The Importance of Partnerships and Data Collection in Long Term Programs for Pre-Service and In-Service Science and Mathematics Teachers

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As noted in reports such as Rising Above the Gathering Storm2, the United States is facing a crisis with regard to the preparation of our science, technology, engineering, and mathematics (STEM) workforce. As noted in reports such as Rising Above the Gathering Storm2, the United States is facing a crisis with regard to the preparation of our science, technology, engineering, and mathematics (STEM) workforce. The United States is facing a crisis with regard to the preparation of our science, technology, engineering, and mathematics (STEM) workforce.

In the Department of Science/Mathematics Education (SME) in the School of Natural Sciences and Mathematics (NSM) at the University of Texas at Dallas (UTD), we have several programs to prepare pre-service teachers and serve and strengthen the capabilities of in-service teachers. Here I describe the nature of these programs, the data collection challenges and requirements, and some of the opportunities that arise from the partnerships that are created with teachers, individual schools, school districts, and state and national program-parent organizations.

Programs in Science/Mathematics Education

Programs in Science/Mathematics Education (SME) at The University of Texas at Dallas (UTD) fall into two broad categories, with significant overlap:

1) Academic programs representing the primary mission of a university, and
2) Outreach programs that require neither enrollment nor formal courses for participation.

Academic Programs:

- **U Teach Dallas** – replication of UTeach3 secondary science and mathematics teacher certification preparation (pre-service 6–12 teachers), with replication overseen by the UTeach Institute, and the MAT Masters in Teaching program.
- **Master of Arts in Teaching** (MAT) programs in Science and Mathematics Education – course-based STEM content-focused teacher preparation (predominately K–12 in-service teachers).

Outreach Programs Serving Teachers:

- **U Teach Dallas Induction** – up to 3 years of support including participants’ teacher credential development and efforts to meet state/county/UTD Texas Regional Collaborative for Excellence in Science and Mathematics Teaching (UTD TRC) – one of a state-wide network1 of high-quality, 100+ contact hour, science or math content-focused professional development (PD) with flow-through U.S. Dept. of Ed. funding.
- **UTeach Dallas Noyce Teacher Scholarship Program** – Internships and scholarships for pre-service teacher STEM majors and stipends for STEM degree holders seeking UTeach Dallas teacher certification.
- **NSF Noyce Program** – grants for a variety of STEM programs.

Data Collection By Program

Data collection measuring success by the Texas Regional Collaborative for Excellence in Science and Mathematics Teaching has resulted in 26 years of continuous funding. Funders have included the Texas Higher Education Coordinating Board (THECB), the U.S. Department of Education, the National Science Foundation (NSF), and various state and district leaders as private corporate foundations and local laboratories.

Data collection measuring success by the UTeach Institute and Texas Regional Collaboratives provide data sources to both institutions and provide benefits to external partners with benefits to both partners in black.

Table 1 (Left) SME Programs for Teachers. Programs benefit from, and provide benefits to external partners with benefits to both partners in black.

Table 2 Right) Leveraging/Cross-Pollination Between SME Programs. Benefits from SME program for pre-service and in-service teachers are shown by column.

**Table 1 (Left):** SME Programs for Teachers.

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**Table 2 (Right):** Leveraging/Cross-Pollination Between SME Programs. Benefits from SME program for pre-service and in-service teachers are shown by column.

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Data Successes

Data collection to measure program impacts for both pre-service and in-service teachers is critical to demonstration of success and requires a coordinated effort. An essential consideration for in-service teacher programs is that measuring impacts on teacher effectiveness depend heavily on partnerships with local schools and districts. When working with K–12 teachers, student outcomes are an important data source for funders (privity concerns and time investments mean these measures are also challenging and potentially expensive for universities and other non-school organizations to acquire. Comparison groups of teachers (or K–12 students) represent many of the same challenges.

With the UTD TRC, we rely primarily on teacher or grade-level aggregated student state testing data, when available. Access to such data requires agreements with teachers, schools, and school districts. Periodic classroom observations, benchmark data, and student performance, and comparison groups would provide a clearer picture of the impacts of teacher preparation and in-service teacher professional development (PD) on K–12 students. However, these data sources have implications for privacy concerns for both teachers and students thus requiring a deeper level of partnership between schools and universities of NAS and K–12 schools.

Expectations for impact measures on teachers and K–12 students, as those of the TRC, are increasingly important in a climate of school and federal funder accountability. Data to demonstrate impacts is important to all funders. By working in partnerships and learning from existing data collection efforts, programs preparing and serving teachers can make the case for funding. NASA EPO programs can benefit from partnerships and data such as described here, as has CINDI EPO.

References