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STEMTEC II Evaluation Plan -- Fall 2002 to Spring 2005

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STEMTEC II Evaluation Plan -- Fall 2002 to Spring 2005

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The Science, Technology, Engineering, and Mathematics Teacher Education Collaborative (STEMTEC) is one of the Collaborative for Excellence in Teacher Preparation (CETP) projects funded by the NSF. The five-year grant for STEMTEC ended in July 2002. At that point, a three-year follow on grant, STEMTEC II, was approved that was designed to "produce a comprehensive summative evaluation and to implement an induction program for new teachers."

The evaluation work of the past two years (Years 4 and 5 of the project) focused on determining whether the STEMTEC Collaborative:

- reinvigorated the teaching of math and science,
- increased the number of students who enter the math and science teaching professions,
- increased the number of underrepresented minorities who enter the math and science teaching professions, and
- supported K-12 math and science teachers.

These priorities were developed from the goals specified in the original STEMTEC proposal¹.

Prior to this year, our evaluation activities have focused on evaluating the impact of STEMTEC at the postsecondary level: on faculty, courses, and students on the campuses of the eight institutions participating in STEMTEC. The focus of the evaluation during the three years of additional funding will be primarily on examining the outcomes of STEMTEC efforts in the K-12 setting. However, teaching of math and science at the postsecondary level, especially that of the Faculty Fellows cohort, will continue to be a part of the evaluation of STEMTEC.

Evaluation Goals and Activities

Given the emphasis of the Follow-on Funding on the K-12 setting, specifically to new teachers, the evaluation goals have been reprioritized to better match the intent of the follow on funding phase of the STEMTEC project.

¹ The specific goals defined in the original proposal were: (1) Establish a functional educational collaborative. (2) Redesign the science and math curricula on the campuses of the Collaborative to incorporate new pedagogies and establish mechanisms for supporting faculty in their course redesign, (3) Improve preparation of future K-12 teachers of mathematics and science, (4) Recruit and retain promising students into the teaching profession, with special attention to underrepresented groups, (5) Develop a program to support new science and math teachers in their first year in the classroom, (6) Establish dissemination mechanisms, and (7) Conduct strong programs of evaluation and assessment.

The evaluation goals for the Follow-on Funding (STEMTEC-II) are to evaluate the:

1. preparation of future K-12 teachers of mathematics and science.
2. programs designed to support new science and math teachers in their first year in the classroom.
3. redesign of the science and math curricula on the campuses of the Collaborative to incorporate new pedagogies.
4. recruitment and retention of promising students into the math and science teaching profession, with special attention to underrepresented groups.
5. degree to which STEMTEC effectively communicates its lessons learned at the local, regional, and national levels (i.e., dissemination mechanisms).

Each of these goals is described below.

The first three evaluation tasks will receive the greatest amount of emphasis. However, we will continue to assess the degree to which STEMTEC has been able to recruit and retain potential math and science teachers. The evaluation will also include a focus on dissemination to practitioners in the field, particularly those who work in local school districts in which a number of graduates from the STEMTEC programs have been employed as teachers.

To conduct these assessments, we will build on the Core evaluation plan constructed by the CETP Core evaluation team at the University of Minnesota. As such, we will incorporate the Core evaluation team goals and instruments into our research design wherever possible. However, we will also construct some additional surveys and observations of our own above and beyond the Core's expectations. Much of the additional survey work will focus on new teachers, particularly those who are employed outside of the local school districts in close proximity to the STEMTEC headquarters at the University of Massachusetts Amherst. We also plan on obtaining larger samples for some of the surveys, particularly in K-12 settings and we will conduct additional classroom observations at the K-12 and higher education levels. We will also conduct numerous observations, surveys, and interviews that specifically target the ongoing new teacher induction and support efforts of STEMTEC.

1. Evaluate the preparation of future K-12 teachers of mathematics and science.

The first evaluation goal focuses on how well STEMTEC has improved the preparation of K-12 math and science teachers. Our evaluation of this goal will involve interviews and surveys of K-12 teachers who received STEMTEC training. In addition, the evaluation will attempt to include a comparable cohort of K-12 teachers who did not receive STEMTEC training. Further, we will interview elementary and secondary administrators to determine if they perceive a difference between their teachers who received STEMTEC training and those who do not. The teacher surveys and interviews will focus on specific teaching and assessment practices used by the teachers, as well as

their adherence to national standards in math and science (e.g., NCTM, NSTA). Also, we will survey or interview K-12 teachers who are serving as mentors to the student teachers from the STEMTEC program. We will inquire about the strengths and weaknesses of the program as well as any perceived differences in STEMTEC versus non-STEMTEC students, if possible. We will also conduct a number of classroom observations over time to assess the extent to which K-12 teachers who have participated in STEMTEC courses and programs as undergraduates are incorporating reformed teaching practices into their classrooms.

Although we will continue to need to develop and use our instruments, CETP core survey instruments and classroom observation protocols will be used wherever possible. We will also utilize CETP core recommendations regarding sampling for surveys and classroom observations each year of the project; as such we will identify a local impact area for K-12 schools and identify 60 second or third year teachers (30 STEMTEC and 30 non-STEMTEC) as targets for the teacher survey. We will also survey principals in those schools. Additionally, we will conduct 6-12 classroom observations of STEMTEC and non-STEMTEC teachers and collect instructional artifacts from observed teachers. We will also observe 5 teaching scholars and survey all scholars (whether engaged in the teaching profession or not).

2. Evaluate programs to support new science and math teachers in their first year in the classroom.

The second evaluation goal will focus on documenting participation rates in each of the STEMTEC sponsored programs and events designed to support new teachers. New teachers will be included in survey and interview (individual and focus group interviews) research as a means of assessing how they perceive the support they are receiving from STEMTEC related activities. Administrators will also be surveyed about how well STEMTEC support efforts are meeting the needs of new teachers. Additionally, evaluators will observe various support activities. Specific questions will inquire about the strengths and weaknesses of the support these teachers receive from STEMTEC. We will pay particular attention in our evaluation of this goal to new activities, including the web-based components, that are sponsored as part of the supplemental funding.

3. Evaluate the redesign of the science and math curricula on the campuses of the Collaborative to incorporate new pedagogies.

The third evaluation goal picks up where much of the focus of our previous evaluations has been, with a particular emphasis on the Faculty Fellows Program.. Periodic review of how well STEMTEC has maintained transformation of postsecondary teaching will be conducted through surveys and observations. We will conduct interviews and surveys, incorporating the CETP core instruments into these efforts, as means for evaluating how well the original collaborative was able to develop and sustain reformed teaching cultures and associated formal support structures at participating departments and campuses. To accomplish this evaluation goal, we will observe classes,

both Faculty Fellows and other STEMTEC participants to see how well reform teaching is being sustained after the initial funding and we will survey students in other courses about the extent to which reform teaching is continuing to be incorporated in classes. Over the course of the three-year evaluation, we will also survey deans and department chairs and selected faculty members from each science and math department at the eight participating institutions, as well as all STEMTEC faculty who have formally changed their courses and all survey all scholars during their senior year in order to get a student perspective.

4. Evaluate recruitment and retention of promising students into the math and science teaching profession, with special attention to underrepresented groups.

The fourth evaluation goal will be assessed by evaluating the numbers of students who enter science and math teaching as a profession and by examining the extent to which students in STEMTEC courses express greater interests in science and math and teaching careers. The retention of STEMTEC graduates as teachers will also be assessed by tracking these students longitudinally and comparing their retention rates with non-STEMTEC graduates. Additional analysis will be conducted on employment trends and career paths of the participants in the scholars program. We will continue to work closely with the registrars and alumni offices of the eight participating institutions to track these students.

Goal 4 will also be evaluated by tracking the number of STEMTEC participants of various underrepresented groups. We will compare these numbers to campus demographics and perhaps with data from other CETP sites. The evaluation will also document the specific efforts and events targeted at recruiting members of underrepresented groups. Focus groups may be necessary to determine the effect that STEMTEC has directly had on various groups.

5. Evaluate the degree to which STEMTEC effectively communicates its lessons learned at the local, regional, and national levels (i.e., dissemination mechanisms).

Previous and planned dissemination activities will continue to be documented and evaluated, with particular attention given to the dissemination of information to local school districts and new science and math teachers in those districts. In addition to using the CETP core surveys, we will conduct some survey efforts of our own with local teachers and K-12 administrators to assess how well the dissemination of STEMTEC knowledge has been shared with local educators.

The attached Task List outlines the specific tasks associated with the evaluation activities planned for the 2002-2003 academic year and indicates the evaluation team members who will be working on these tasks. Tentative deadlines are also included.

STEMTEC Evaluation 2002-2003 Detailed Task List and Timeline By Priority

1. Evaluation of the preparation of future K-12 teachers of mathematics and science.

Identify STEMTEC Students

Task	Deadline	Date Completed	Personnel
Email STEMTEC to identify list of STEMTEC courses	10/4	in progress	SCS
Meet with Bill Tyler to obtain all Teaching Scholar information available	10/29	10/29	SCS, MB
Meet with STEMTEC PIs to present revised evaluation plan	11/1		SS, JB, JH, SCS
Get list of STEM certified teachers from School of Education (Ray Sharick)	11/5		JB
Meet with undergraduate Registrar about how to get as much information about STEMTEC courses/students as possible	11/10		JH, SCS
Train someone in Mort's office on transcript analysis and data entry	11/23		JB, SCS, SS
Update our Teaching Scholar database to include all STEMTEC students	12/10		SCS, MB

K12 Setting Surveys*

Task	Deadline	Date Completed	Personnel
Review Core instruments	11/1		SS
Determine sampling and data collection techniques	11/15		Team
Update Core Scholar survey to meet our needs	11/27		SS
Update Core K12 teacher surveys to administer to STEMTEC trained teachers	12/13		SS
Update Core 6-12 student surveys	12/13		SS
Design survey to be administered to mentors and administrators involved with STEMTEC trained K12 teachers	12/13		SS
Administer all surveys	1/15		STEMTEC? Core?
Follow-up on K12 survey administration (by mail, phone, email?)	1/30		MB, LD
Enter K12 survey data into SPSS	2/28		MB, LD
Prepare K12 survey report	4/15		MB, LD, SCS

*Surveys will focus on teaching and assessment practices used, as well as adherence to national standards (e.g., NCTM, NSTA)

K12 Classroom Observations

Task	Deadline	Date Completed	Personnel
Determine which new teachers to observe	12/15		LD, JH
Obtain approval from Human Subjects Review Committee	12/15		SS, JH
COP training review	1/15		JH, LD, MB
Contact Principals of all schools where teachers will be observed	1/15		JH
Schedule K12 observations	1/31		MB, LD
Complete K12 observations	2/15		MB, LD
Prepare COP report and mail copies to participating teachers	5/1		JH

2. Evaluation of programs to support new science and math teachers in their first year in the classroom.

New Teacher Support

Task	Deadline	Date Completed	Personnel
Contact Bill Tyler to get New Teacher Support information (e.g., planned activities, support group, names of teachers)	10/3	10/4	SCS
Document participation rates in each of the STEMTEC sponsored activities and events	Ongoing		LD
Design surveys and/or interviews for new teachers	11/27		SS
Design interview for administrators about how they perceive STEMTEC support of new teachers	11/27		SS
Observe selected STEMTEC sponsored activities	5/1		JH, MB

3. Evaluation of the redesign of the science and math curricula on the campuses of the Collaborative to incorporate new pedagogies.

Faculty Fellows Data

Task	Deadline	Date Completed	Personnel
Design follow-up survey for Faculty Fellows	10/31	10/28	KO,SS
Administer Faculty Fellows survey	Fall		STEMTEC?, KO
Observe Faculty Fellows teaching (COP)	Fall		JH,MB,LD
Collect Faculty Fellows survey	Fall		STEMTEC?, KO
Analyze Faculty Fellows surveys / Write report	Spring		KO

Teaching Scholar Data

Task	Deadline	Date Completed	Personnel
Review Teaching Scholar survey with Bill Tyler and Sharon Palmer	3/1		SCS, SS
Get copies of completed Teaching Scholar surveys	5/1		LD
Enter Teaching Scholar survey data	5/15		LD
Write Teaching Scholar report	6/15		SCS

4. Evaluation of recruitment and retention of promising students into the math and science teaching profession, with special attention to underrepresented groups.

Recruitment and Retention of Teachers

Task	Deadline	Date Completed	Personnel
Clean Teaching Interest Survey (TIS) databases and get copies to Steve	10/1	in progress	SCS
Design follow-up to TIS survey, either paper or web-based	10/30	in progress	SCS, SS
Get overall campus demographics from Offices of Institutional Research (check with SARIS)	11/15		MB, LD, SCS
Get Teaching Scholar demographics from Student Program office	11/15		SCS, MB, LD
Contact Core to find out if demographics from other CETPs are available (CETP website?)	11/27		SCS
Contact Ray Sharick to track numbers of STEM certified graduates over the past 5 years and before STEMTEC	11/27		JB, LD
Work with Student Program and Alumni offices to track teacher retention rates	11/27		LD, SCS

5. Evaluate the degree to which STEMTEC effectively communicates its lessons learned at the local, regional, and national levels (i.e., dissemination mechanisms).

Dissemination to Local Educators

Task	Deadline	Date Completed	Personnel
Document dissemination activities, with particular attention to dissemination of information to local school districts and new teachers	Ongoing		LD
Add STEMTEC dissemination questions to other surveys being distributed to local educators and new teachers	12/31		SS, SCS