of the contributed support, as described above, that The College of Education will bring to this project totals at least \$3,023,430.

**College of Natural Science Revisions: Discovering Science for Elementary School Teachers**

Associate Professor of Physics and Associate Chairman of Physics Sacha Kopp, in collaboration with Cynthia LaBrake of Chemistry, Peter English of biology, and other instructors, will develop new courses for elementary teachers. A \$250,000 Transforming Undergraduate Education grant from the University of Texas System is supporting this effort, and will be used as matching funds. The instructional salaries of all faculty involved in the effort

will be paid from University sources as well, bringing the match to approximately \$1 million. In addition, the University of Texas agrees to forego all overhead return on year 1 of the UT Austin portion of this grant, an additional match of \$140,547.

The co-directors of the UTeach program are Professor Larry Abraham, College of Education, and Michael Marder, College of Natural Sciences. The Co-Directors will oversee the program enhancements related to the UT Austin's expanded reform efforts: Clinical Associate Professors and UTeach Master Teachers Mary Walker and Mark Daniels, Associate Professor Walter Stroup, Chair, STEM Education Graduate Studies Committee and Associate Professor Taylor Martin, STEM Education Graduate Adviser.

Existing UTeach induction and professional development programs are supported by a mixture of endowment income and recurring institutional funds. Electronic outreach receives recurring annual support of \$75,000 to support web coding, database management, and data entry. The UTeach Master's program that will serve as the development site and test-bed for materials receives recurring annual support of \$170,000 to cover student participation. Thus, the match for this portion of funded activities is \$1.225 million, bringing the total Natural Sciences matching contribution to \$2.225 million. This contribution is in addition to the many millions of dollars that have already been invested to create the Institute.

## **2. Cleveland State University**

The entire Cleveland State community is ready to jump into the national arena of math and science education. Over the last two years, everyone from the President to the staff have worked tirelessly to bring the UTeach program to the University. This has included sponsoring trips and providing faculty and staff time for planning and beginning to implement the transition.

The administration leadership has provided significant support for UTeach program replication at Cleveland State, as evidenced by the financial commitment offered on the NSF Noyce Scholars proposal (a complement to this proposal). Provost Mary Jane Saunders has pledged her support of over \$120,000 for CSUTeach and the Noyce Scholars effort, and will provide additional support for this grant. At the college level, not only have College of Science Dean Bette Bonder and College of Education and Human Service Dean Jay McLoughlin been highly engaged in this process through proposal planning attendance, financial contributions, and the review of expected changes, but Dean Bahman Ghorashi from the College of Engineering has also been involved and interested (see attached letters of support). Moreover, the Education College has committed \$127,000 over five years to the program.

Further, as the College of Science and the College of Education and Human Services move their collaboration to the next level through CSUTeach and the joint development of the four-year content and licensure plans, the team will also reach out to strengthen its relationships with other colleges on campus. Within the College of Engineering, two engineering faculty members (Dr. Stephen Duffy and Dr. Nigamanth Sridhar) have been asked to serve on the Steering Committee to help increase teacher understanding of the role of engineering within the mathematics and science curriculum. In addition, CSUTeach will work with Engineering to help identify summer internship opportunities within the laboratories of faculty. The presence of engineering in the CSUTeach program will be further increased by tapping an Engineering faculty member to co-teach the Project Based Learning course.

Finally, the following chart below outlines the involvement of STEM faculty in this effort and shows significant commitment toward the proposed UTeach model.

<b>Name/Department</b>	<b>Expected Contribution to CSUTeach</b>
Bette Bonder, Dean, College of Science	Budgetary, space, and personnel decisions on behalf of the College of Science will be made by Dean Bonder
David Ball, Professor, Department of Chemistry	Leader of team that will develop various four-year tracks within the Chemistry Department
Michael Walton, Associate Professor, Department of Biology	Leader of team that will develop various four-year tracks within the Department of Biological, Geological, and Environmental Sciences
Petru Fodor, Assistant Professor, Department of Physics	Faculty member who will serve on team to alter courses to fit within a four-year time frame; will teach Physics Research Methods courses for CSUTeach students
Miron Kaufman, Chairperson and Professor, Department of Physics	Co-Director of the CSUTeach representing the College of Science; will assist in overseeing entire effort and implementing required changes in the development of the CSUTeach structure
Greg Lupton, Chairperson and Professor, Department of Mathematics	Leader of Mathematics team that will alter programs to fit four-year timeframe as well as leader in ensuring fidelity of CSUTeach implementation
Barbara Margolius, Professor, Department of Mathematics	Will serve on team to alter courses and program to fit within a four-year time frame; will serve as point-person for the Mathematics Department for recruitment of students
Ulrich Zurcher, Assistant Professor, Department of Physics	Will serve on team to alter courses and program to fit within a four-year time frame
Jay McLoughlin, Dean, College of Education and Human Services	Will make budgetary, space, organizational, and personnel decisions on behalf of the COEHS
Rob Ferguson, Associate Professor, Science Education, Department of Teacher Education	Will teach Project-Based Instruction or Apprentice Teaching courses for CSUTeach students
Joanne Goodell, Associate Professor, Mathematics Education, Department of Teacher Education	Co-Director of CSUTeach representing the College of Education and Human Services; will alter program to meet CSUTeach requirements; teach the appropriate pedagogy courses; and oversee entire effort
Debbie Jackson, Assistant Professor, Science Education, Department of Teacher Education	Will serve on team to alter courses to fit within a four-year time frame (as a Co-PI); teach Project-Based Instruction or Apprentice Teaching or Knowing and Learning courses

### **3. Middle Tennessee State University**

The MTeach program has the complete support of the University from the President through the department chairs and the faculty and has the full support of U.S. Congressman Bart Gordon.

Following an initial meeting, the science and education deans met again with the Provost about space and financial support for MTeach. The Provost assured the deans that the University is fully committed to MTeach and will provide the necessary resources to make the program a success. The above-named group will be the core of the Advisory Board that will meet at least once each semester. Other Board members will include at least one administrator from one of the participating school districts and one mentor teacher from a different district. The PI, Co-Directors, Program Coordinator, and a Master Teacher will serve as ex-officio members.

The MTeach Center will require space for all functions related to the training of secondary math and science teachers. Two significant new facilities that are in various stages of development will ultimately hold the key to a permanent home—a new 257,000 ft<sup>2</sup> science building and a new 120,000 ft<sup>2</sup> education building. The Provost and deans are committed to finding space on the interior of MTSU's campus where it will be convenient for students to drop in each day for discussions, advising, and social activities and be encouraged to stay by a welcoming staff that will help form a community of teaching scholars. The desired space will consist of nine offices (two Co-Directors, one Program Coordinator, four Master Teachers, one Advisor, and an Executive Aide), a conference room, social space, a master/computer classroom, workroom, and storage totaling approximately 2,500 ft<sup>2</sup>. Access to additional master classrooms for scheduling classes is also essential. A contiguous block of space is being identified for the MTeach program.

There is also strong financial support for the MTeach program and its students. The State of Tennessee has a Hope Lottery Scholarship program available to new freshmen who have a weighted minimum high school GPA of 2.75 and a minimum ACT of 18-20. The state also has a loan forgiveness program for students enrolled in a math or science teacher certification program; \$2,000 per year is available up to a maximum of \$10,000. Upon graduation, the loan is forgiven at the rate of two years of teaching for each year of the loan. MTeach staff will mentor participants through the application process for these loans starting after STEP II.

MTSU has a number of scholarships available to incoming students including Buchanan (20, up to \$16,000/yr), Chancellor (ACT 32 and HS GPA 3.75, \$5,000/yr), Presidential (ACT 29 and HS GPA 3.75, \$4,000/yr), Edscholar (12, ACT 23 or 3.25 GPA, \$5,000/yr), Academic Service (ACT 27 and HS GPA 3.75, \$3,000), Valedictorian/ Salutatorian (ACT 23 and ranked 1-2 in class, \$3,000), Provost (ACT 26 and 3.75 GPA, \$1,500). There are also numerous scholarships within each department typically ranging from \$500 to \$2,000. Each semester, TLSAMP provides 15 half-tuition scholarships and 10 book scholarships to minority STEM majors.

MTeach graduates will remain an active part of MTeach, participating in workshops, in a fall cookout, in the MTeach seminar series, and serving as mentor teachers. They will receive and can offer articles for printing in the monthly MTeach newsletter. MTSU will continue to support MTeach graduates with mentoring by the Master Teachers and in other ways such as assistance with obtaining supplies.

The business community will also provide resources to the MTeach program. Oak Ridge National Laboratory will provide summer research experiences for several pre-service teachers each year. The regional State Farm office, Chamber of Commerce, and Mind2Marketplace

which consists of business, government and educational institutions from Huntsville to Oak Ridge are also eager to help improve preK-12 STEM education. Finally, MTSU will seek buy-in from businesses and industries benefiting from the program.

The significance of the mentors' roles requires additional resources. The University will assume the cost of the Master Teachers, and ultimately, all MTeach staff will have a permanent line in the University budget. During the grant period, some positions may be funded by alternate sources and some by grant funds. Recurring funds will be made available in the MTeach budget for workshops, operating costs, student recognitions, and website development and maintenance. Additional faculty will be required in the College of Business, Education and Behavioral Sciences for MTeach teachers. The College of Basic and Applied Sciences must continue to hire employees in biology, chemistry, physics, and math education. Mathematical Sciences has two faculty job postings in mathematics education for 2009-2010. Both colleges should give priority to potential new faculty members who are passionate about teacher preparation and are committed to modeling excellence for the next generation of teachers.

### **III. QUALITY OF THE MANAGEMENT PLAN (Selection Criteria - 15 Points)**

Every aspect of this proposal is connected to a comprehensive management plan that ensures efficient and faithful implementation of UTeach, accountability, partner collaboration for program improvement, long-term sustainability, data driven evaluation and reporting, and a nationwide learning environment that includes an active role in national STEM initiatives. The Consortium management plan has four distinct and important components: the managing partner, the support provider, the partner institutions, and the partner LEAs.

As partners, NMSI and the Institute propose to monitor and support the implementation of UTeach at partner universities as well as the expansion of teacher preparation reform at the

University of Texas. NMSI and the Institute complement one another so that together, they provide comprehensive support and oversight to the university partners, who in turn provide support to the partner LEAs. NMSI serves as the managing partner while the Institute provides implementation support and program evaluation.

#### **A. MANAGING PARTNER – THE NATIONAL MATH & SCIENCE INITIATIVE**

NMSI provides a **fiscal and data management system** to ensure effective implementation of the programs it scales. The fiscal management system is keyed to performance benchmarks that are determined by the Institute and that guide the partner universities' implementation progress.<sup>6</sup> The data reporting system provides frequent, real-time feedback to program participants, partners, funders and third parties (such as policy makers or local governments). This system is essential for assistance in successful implementation and for performance accountability. Partner universities are required to reach pre-determined benchmarks in order to receive each distribution of funds. NMSI and the Institute have learned through experience that these benchmarks are necessary to ensure that the program is effective and reaches its goal of producing highly-qualified teachers. However, NMSI and the Institute have crafted these benchmarks such that, while they provide an outline and guidance for implementation, they also leave ample space for creativity, independence, and collaboration on the part of the universities and LEAs. As the managing partner of the Consortium, NMSI determines when each partner university has met its benchmarks and authorizes each distribution of funds. NMSI's Web-based financial data management system provides real-time monitoring and reporting at both the individual university program level as well as across all universities.

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<sup>6</sup> See *below*, Section IV.C, page 85.

At the individual program level, immediate feedback is available to help guide planning and implementation decisions. From a management standpoint, technical assistance is immediately deployed to the universities and LEAs if problems are detected or questions arise, and to assist the universities and LEAs as they bring new ideas to the implementation process. Perhaps most useful, however, is the potential to perform analyses across all partner university and LEA sites to identify trends and generate statistics on teacher preparation programs across the country. NMSI also provides **policy and other strategic support** services to sustain the project for the long-term and to advance the broad-based teacher preparation reform efforts of our partners. These services help create a national learning environment and include: (1) organizing forums for partner collaboration, (2) coordinating with state licensure boards, (3) helping partner universities secure policy changes needed in their state, (6) providing fundraising assistance, and (7) developing a national UTeach alumni network. NMSI will also fund the cost of an external evaluator for the UTeach program, thereby lending additional objectivity and independence to the project. There will be no cost to the Consortium for this external evaluator. All of these services listed above will be funded through private sources, not through the Federal funds requested under this grant, and have a value of \$2.3 million over the five-year grant period.<sup>7</sup> However, many of these services, like the alumni network, will continue beyond the life of the grant.

## **B. SUPPORTING PARTNER – THE UTEACH INSTITUTE**

While NMSI administers the fiscal and business management role, the Institute provides **program content, implementation support and evaluation services to partner institutions.** Using well-developed products and services, and experience successfully supporting the 13

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<sup>7</sup> See *above* at note 5.

universities currently implementing the UTeach program, the Institute is properly positioned to guide immediate adoption of the UTeach program at the Consortium universities while ensuring both fidelity to the UTeach model and reforms as well as space for creativity and collaboration with the university and LEA partners. The Institute provides each university partner with a site coordinator who is a personal contact for support from day one. The Institute also supplies partner universities with immediate access to a wealth of resources to guide implementation of the UTeach program, including a comprehensive UTeach Operations Manual (including a five-year implementation plan, attached at Appendix D, part 1) and the complete UTeach curriculum and course resources.

Additionally, the Institute provides the following operational and instructional support services: (1) online and face-to-face support events, beginning with a program launch meeting; (2) program design and start-up consultation; (3) Web-based data collection and reporting; (4) on-site consultation and data collection through multi-day, regularly scheduled site-visits; (5) coordination of university and LEA induction and professional development efforts; and (6) coordinated support for community-building and professional networking among master teachers, co-directors, faculty, students, and partner LEA administrators, teachers, parents, and students. These resources and services all contribute to advancing the Institute's mission of supporting replication of the highly successful UTeach teacher preparation program at other universities and to lead efforts toward continuous improvement of the program model.

### **C. PARTNER INSTITUTIONS**

Joining NMSI and the Institute are the Consortium university and LEA partners who represent a diverse set of schools all devoted to reforming teacher preparation using a common content-driven approach. University Consortium partners include the University of Texas at

Austin, Cleveland State University, and Middle Tennessee State University. Each partner brings to the consortium unique contributions and strengths. Two of the university partners will be focused on implementing the UTeach program and will distinctly benefit from the impact it will have on teacher preparation at each institution. As lead university in this consortium, the University of Texas at Austin plays a dual role: (1) it is host for the UTeach Institute and will provide support for partners engaged in UTeach expansion, and (2) it will undertake additional reform of teacher preparation at UT Austin.

Each partner institution has a strong commitment from administrative and senior faculty in education and in arts and sciences. This structure ensures strong institutional support in terms of providing faculty resources, space and a steering committee that oversees the implementation of the UTeach program and other reforms. This model provides a permanent organizational partnership among colleges and allows the local team to incorporate creative participation in the development of courses. This institutional involvement also ensures full adoption and long-term sustainability of the reforms beyond the grant period.

Each university has also established a collaborative partnership with high-need school districts and LEAs who will both help the university implement the UTeach program and who will benefit from the professional development and induction services provided to these schools as part of the UTeach program. As discussed above, these school districts and high-need schools will work actively with the partner universities and the Institute to design and determine the scope of the professional development and induction services provided to them. Through this collaborative process, each school will receive services tailored to their individual needs.

#### **IV. QUALITY OF PROJECT EVALUATION (Selection Criteria - 25 Points)**

NMSI and the Institute have created a comprehensive evaluation approach that ensures accountability for results, fiscal responsibility, and successful program implementation in a centralized, timely and objective manner. The first cohort of 13 expansion and the proposed Consortium universities collect a wide array of data consistent with the required measures for increasing the key success components as outlined in the TQP Grants Program RFP (e.g., teacher retention percentages, pass rates for initial certification and licensures, the percentage of highly qualified teachers in the consortium, etc.). In addition, NMSI and the Institute collect and analyze data based on the requirements of private funders who have invested in and whose dollars will be leveraged by this proposal.

First, NMSI's Web-based financial data management system provides real-time monitoring and reporting at both the individual university program level as well as across all universities. At the individual program level, immediate feedback is available to help guide planning and implementation decisions. Technical assistance is immediately deployed when problems are detected. In addition, NMSI can perform analyses across all university and LEA sites, and combine them with data from other university partners to identify trends and generate statistics on teacher preparation programs across the country.

Second, the UTeach Institute collects evaluation data to support program implementation and keep the Consortium partners on track and sustained. To do this, the Institute employs a variety of evaluation methods including site visits, surveys, and real-time, centralized data collection through PEARS (a Web-based data collection and reporting system focusing on university, program, and LEA demographic data and ongoing program implementation data collection and analyses). The Institute prepares regular individual progress reports as well as

cross-site analyses to (1) assist with identifying local program technical assistance needs, (2) document implementation progress, and (3) identify trends related to program implementation across all universities. These reports are used by NMSI to assess progress on established benchmarks in order to trigger future funding. This process can easily be expanded to include two more UTeach expansion sites. The UT Austin program components do not fit this paradigm and will be evaluated separately, as described below.

Thirdly, the evaluation plan will provide the Consortium partners with immediate and current programmatic data, which they can use to continuously improve their UTeach program. Program faculty and staff have direct access to their program's student demographics, enrollment, retention, number of graduates, and retention of teachers in the field. By gathering and analyzing data based on the progress and outcomes at each Consortium university, NMSI and the Institute provide those universities with a crucial tool that allows them to regularly gauge their own progress, identify any implementation difficulties, and improve their UTeach program.

In addition, NMSI and the Institute will collect and evaluate a wide array of data from the replication sites consistent with the key success measurements as outlined in the Teacher Quality Partnership Grants Program RFP (e.g., teacher retention percentages, pass rates for initial certification and licensures, the percentage of highly qualified teachers in the consortium, etc.).<sup>8</sup> NMSI will serve as the **single point of fiscal and performance reporting to the Department** for all of the Consortium partners. Importantly, the data reports generated through NMSI's Web-based system can be easily tailored on short notice to answer the demands of the Department.

Finally, The UT College of Natural Sciences will fund an external evaluation of the Teaching Diverse Learners (UT-TDL) and Discovering Science Programs and NMSI will fund

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<sup>8</sup> See *below*, Section IV.B.ii.a., page 83.

the cost of an external evaluator for the UTeach program, thereby lending additional objectivity and independence to the project. As noted above in the description of the Management Plan, there will be no cost to the Consortium for these external evaluations. Rather, NMSI and UT CNS will use private-partner or local university funds to support these independent endeavors. NMSI UT-CNS and the Institute's combined efforts and expertise ensure successful program implementation, accountability for results and fiscal responsibility in a centralized, comprehensive, timely and objective manner.

Thus, the proposed evaluation plan is based on three critical goals: (1) to examine and improve implementation of the UTeach program; (2) to examine and report UTeach program outcomes; and (3) to understand promising program outcomes.

## **A. EVALUATION QUESTIONS**

### ***i. Implementation Outcomes.***

To what extent have the UTeach programs, the LEA partnership professional development programs, and the LEA induction programs been implemented at expansion sites as planned? To what extent are the implementation benchmarks of the program being met with fidelity?

### ***ii. Program Outcomes.***

Do UTeach programs and participants improve both teacher quality and effectiveness and student academic achievement? Does the UTeach program impact:

- a) Program/organizational outcomes (graduation rates, certification rates, placement and rates of UTeach program graduates teacher retention);
- b) University faculty outcomes (cross-college collaboration, identification with the program, attitudes toward teaching);

- c) Participant/teacher outcomes (satisfaction/commitment to teaching profession, attitudes/beliefs, grades, course-taking, retention, teacher practices in classroom, school, and profession); and
- d) Student/child outcomes of UTeach teachers and participants of the LEA partnership professional development and induction (academic achievement, behavior, attitudes/beliefs)?

*iii. Promising Program Outcomes.*

What are the promising program practices that can be applied to other areas of teacher preparation and how are they related to program resources, implementation resources, or other intermediary program resources?

**B. DATA COLLECTION PLAN**

The Evaluation Table in Appendix D, part 3 presents the general approach to data collection activities aligned to the evaluation questions and which meet all of the accountability and evaluation measures as provided in the RFP. In general, data collection efforts will involve two waves (fall and spring) of intense site visits over each program school year to each site. As indicated in the table, each wave will involve collecting information from multiple sources using multiple methods and will provide data to demonstrate performance on the GPRA indicators and Title II Section 204(a) of the HEA.

*i. Evaluation of Program Implementation*

**a. UTeach Implementation**

A significant portion of the UTeach Institute's staff is dedicated to site data collection, analysis, and reporting. Program indicators reveal whether expansion sites are operating as designed and producing specific, stipulated results. Site coordinators and data collection staff

routinely gather a common set of qualitative and quantitative data on these indicators through a combination of site visits, surveys, and database entry and analyses.

### **a.1. Methods**

*Site Visits.* Site visits are conducted by members of the NMSI and Institute staff twice each year at every partner institution. In Fall semester visits, field staff follow a standard site visit protocol and collect data using the following instruments and methods: (1) interviews and focus groups with students, co-directors, master teachers, faculty, and university administrators; (2) a program assessment on progress made toward the Elements of Success and on meeting replication milestones; and (3) observations and checklists including course content observations. In Spring site visits, the emphasis shifts to sharing the data collected during the previous semester, discussing program progress, and providing the partner universities with useful information to guide programmatic decision-making. This feedback ensures continuous program improvement.

*Surveys.* The Institute will administer online surveys of students enrolled in UTeach program universities at key intervals each semester. All surveys include a common set of required items and as well as items that can be modified and tailored to each university's unique programmatic and evaluation needs. Online survey results are easily accessible through automated reports. Survey instruments include a student entrant's survey, mid-semester course surveys, a leaver survey, a graduate survey, and an alumni survey.

*Course Content Reviews.* To ensure effective implementation of current and future UTeach program courses, the Institute has developed course evaluation instruments and protocols designed to measure the degree to which UTeach (1) core course components and (2)

course objectives and evidence of student learning are faithfully implemented in course equivalents.

The first course content review set (core course components) are those fundamental design elements or attributes that provide the foundation for course content and activities. Each core course component is further defined by a set of indicators on which information is collected, including demographic and profile data reported by expansion universities, student surveys, course observations, instructor interviews, student interviews, selected course materials and student artifacts. The second course content review set (course objectives) highlight important learning outcomes and student performance expectations. The degree to which the replicating sites achieve similar outcomes and performance expectations is measured through a review of selected course materials and student artifacts.

These course evaluation data are aggregated and analyzed annually by Institute staff in order to (1) identify patterns in implementation across all sites; (2) plan targeted technical assistance related to course implementation; (3) update course documentation where needed, and (4) refine course evaluation plans and processes. The Institute regularly solicits input from course instructors at partner institutions in order to strengthen this process. Course instructors share cross-site analyses of course implementation during instructor meetings and retreats where course instructors from all partner institutions gather to review course data, reflect on their experiences implementing the course, and make recommendations to improve both the design of courses and the course evaluation process.

*Progress Evaluation and Reporting System (PEARS)*. Archival program, participant data, and UTeach program graduate data from expansion sites is collected through PEARS, a data management system housed at the UTeach Institute, which allows implementation universities,

NMSI, and the Institute to track program enrollment, program retention, numbers of graduates and their retention in the field. PEARS houses: (1) aggregate student profile data for the university, college of science, the teacher preparation program, and partnering LEAs; (2) individual student participant records (i.e., race/ethnicity, gender, socioeconomic status, GPA, SAT, or ACT scores, program coursework completed, name of high school, and high school GPA); and (3) graduate teacher records (i.e., scores on state certification tests, professional credentials, status of teaching, courses taught, and school information (district name, school address, student ethnicity)). PEARS will also collect and report data on the participants receiving induction and professional development support (i.e., numbers of teachers served, number of support services provided, etc.) as well as data consistent with the required measures for increasing the key success components as outlined in the TQP Grants Program RFP (e.g., teacher retention percentages, pass rates for initial certification and licensures, the percentage of highly qualified teachers in the consortium, etc.).

PEARS is designed to be compliant with student privacy policies and each individual is identified only by a unique identifier and categorized as one of the following: incoming participant, current participant, early leaver, graduate, graduate obtaining certification, graduate not obtaining certification, graduate entering teaching, graduate not entering teaching, graduate leaving teaching within three years, or graduate leaving teaching after three years.

PEARS is the primary data source for assessing the GPRA indicators and Title II Section 204(a) of the HEA. Department program officers will have direct access to PEARS for the latest reports of this information. Results of external evaluations of the new UT Austin components of this proposal will also be made available to program officers via the PEARS web site.

## **b. LEA Partnership Professional Development and Induction Implementation**

Using data collected through local needs assessments, the Institute will create a common set of indicators whose measurements provide guidance on the design and implementation of the partnering LEA's professional development and induction programs. The Institute plans to evaluate these program indicators through site visits, surveys, and database entry and analyses.

*Professional Development and Induction Needs Assessment.* To ensure that appropriate professional development opportunities are provided to math and science teachers in partnering LEAs, each consortium university will conduct a needs assessment and submit to the Institute a report summarizing the findings. Based on these findings, the Institute will collaborate with the universities and their partner LEAs to develop and implement a professional development program. The results of the needs assessments will determine the evaluation instruments used to assess a common set of indicators for the various programs.

*Site Visits.* NMSI and the Institute will conduct site visits to participate in needs assessment activities and to observe the professional development and induction programs once a year at each university and LEA in the consortium. Field staff from NMSI and the Institute will follow a standard site visit protocol and collect data that may include observations, checklists, interviews and focus groups with program participants, professional development providers, and induction coordinators.

*Surveys.* The Institute will administer online surveys of participants enrolled in the professional development and induction programs at key intervals. Survey instruments include a professional development participant survey and an induction survey.

*Progress Evaluation and Reporting System (PEARS)*. The Institute's PEARS data management system (described above) will house participant data from partnering LEA professional development and induction programs. The Induction Coordinator from each consortium university will submit program implementation data to PEARS twice a year. Data collected will include:

- Number of sessions offered during the semester;
- Description of each professional development session provided (topic, presenters, etc.);
- Number of participants; and
- Participant information (demographics, school information, etc.).

***ii. Program Outcomes***

Outcome data will be collected from each university and LEA partner. over the course of each school year. The primary focus is on gathering data on students as they enter, leave or graduate from the program. The Institute will conduct surveys (e.g., entrant, leavers, graduate) and focus group interviews. Additional information will be captured from archival program data and reports, as well as interviews with program faculty and staff. Outcome data will also be captured through observation, employing time sampling of students and graduates over the course of the year to document their experiences in the program and as teachers in the field over time, such as changes in observable behaviors and instructional practices. Finally, NMSI and the Institute will make efforts to capture archival data from partnering LEAs where UTeach teachers are placed to gather baseline data on teacher retention, pass rates for initial certification and licensures, and the percentage of highly qualified teachers as well as document student academic achievement and other student (child) outcomes.

**a. Measuring Key Success as Outlined in the Teacher Quality  
Partnership Grants Program**

The PEARS database allows NMSI, the UTeach Institute, and implementation partners to longitudinally track teacher graduates of UTeach programs and participants in the LEA professional development and induction programs. PEARS will collect, house, and report the data consistent with the key success measurements as outlined in the Teacher Quality Partnership Grants Program RFP (e.g., teacher retention percentages, pass rates for initial certification and licensures, the percentage of highly qualified teachers in the consortium, etc.). In addition, PEARS will be the main data source for reporting GPRA Indicators related to teacher outcomes of this project and Title II Section 204(a) of the HEA (See the Evaluation Table in Appendix D, part 3).

Measurable performance outcomes are aligned with the evaluation requirements as outlined in the TQP Grants Program RFP. The Institute will collect annual information on partnering LEAs to serve as baseline comparisons after the university Consortium members begin graduating teachers. These measures include:

1. Teacher retention in the first three years of a teacher's career;
2. Improvements in pass rates for initial certification or licensure;
3. Percentage of highly qualified teachers hired by the high-need LEA and their characteristics;
4. Percentage of highly qualified teachers hired by the high-need LEA and their teaching areas (including content area, special education, language instruction, programs for limited English proficiency);

5. Percentage of highly qualified teachers hired by the high-need LEA that teach in high-need schools, disaggregated by the elementary and secondary levels; and
6. Percentage of teachers hired to integrate into curricula and instruction and use technology effectively to collect, manage, and analyze data.

***iii. Promising Program Practices Outcomes***

*UTeach Research Consortium.* To encourage and support research and evaluation studies that identify promising program practices related to UTeach and STEM teaching and learning, the Institute is establishing a research consortium made up of social, science, and educational researchers from UT Austin and all of the UTeach program replication sites. All universities replicating the UTeach program are encouraged to participate in the research consortium and have representation on its advisory board, and all Consortium partners will be invited to join this research consortium and contribute to ongoing research in this important area.

The goal of the research consortium is to increase the amount of research on the UTeach program and provide stakeholders with rigorous research-based evidence on effective practices in STEM teacher preparation and STEM teaching and learning. The research will focus on examining outcomes related to replicating the UTeach program through the Consortium as a means of determining the extent to which scaling the UTeach program nationally has led to:

1. Improvements in teaching practices;
2. Improvements in student learning outcomes;
3. Improvements in teacher retention; or
4. Improvements in new teacher performance.

**External Evaluator.** As described earlier, NMSI, in consultation with the Institute will contract with external evaluators to provide an external perspective on the activities of the

Consortium and the new UT Austin curriculum/program reforms (TDL & Discovering Science). Although the evaluator has not yet been named, the consortium will ensure that the highest level of expertise and experience will be brought to complement the strong evaluation design already utilized by the Institute.

### **C. REPORTING AND MANAGEMENT**

*Fiscal Performance Management.* As discussed above, NMSI has developed a Web-based fiscal reporting and management system that is updated monthly. The system tracks and monitors expenses, spending and gifts or endowment revenue raised for the required match. The UTeach replication program requires a one-to-one match as does this grant. The fiscal management system allows NMSI to track progress through spending, determine eligibility of expenses, and progress of the required match.

*Performance Feedback.* NMSI and the Institute prepare a variety of reports that provide partner universities with results of periodic assessments of their progress toward achieving the intended outcomes. In addition to the data debrief sessions during spring site visits and the automated reports generated from each survey administration and from PEARS, the Institute summarizes data and publishes a variety of evaluation reports including:

1. Cross-site reports;
2. Individual progress reports;
3. State-level reports;
4. Site-visit summaries;
5. Needs assessment summary report; and
6. Professional development and induction implementation summary report.

Finally, NMSI and the Institute track each site's attainment of benchmarks and milestones, which serve as the basis for NMSI decisions about ongoing funding. Benchmarks for UTeach implementation include:

1. Hiring master teachers;
2. Identifying faculty to teach courses;
3. Obtaining target student enrollments;
4. Developing four-year degree plans;
5. Functional classroom/office space exists;
6. Steering committee is established and meeting regularly;
7. Implementing UTeach courses according to the implementation schedule;
8. Implementing professional development program according to the implementation schedule;
9. Submitting all data collection requests and participating in evaluation activities; and
10. Submitting accurate financials

**D. COMMITMENT TO PARTICIPATING IN A NATIONAL EVALUATION STUDY (General Program Requirement)**

The UTeach Research Consortium serves as the primary vehicle for developing and enacting the policies and procedures for reviewing and approving research proposals that involve mining the UTeach Institute's data and/or accessing subject pools from UTeach Austin and the partnering institutions. This consortium provides a process by which internal and external researchers such as those involved in the national research study, can have direct access to UTeach replication data will full support from the participating replication sites. Thus, the

members of this Consortium Proposal all commit to participating in a national study commissioned by the Department.

## **CONCLUSION**

The Consortium proposes: (1) to improve the quality of teacher preparation at two distinct types of universities immediately by implementing the UTeach model – an evidence-based program that combines content knowledge and pedagogy in a four-year plan for STEM teachers, and (2) to reform broader teacher preparation programs based on lessons learned from the UTeach program. NMSI and the Institute have the experience and capacity to lead the Consortium in this endeavor because they are currently and successfully replicating the UTeach program in 13 universities. While NMSI provides the fiscal accountability and business management to ensure that the university partners adhere to both the Consortium’s and the Department’s requirements, the Institute oversees and guides program implementation to ensure that the universities implement the UTeach program with fidelity. The partner high-need LEAs and schools will play an integral role in the reform process through integrated clinical teaching experiences and will benefit, not only from the professional development and induction programs that the Consortium will introduce, but also from the influx of highly-qualified teachers graduating from the partner universities who may teach in these districts and at these schools. Finally, The University of Texas at Austin will share its lessons learned and provide a model for similar reform efforts at the other Consortium partner universities as they expand the best practices of the UTeach program to other teacher preparation programs.

Thus, by selecting this Consortium’s proposal for funding, the Department launches a new concept in teacher preparation reform, one that is built upon a public private partnership, that addresses a critical and growing need for highly effective teachers, that fosters collaboration

among higher education institutions, and that produces strong two-way relationships with high need LEAs and schools.