

# Replication as a Strategy for Expanding Educational Programs That Work: The UTeach Institute's Approach to Program Replication<sup>1</sup>

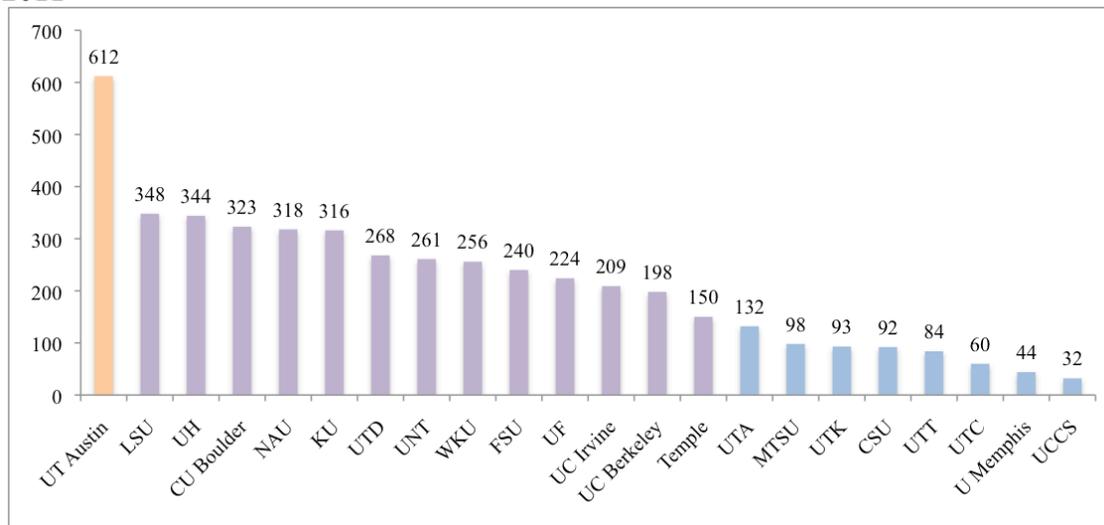
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The UTeach Institute was established in 2006<sup>3</sup> in response to national concerns about the quality of K-12 education in the areas of science, technology, engineering, and mathematics (STEM) and growing interest in the innovative and successful secondary STEM teacher preparation program, UTeach, started in 1997 at The University of Texas at Austin (UT Austin).<sup>4</sup>

The Institute currently supports UTeach replication at 21 universities in 11 states across the United States. Thirteen of these UTeach-based programs began in Fall 2008 and are completing their third of four years of implementation (their five-year grants also support a planning period). Eight began in Fall 2010 and are completing their first year.

Excluding the original program at UT Austin, 4,090 students currently are enrolled in UTeach programs across the country.

**Figure 1. Program Enrollment, UTeach Replication Programs Nationwide, Spring 2011**



<sup>1</sup> Paper presented at the annual meeting of the American Association of Colleges of Teacher Education, San Diego, February 2011.

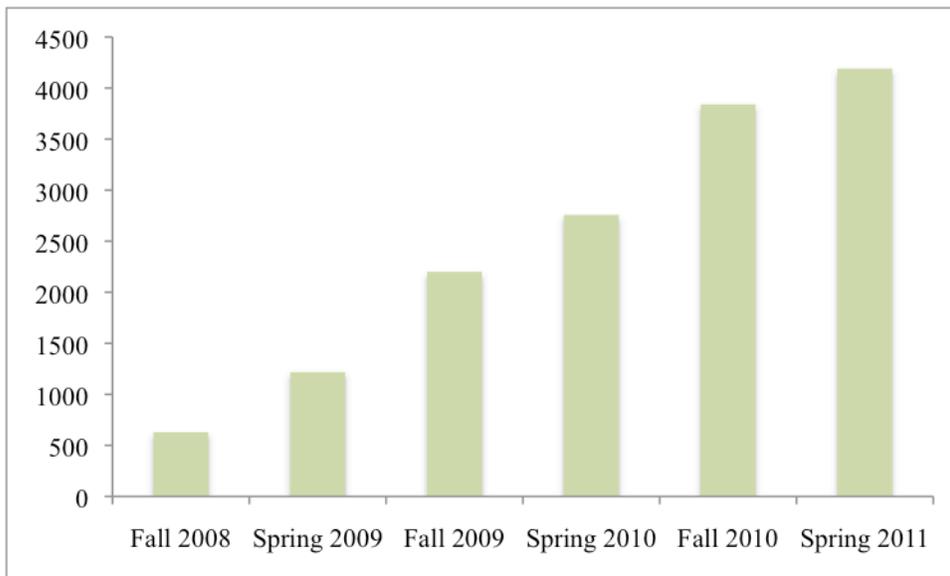
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<sup>3</sup> The UTeach Institute partners with the National Math and Science Initiative and the states of Texas, Tennessee, Georgia, and Massachusetts to replicate UTeach at universities across the country. A complete list of our strategic partners is available here: <http://uteach-institute.org/about/detail/partners/>.

<sup>4</sup> A discussion of the elements unique to the UTeach program and its success is beyond the scope of this paper. For further information, please visit <http://uteach-institute.org/uteach>.

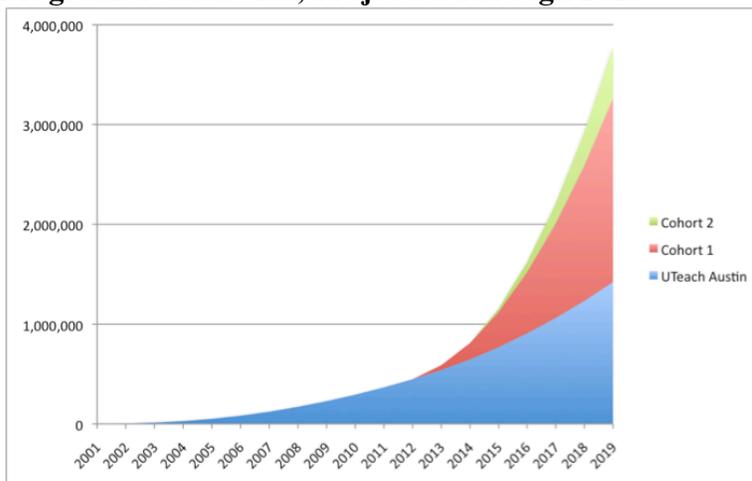
These figures represent constant increases in program enrollment from the first semester of implementation for the first cohort, Fall 2008, to the current semester, Spring 2011.

**Figure 2. Program Enrollment by Semester, UTeach Replication Programs Nationwide, Fall 2008 to Spring 2011**



Perhaps most importantly, the Institute projects that the graduates of these UTeach programs will impact more than 3.5 million secondary STEM students nationwide by 2019.<sup>5</sup>

**Figure 3. Students Expected to be Taught by Graduates of UTeach Replication Programs Nationwide, Projected Through 2019**



<sup>5</sup> Projections are based on UT Austin's experiences (i.e., percentages of graduates entering and remaining in the field).

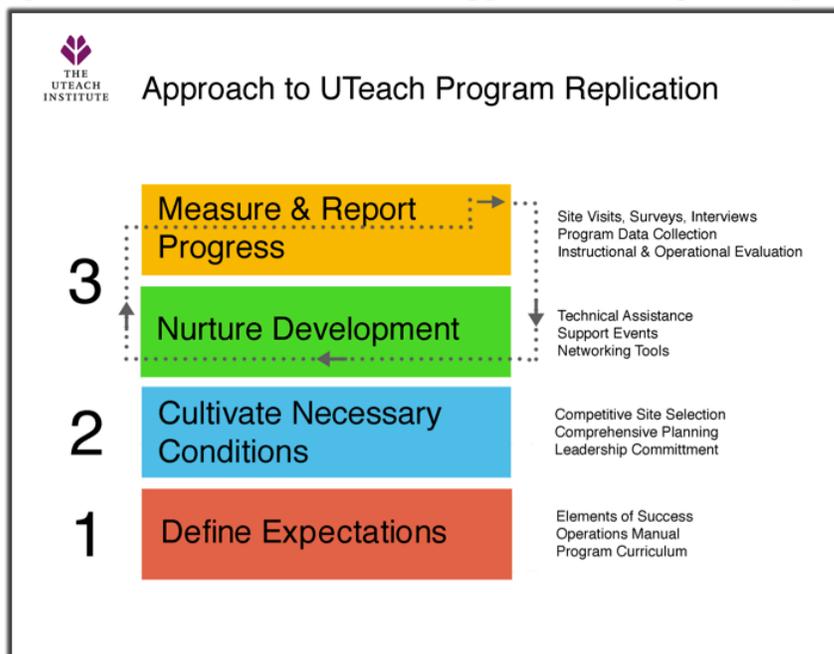
The UTeach Institute is a young organization, and the national replication of UTeach is only in its third year of implementation. Although we already have learned a great deal, we cannot draw conclusions yet about our 21 partner programs or the role our approach to replication is playing to support the scale-up of UTeach nationwide. Here we describe our approach to replication, the formative lessons we have learned, and the challenges we have encountered and expect to encounter as we move forward to sustain the innovation and the national community it engenders. We also speculate on directions for future research and evaluation of these programs and our approach to replication.

### The UTeach Institute’s Approach

To promote the dual goals of fidelity to the UTeach model and long-term sustainability, the UTeach Institute has developed a comprehensive approach to replication aligned with recommendations from the research literature on fidelity of implementation and program replication and expansion (e.g., Century, Rudnick, & Freeman, 2010; Glennan, Bodilly, Galegher, & Kerr, 2004; Hall & Hord, 2010; Hill, Maucione, & Hood, 2007).

The Institute’s approach, represented by the figure below, emphasizes (1) clear articulation of program elements and expectations for replication, (2) comprehensive planning with qualified sites, (3a) intensive implementation support, and (3b) ongoing evaluations of progress. Another element, *sustaining the innovation*, is expected to become an important consideration by Spring 2012, when the original 13 universities reach the end of their five-year implementation grants.

**Figure 4. The UTeach Institute’s Approach to Program Replication**



## **Articulating Program Elements: Defining Expectations for Replication**

Once a university understands the instructional philosophy and operational details of the UTeach model, it is better able to successfully prepare for, implement, and sustain a UTeach program. Thus, one of the UTeach Institute's primary responsibilities is to define and communicate clearly the essential elements, operational details, and instructional content that make the UTeach program successful at UT Austin. We have articulated these fundamental program components through a variety of publications.

**The *UTeach Elements of Success*.** The *UTeach Elements of Success*, available at <http://uteach-institute.org/publications>, describes essential aspects of the UTeach program at UT Austin. This document defines the unique and fundamental features of the program and allows interested universities to make informed decisions about whether UTeach is a good fit with their own priorities and local characteristics. These elements also form the basis for the Institute's evaluation of program implementation at universities replicating UTeach.

**The *UTeach Operations Manual*.** In an effort to make explicit many of the specific practices of the UTeach program at UT Austin, the Institute created the *UTeach Operations Manual*. The manual explains a number of theoretical assumptions underlying the program and provides practical information on program operations. Topics include institutional commitment, planning for growth, partnering with school districts, recruiting and supporting students, budgeting, staffing, space requirements, equipment and supplies, degree plans, and course descriptions. The manual also includes examples of job descriptions, data collection forms, correspondence, and reports.

**The implementation schedule.** The Institute has created a five-year timeline that allows each of its partner programs to fully adopt UTeach with measurable success (e.g., implementing one or more courses each semester of the grant cycle). The implementation schedule for UTeach replication sets a clear, tenable sequence of steps that places organizational development ahead of growth and expansion. Additionally, regular measurement of interim milestones reveals the ways in which programs are and are not being implemented according to the UTeach model.

**The UTeach curriculum and instructional program review materials.** One of the most significant challenges for universities replicating UTeach is implementing the course sequence, a streamlined and tightly articulated set of courses that integrates STEM content and pedagogy. To facilitate this transition, the Institute has developed curricula for nine UTeach courses, including extensive supporting resources, instructor notes, rationales, lessons learned, recorded interviews and discussions, videotaped activities, and samples of student work. These materials are accessible via a secure Website. In addition, we make available the rubrics and observation protocols used to evaluate the fidelity of each course at our partner universities.

## **Comprehensive Planning with Qualified Universities: Cultivating Conditions**

Promoting the long-term sustainability of our partner programs begins with site selection. Universities interested in implementing UTeach must engage in an intensive competitive RFP process, during which the Institute carefully considers the local context of each applicant university in light of the conditions necessary for successful implementation of the UTeach model (e.g., sufficient STEM major pool, university leadership support, strong institutional relationships with local school districts).

Universities that prepare proposals must engage in substantial cross-college discussion and preparation, with input from administrators, faculty, and staff. The UTeach Institute's goal with this process is not only to select the universities most capable and ready to implement UTeach but also to cultivate conditions conducive to implementation on these campuses even before they are selected to receive grants.

As part of its selection process, the Institute carefully considers the long-term funding capacity of each program. A grant amount of \$1.4 million is projected to cover approximately 40 percent of a program's expenses across the five-year implementation period. To cover remaining expenses, universities must commit to a funding model in which grant funds decrease as a percentage of their total program budgets across the grant period. Successful proposals must demonstrate the institution's ability to fundraise in order to finance portions of the program that cannot be funded from the regular university instructional or fee budgets, as well as a commitment to create a perpetual income source for the program (i.e., an endowment).

Implementation of the UTeach program model requires substantial and long-term changes at the university level. To become sustained and permanent, universities must establish their programs on the scale of a small department, with permanent funding lines for administrators, instructors, and support personnel. Likewise, as the decision makers responsible for these commitments, university leaders (e.g., presidents, provosts, deans) must remain involved and aware of significant program developments and needs. Successful proposals demonstrate that these conditions are already in place or likely to be met during the grant period.

In addition to this careful site selection process, the UTeach Institute requires that each university selected to replicate UTeach participate in a planning period, typically during the spring and summer semesters preceding program implementation. Along with comprehensive technical assistance provided as needed, the Institute visits each university during this time and works to educate all individuals and groups involved in implementing the new UTeach program.

## **Intensive Implementation Support: Operations and Instruction**

The UTeach Institute is committed to replicating UTeach, to the success of its individual partner programs, and to the national effort to improve secondary STEM teacher preparation, in general. Following the initial planning period, when many of the

foundations for successful program implementation are established, the Institute's principal role is to provide its university partners with ongoing operational and instructional support. To promote effective and sustained implementation of all aspects of the UTeach program, the Institute has designed a comprehensive support plan that includes the following key components.

**Web-based tools for networking and sharing information.** The UTeach Institute hosts a secure Website for its university partners, on which many of the primary resources for UTeach replication, such as the curriculum and *UTeach Operations Manual*, are accessible specifically to individuals associated with UTeach replication. During the next phase of secure Website development, enhanced community networking tools will be integrated to allow instructors at UTeach universities across the country to collaborate in moderated discussions related to specific course content, instructional strategies, field experience logistics, and other topics of interest (currently, these discussions are facilitated via electronic mailing lists devoted to particular topics and groups (e.g., master teachers)). During the final phase of development, content contribution tools will be integrated to enable instructors to upload unique course materials and share adaptations to instructional materials and strategies.

**In-person and Web-based support events.** The UTeach Institute regularly hosts operational and instructional support events ranging from topical Webcasts to intensive professional development workshops and retreats. Webcasts are developed dynamically in response to the evolving interests and needs of our partner universities. They provide a forum for discussions of various resources, demonstrations of course materials, and collaborations among faculty and staff associated with the original UTeach program at UT Austin and those at our partner universities. Additionally, course workshops and retreats occur each fall and spring in Austin. During these events, instructors of specific UTeach courses interact directly with their counterparts at other UTeach programs across the country. Finally, each May, a variety of operational and instructional support events and retreats are held in conjunction with the UTeach Institute's annual conference.

**On-demand technical assistance.** UTeach Institute staff, in conjunction with consultants from UT Austin and our most experienced university partners, provide ongoing technical assistance on every aspect of UTeach program operations and instruction. Assistance is provided via email, site visits, conference calls, meetings, customized action plans, and other means. More than any other activity supporting replication, the Institute's role as a support provider encourages the cultivation of productive collegial relationships. These kinds of collaborative partnerships are essential in overcoming the inevitable challenges and uncertainties involved in replicating a comprehensive higher education program.

### **Ongoing Evaluation: Measuring and Reporting Progress**

Informal information collected during events, on support calls, and via email and in-person conversations provides formative feedback on the progress of our partner programs. Likewise, formal evaluative data inform our plans for technical assistance. This continuous and reciprocal relationship between implementation support and

evaluation defines the UTeach Institute's dual role during program implementation and forms the basis for the bulk of our work.

All aspects of the Institute's plans for evaluation are based on the *UTeach Elements of Success*. Specific, measurable indicators have been identified and mapped to each of the elements and activities and can be used to track program progress. Fidelity of implementation generally is expected to be high in the early stages of replication to ensure successful start-up without unnecessary delays. Adaptations are expected, however, and even welcomed as a means of strengthening UTeach programs nationwide. Indeed, faculty members at UT Austin continuously refine and adapt the UTeach curriculum based both on current research on effective teaching and learning and on their experiences teaching the courses. The same is expected to occur with our partner programs.

A significant portion of the Institute's staff is dedicated to collecting quantitative and qualitative data through a combination of site visits, surveys, reviews of course materials and student artifacts, and analysis of program and student level data.

**Site visits.** Site visits are scheduled in the fall and spring for each university replicating UTeach. Although these visits involve specific evaluation activities, they also serve to provide ongoing assistance and promote relationships among Institute and university program staff. The focus of fall site visits is data collection through interviews and focus groups, course observations, and tours of facilities, as well as the identification of areas that may indicate the need for additional support from the Institute. Spring site visits are focused on data sharing and discussions about individual program progress. In the second half of the grant period, after program operations are established, site visit data collection centers primarily on instruction, through course observations, meetings with instructors, and student focus groups.

**Student surveys.** Using surveys adapted from the original UTeach program at UT Austin, the UTeach Institute collects data on student perceptions of a number of aspects of each of its partner programs. Instruments include mid-semester surveys for each of the UTeach courses, a program leaver survey, a graduate survey, and an alumni survey. In addition to a set of common items for each of these surveys, items can be added and modified to suit each university's unique programmatic and evaluation needs. All surveys are administered online, and results are provided to co-directors, course instructors, and others through a variety of reports.

**Instructional program review.** The Institute has developed a comprehensive instructional program review process, with instruments and protocols designed to measure the degree to which UTeach course design principles, core course components, and course objectives and evidence of student learning are reflected in course equivalents at our partner universities. In addition to conducting course observations and focus groups during site visits, the Institute uses rubrics based on each course's core components and objectives to review course materials and student artifacts for each UTeach course at our university partners over the course of the grant period.

**Progress Evaluation and Reporting System (PEARS).** To store and sort longitudinal data from all participating universities, the UTeach Institute has invested in the development of PEARS, a sophisticated Web-based data management system. Authorized users for each program enter data about their university, program, and students twice a year. These data, along with survey and site visit data, are used to develop a variety of reports for multiple stakeholders and address important questions related to program implementation, student enrollment and retention, and teacher production and retention. Universities use the information to review progress and make informed decisions about program development and improvement, while funders are interested in tracking the program implementation benchmarks that trigger annual grant disbursements. Subsequent phases of PEARS development will allow for multi-site data sharing and analysis related to approved research projects by graduate students, faculty, and external research groups. PEARS continues to be developed in phases. It will soon include a user-friendly interface for accessing real-time statistics on program enrollment and retention and comparisons to other universities replicating UTeach. This interface will allow authorized users at each university to generate a variety of standardized reports, as well as sort, query, and customize data exports.

**Reporting.** Using the data collected through site visits, surveys, instructional reviews, PEARS, and other sources, the Institute prepares individual site summaries, progress reports, annual presentations of individual program and cross-site data for the programs themselves, and other formative and summative reports. In addition to documenting progress toward UTeach replication, the goal is to assist universities in using the information to assess their program's development and inform decisions about improvement. In turn, the Institute uses these data to assess its own efforts and determine which support activities should be modified or expanded to address local needs. Many of these reports also are shared with funders, policy makers, and others to support funding and promote the national UTeach community.

### **Sustaining the Innovation: Engaging the National Community and Improving the Model**

The UTeach Institute's relationship with the 13 universities in the first cohort will shift in Spring 2012, at the conclusion of their grant period. At that point, no formal mechanism will exist for us to continue providing technical support or evaluation services. We have begun to think about how best to continue to engage the national UTeach community and improve the UTeach model beyond the formal grant period.

**The UTeach national research consortium.** One possible support structure is the UTeach national research consortium, a collaboration of individuals at UT Austin and universities replicating UTeach that set policies and support robust, cross-site research agendas on UTeach program implementation and national outcomes. We are early in the planning/funding stages of the consortium, but have already established an advisory board composed of representatives from each partner university. Consortium meetings are held in conjunction with the UTeach Institute's annual conference and key educational research conferences, such as the annual meeting of the American

Educational Research Association. Individuals interested in the national UTeach research agenda also communicate via an electronic mailing list.

**Community networking and contribution tools.** Also expected to be significant in sustaining the national innovation and community are the networking and content contribution tools currently being developed for the UTeach Institute's secure Website. These tools will allow instructors and others involved in UTeach programs across the country to collaborate via discussion boards, share their ideas for improving courses, upload innovative materials, and discuss program adaptations given specific local characteristics and challenges. These Web-based tools are expected to be vital not only in engaging the national community but also in leveraging the expertise of UTeach faculty members across all partner institutions to improve the UTeach model and curriculum.

### **Lessons Learned and Continuing Challenges**

We are unaware of any effort to systematically replicate an entire academic program – including multiple courses and operational procedures to support a small department – in a higher education setting. Although the UTeach Institute has not yet completed a full cycle of UTeach replication, we have developed some initial impressions regarding our approach in this setting and potential ways to streamline and improve the services and support we provide.

In general, our approach to replication appears remarkably successful thus far. When we began this effort, a great deal of uncertainty surrounded the degree to which we could expect fidelity of implementation and true institutional change in the university setting. Three years into implementation, with most of our university partners beginning to produce teachers, we are struck by the extraordinary similarities we observe between the UTeach program at UT Austin and our partner programs. Many of the program's Elements of Success, used as an implementation roadmap, have taken shape. Universities with very different characteristics and student populations are implementing courses with similar content in roughly the same sequence, involving faculty and master teachers with similar areas and levels of expertise, attending the same support events, and asking similar questions. These universities have implemented programs that bridge colleges of science and education, actively recruit STEM majors, promote early and intensive field experiences, incorporate relevant and authentic STEM content in their professional development courses, establish endowments to ensure sustainability, and support students with a variety of benefits. Instructors across the country collaborate via UTeach Institute email lists, submit their instructional materials and student work samples for review, and regularly use results from a set of common student survey questions to adapt instruction and inform programmatic decisions. Although earliest program completion data will not be available until Spring 2012, we are satisfied by these formative observations that institutional change through replication is not only possible in a higher education setting, but that it is happening in the 21 universities with which we are working to implement UTeach.

Further, we propose that our approach is a viable model for replication of other successful programs. The combination of key elements – defining expectations and cultivating conditions prior to replication, intensive and continuous operational and instructional support, ongoing evaluation, and focused community building activities – appears to result in successful program implementation in higher education settings.

The university setting, however, also presents unique challenges for program replication. Perhaps the most significant lies in engaging faculty members – experts in STEM and STEM education themselves and peers of the developers of the innovation – in modifying or teaching new courses and becoming advocates for the new program, particularly when the new program is very different from the one in place prior to replication. The K-12 educational community has long experienced pressures to adopt and adapt innovations in curriculum and instruction, based on evidence and research, but the higher education community rarely has been asked to replicate another institution’s program with fidelity. The UTeach Institute, then, must be much more explicit in communicating its expectations that the national community will adapt and improve, not simply replicate, the UTeach model than perhaps it would need to be in a different setting (e.g., K-12). Indeed, we recognize the concentration of the expertise and commitment of our partners as a major advantage of replication in this setting. We feel certain that the UTeach model will be improved and strengthened under the continuous scrutiny of a national community of experts dedicated to STEM education.

In fact, engaging these experts in conversations and research surrounding STEM education may be the key to the long-term sustainability of the national community. While we expect that devoting resources to the research consortium and making available Web-based support structures for networking and sharing adaptations will encourage our partner programs to continue participating in the national community, the challenge of continuing to engage these partners and refine the UTeach model beyond their five-year grants is one we are not yet certain how best to address. We feel strongly that the national community surrounding UTeach replication must have reasons to come together. The question is whether these reasons are compelling enough when there is no financial incentive. We would welcome any ideas or potential partnerships that might be beneficial to this ongoing collaboration.

### **Directions for Future Evaluation and Research**

We have just begun to think seriously about the ways in which we might contribute to conversations about program replication, fidelity of implementation, STEM education, and the UTeach model. Our immediate focus is on planning summative data collection of the programs funded by grants ending in Spring 2012. We are piloting these summative evaluation plans and instruments with two of our partner universities this spring.

Our expectation is that there are multiple ways to achieve what we call the Elements of Success for UTeach at UT Austin. Eventually, we envision developing innovation configuration maps (Hall & Hord, 2010) to describe the variations we have observed across our university partners. We also would like to identify relationships among various

configurations and program and graduate outcomes (e.g., enrollment, retention in the profession). Ultimately, we imagine these maps not only informing our approach to replication and support but also expanding our understanding of acceptable practices with regard to the fidelity of UTeach implementation.

The UTeach Institute is keenly interested in establishing and maintaining research relationships with individuals and groups interested in UTeach and its replication. We see the national community expanding not only to include researchers interested in UTeach (e.g., faculty members at partner institutions), but also external organizations focused on broader ideas of fidelity of implementation and program replication and evaluation. We hope the UTeach national research consortium will become a mechanism for facilitating rich, multi-site research agendas on these topics and on best practices in STEM teacher preparation, in general.

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