Project Description

Title: *Minority Student Pipeline Math Science Partnership (MSP)²*
Lead Partner: Bowie State University
Additional Core and Supporting Partners: Prince George's County Public Schools (PGCPS); University System of Maryland (USM), University of Maryland College Park (UMCP); University of Maryland Biotechnology Institute (UMBI); Prince George's Community College (PGCC).

This project, *(MSP)²*, proposes to establish a strong, multifaceted partnership among the essential P-16 players in one of the largest minority-majority counties in the country: Prince George's County, Maryland to expand the minority student pipeline in to STEM fields in higher education using four separate strategies involving STEM faculty targeted at multiple populations (teachers and students):

- Working with approximately 750 teachers over the five years in 4-8th grades, science faculty at UMCP and PGCC will develop two different types of professional development programs designed around principles of teaching and learning through inquiry science.
- A total of 110 high school science teachers will engage in summer research experiences over five years with UMCP, UMBI and BSU faculty. UMBI will guide partners in establishing learning communities for participating teachers built on the lessons learned from their previously funded ExPERT program.
- At least 375 high school students over five years will be offered opportunities to take challenging science courses through an innovative early college/dual enrollment program to be developed collaboratively by PGCPS with BSU and PGCC.
- 100 undergraduate underrepresented minority students will be offered opportunities for undergraduate teaching experiences (with 100 PGCPS science teachers to mentor them) and 50 undergraduate research experiences through BSU over 5 years.

PGCPS requested that we target this proposal to science only, since the State and county have provided funding to improve mathematics instruction in the schools.

Intellectual merit:
Inquiry instruction, when done properly, is not only a proven method of improving student learning, it is also inherently suited for reducing the achievement gap by requiring the active participation and interactive engagement of all students. This project will build on most current research in teaching and learning and upon recommendations from the National Academies of Science and the National Science Board that demand a rethinking of approaches to K-8 science curriculum, instruction, and assessment. Their overarching recommendation is that K-8 education should be coordinated around "doing science." *(MSP)²* is designed around a research plan that will compare different models of inquiry-driven professional development. In addition, the project will evaluate the impact of science teacher summer research experiences, and the impact of challenging courses and curricula on the STEM minority pipeline from PGCPS into higher education in Maryland.

Broader Impact:
Minorities are underrepresented in STEM disciplines at every level from secondary science and mathematics courses through graduate school. Lack of preparation in mathematics and science among underrepresented minority groups in the early elementary grades undermines enrollment and success in secondary-level school programs and, ultimately, in college and career choices later in life. Prince George's County is one of the largest majority-minority school systems in the nation, with 132,000 students enrolled in grades K-12 (76% African American, 15% are Hispanic). If ever this nation seriously hopes to address the opportunities and the challenges of fostering a robust pipeline for bringing underrepresented minority students into STEM professions and fields of study, Prince George's County offers a worthy case study for such an effort.

Indicators of Success

- Goal 1: Increase the number of minority and other underrepresented students who enter science disciplines
- Goal 2: Improve the ability of science teachers in elementary, middle, and high schools to effectively teach science to underrepresented minority students
- Goal 3: Increase and reward STEM faculty participation in ongoing professional development partnerships with K-12 teachers


Teachers of grades 4-8 examine rock samples in a Science Summer Institute.


High-school students enrolled in a college course write the date and names on compost while Prof. Min Fang (right)

(MSP)²
Minority Student Pipeline Math Science Partnership

A National Science Foundation
Mathematics and Science Partnership
Awarded October 2008


Teachers of grades 4-8 complete an inquiry activity using tuning forks in a Science Summer Institute.


A 4th grader reacts to a classmate manipulating a carbon chain model into a ring structure. The students participated in a Saturday workshop with their teacher.

Strand 1: Grade 4-8 Teachers

Working with approximately 750 teachers over the five years in 4-8th grades, science faculty at UMCP and PGCC will develop two different types of professional development programs designed around principles of teaching and learning through inquiry science

Strand 2: High-School Teachers

A total of 110 high school science teachers will engage in summer research experiences over five years with UMCP, UMBI and BSU faculty. UMBI will guide partners in establishing learning communities for participating teachers built on the lessons learned from their previously funded ExPERT program

K-12 Teachers

IHE Students

High School Students

Strand 4: Undergraduate Students

100 undergraduate underrepresented minority students will be offered opportunities for undergraduate teaching experiences (with 100 PGCPS science teachers to mentor them) and 50 undergraduate research experiences through BSU over 5 years

Strand 3: High-School Students

At least 375 high school students over five years will be offered opportunities to take challenging science courses through an innovative early college/dual enrollment program to be developed collaboratively by PGCPS with BSU and PGCC

Partners

- Bowie State University
- Prince George's County Public Schools
- Prince George's Community College
- University System Of Maryland
- University of Maryland College Park
- University of Maryland Biotechnology Institute

Project Challenges

Current/past challenges:

- Leadership changes in School District
  - Both Superintendent and Director of Accountability left their positions in the past year, slowing down the approval process for collecting data from students and teachers.
  - We are on track to gain approval soon without substantial modification of our evaluation plan.
- Recruiting enough K-12 teachers
  - We were not initially aware of the citizenship requirements for paid NSF grant participants, and had to reject many applicants for our programs.
  - We are solving this in two ways: (1)by expanding our advertising in order to increase the size of the applicant pool, and (2) by inviting non-eligible teachers to join some of our cost-free programming.

Challenges that are ahead:

- Longitudinal tracking of students from HS to College
  - A statewide student tracking system does not yet exist. In the meantime, we will have to try to gather student identifiers from both ends: finding out where HS students might attend postsecondary education, and working with our IHE partners to determine where matriculating students went to high school.
- Will we be able to produce more STEM teachers?
  - Small part of project, big issue for the state and country. Pilot program for undergraduate science majors placed in high-school classes for a few hours a week showed that their interest in a teaching career did not increase.
- Disaggregation of University of Maryland Biotechnology Institute
  - All faculty at partner institution UMBI will move to other institutions; Office of Education and Outreach will move to a non-partner institution. Faculty involvement levels may dip for a year or two, so we may have to shore up participation from other institutions.

Learning from Other Projects

- How do other partnerships recruit faculty participants from diverse types of institutions (Research 1 Universities, Research Institutes, Comprehensive Historically Black Institutions, and Community Colleges) ?
- Are any other projects working on the undergraduate STEM major part of the pipeline? If so, how?
- Have other projects looked at the effect of professional development for K-12 teachers on the interest of their students in pursuing STEM majors in college? If so, how are they doing this?
- How are other projects dealing with the challenges of tracking students from K-12 to Postsecondary Education.