MemphiSTEP: A STEM Talent Expansion Program at the University of Memphis

Project Summary
MemphiSTEP (MSTEP) is a project focusing on retention and persistence to graduation to increase the number of majors and graduates across the STEM areas at the University of Memphis (U of M). The project (1) concentrates on all stages of a STEM student's undergraduate experience – from first semester through graduation; (2) combines the strengths of the University's support infrastructure with efforts and expertise of faculty, staff, students, administrators, and the professional community; and (3) builds on research, best practices, and the local knowledge base. It has been well-established that the lack of a solid preparation in mathematics often can be a deterrent to a student’s success in a STEM major. Although we concentrate on all STEM areas across the campus and each year of a student’s undergraduate career, mathematics, especially as used in science and engineering is a focal point of our key strategies and activities, especially for the early undergraduate years.

Project Goals
To increase the number of baccalaureate graduates in STEM at the U of M from 225 (2008) to not less than 335 (2013) through improvements in recruiting and retention. The project implements the following core strategies designed to increase graduation rates.

Project Strategies and Implementation
Learning Communities
Learning communities are offered to incoming STEM freshmen. The learning communities use clusters of courses, often including math courses, to connect different disciplines to a common theme and to provide a collaborative learning experience.

Annual Math Bootcamp
Students entering (or considering) STEM majors are invited to take part in a refresher course designed to boost pre-calculus skills, facilitate social networking and broaden knowledge of career opportunities in STEM fields.

Networking Program
STEM students participate in a range of activities designed to facilitate networking among STEM majors at the U of M. Approximately ten large group events are arranged per academic year (e.g., lunch and learn sessions, motivational talks and science demonstrations) to encourage collaboration among students from all STEM disciplines.

Undergraduate Research Program
Patterned after NSF’s cross-divisional UBM (DMS/BIO/DUE) and CSUUMS (DMS/DUE) programs, opportunities are available to STEM majors (primarily Juniors and Seniors) to participate in paid research fellowships. The goal is to offer students a chance to work with a professor in their selected area of study, and to gain valuable research experience. The research experience, designed to cover at least two semesters, aims to help students acquire knowledge and skills for graduate school, and skills for STEM-based careers.

STEM Club Mini-Grant Program
Ten mini-grants in the amount of $400 per year are available to U of M student organizations submitting proposals designed to: increase participation in STEM club activities, enhance professional development/career exploration in STEM majors, and increase opportunities for service learning and outreach within STEM fields.

Travel Award Program
Travel awards of up to $400 are available to support student travel to conferences or STEM networking functions.

Project Data
1. Impact on Graduation Numbers at the U of M
For the 5 main years of the project (2008-09 through 2012-13), the number of students graduating in STEM from the U of M closely aligned with the projected benchmarks. Table 1 shows the actual and projected graduation numbers.

2. Retention in STEM for First-time, Fulltime Freshmen at the U of M
We investigated retention rates of first-time, fulltime U of M STEM freshmen before and after the onset of the MemphiSTEP grant. Table 2 suggests that one, two, three and four year retention/graduation rates in STEM increased since the onset of the MemphiSTEP program.

3. Proportion of U of M STEM Students Participating in MemphiSTEP

4. Retention and Performance of MemphiSTEP Students
The retention and performance (GPA) of MemphiSTEP students is compared to that of a weighted control group of non-MemphiSTEP students. This control group is matched to the MemphiSTEP students in terms of demographics, major, class standing, and prior performance. The comparative analyses indicated that students who participated in MemphiSTEP activities were more likely to be retained in STEM and attain higher GPAs than non-project students enrolled in STEM during the project period (see Table 3).

Table 1: STEM degrees awarded in years 1 through 5 (Baccalaureate)

Table 2: Retention in STEM for first-time fulltime freshmen

Table 3: Retention and Performance in STEM and project students and control students

Class of 2007-08: 272 Class of 2008-09: 239
Class of 2009-10: 298 Class of 2010-11: 253
Class of 2011-12: 259 Class of 2012-13: 168

Retention (%): Year 1 (08-09): 56.3% Year 2 (09-10): 59.9% Year 3 (10-11): 60.1% Year 4 (11-12): 53.3% Year 5 (12-13): 60.1%

Retention/Graduation Rates: Year 1 (08-09): 33.1% Year 2 (09-10): 44.4% Year 3 (10-11): 40.9% Year 4 (11-12): 39.9% Year 5 (12-13): 41.9%

3. Proportion of U of M STEM Students Participating in MemphiSTEP

4. Retention and Performance of MemphiSTEP Students

Challenges and Opportunities

Need to implement numerous marketing and advertising methods, including student outreach.

Finding the best models of practice (Bootcamp and Networking Program) takes multiple years of piloting.