



TOPIC: USM P-20 National Science Foundation Math Science Partnership Grant: Final Report

COMMITTEE: Education Policy and Student Life

DATE OF COMMITTEE MEETING: September 20, 2016

SUMMARY: The USM Office of P-20 Education and Outreach is the policy umbrella that connects the four mission-driven goals of the USM's Office of Academic Affairs:

College Readiness, College Completion, Citizenship and Career Readiness.

USM P-20 leads policy and project work in collaboration with Maryland's K-12 schools, community colleges, workforce and industry, and other higher education stakeholder groups to ensure that Maryland students complete their educational goals reach their full potential. One way we do this is by developing collaborative grant proposals to federal agencies such as the National Science Foundation and the U.S. Department of Education.

USM's *Math Science Partnership Minority Student Pipeline (MSP)²* project is a partnership, under the USM umbrella, including Bowie State University, University of Maryland, College Park, PGCC, Towson University, and the Prince George's County Public Schools. The project was one of the largest NSF MSP competitive grants ever awarded, \$12,400,000 over five years (2008-2014). The project's goal was to expand the minority student pipeline in science, technology, engineering, and mathematics (STEM) fields in higher education, by employing strategies engaging STEM faculty, teachers, undergraduates, and high school students. In 2015 we were awarded a \$460,000 three-year supplement to focus on computer science instruction.

The executive summary of the final report for this significant partnership project is attached, with links to the full report and other information. The key outcomes and findings include:

- **Raising student achievement in science.** Scores on the science portion of the Maryland State Assessments increased twice as much in schools with participating teachers.
- **Stopping the decline in student interest through the elementary years.** Students of participating teachers were more interested in science than their peers after instruction.
- **Preparing students for college STEM.** Many students entered STEM programs in college and 80% of them are still there today.

USM's P-20 Office provides state-wide leadership in aligning K-12 policy reforms with postsecondary expectations. Our grant funded projects bring committed university faculty together with outstanding K-12 educators to create the best learning opportunities and pathways for the Maryland students. P-20 work is a most serious investment in our future.

ALTERNATIVE(S): This is an information item only.

FISCAL IMPACT: This is an information item only.

CHANCELLOR'S RECOMMENDATION: This is an information item only.

COMMITTEE RECOMMENDATION: Information Only

DATE: September 20, 2016

BOARD ACTION:

DATE:

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Project summary

Through professional development opportunities for teachers, teaching experiences for undergraduates, and challenging course work for high-school students within Prince Georges county, (MSP)² has helped to prepare and retain minority students in STEM professions.

Project details

Partners: Bowie State University • Prince George's Community College • Prince George's County Public Schools • Towson University • University of Maryland Biotechnology Institute • University of Maryland, College Park • University System of Maryland

Funding: \$12.4 Million from the National Science Foundation, through NSF's Math Science Partnership (MSP) program

Time frame: 2008-2014

Programs

(MSP)² comprised four different strands of activity for different groups of participants:

1. **Elementary and middle-school teachers:** science faculty at UMCP and PGCC developed and provided two different types of **professional development** programs for teachers, designed around principles of teaching and learning through inquiry science. One type focused on specific science content areas, the other on the nature and practice of scientific inquiry.
2. **High-school science teachers** engaged in **summer research** experiences over five years with UMCP, UMBI and BSU faculty. Staff at UMBI and Towson University established learning communities for participating teachers to learn more about the nature of science, build on their research experiences, and connect them with the thousands of students in their classrooms.
3. **High-school students** were given opportunities to take challenging science courses for college credit through innovative **dual enrollment** programs developed collaboratively by PGCPs, BSU, and PGCC.
4. **Undergraduate students:** Science majors were given unique opportunities to learn about teaching through formal training and **guided experiences in teaching** in reformed college science courses at UMCP.

(MSP)² participants

Students and teachers participating directly in the project:

Elementary and middle-school teachers: **380**

High-school teachers: **60**

High-school students in college science courses: **More than 300**

Undergraduate science majors (learning to teach): **70**

Students impacted by participating teachers:

7,600 elementary and middle-school students per year

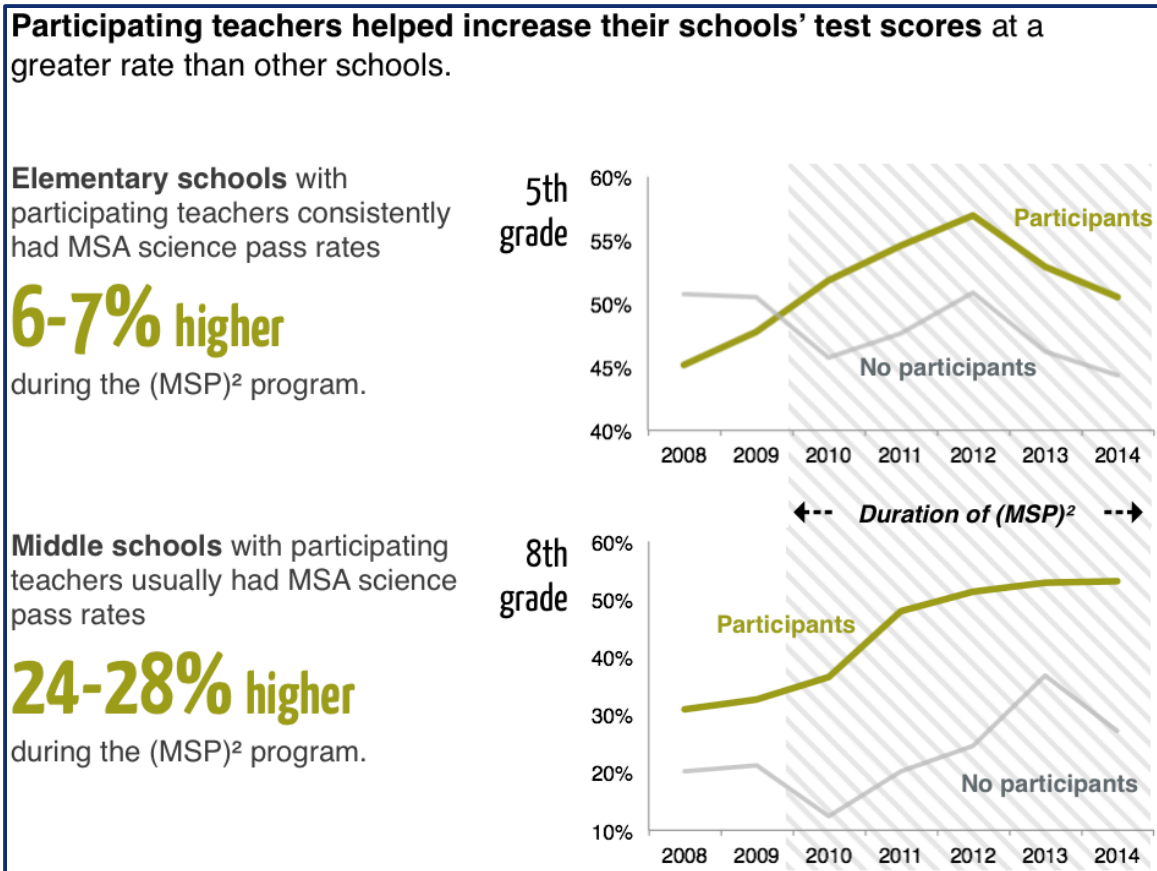
9,000 high-school students per year

700 undergraduate students per year

Outcomes

Through these programs, the (MSP)² partnership successfully:

- **Raised student achievement in science.** Scores on the science portion of the Maryland State Assessments increased twice as much in schools with participating teachers (see figures below).
- **Stopped the decline in student interest through the elementary years.** Students of participating teachers were more interested in science than their peers after instruction.
- **Prepared students for college STEM.** Many students entered STEM programs in college and 80% of them are still there today.



Important findings

Each strand of project activity produced valuable lessons for implementing similar programs in the future, including:

- **Science teacher professional development.** The train-the-trainer model of professional learning that was implemented by (MSP)² is a useful and sustainable method for training teachers across grade levels and subjects, and is even more effective with on-the-job, real-time support from dedicated coaches.
- **Instruction in the Nature of Science.** Combining research experiences with professional development in the Nature of Science is an effective way to improve teachers' instruction in this area, but requires trainers with specialized knowledge and skills.
- **Dual enrollment science programs.** The dual enrollment courses taught during the regular school year in high schools were just as successful at strengthening student persistence in STEM as the much more expensive residential model in which students came to campus each summer.
- **Undergraduate learning assistants.** Simply providing opportunities for undergraduate science majors to help in classrooms has little impact on the undergraduates' interest in or knowledge of teaching. Our program that explicitly combines teaching experiences with training and support in the theory of science learning had a greater impact on everyone involved.

As for the partners of (MSP)², the aspects of our project that have been sustained and expanded promise to achieve more for our students, and the solid partnership that has been developed across K-12 and higher education in Maryland will undoubtedly generate and strengthen additional efforts in the future. ●

Additional information

- Full project outcomes report (PDF, 23 pages):
<http://hub.mspnet.org//index.cfm/29381>
- Video introduction to (MSP)², produced by PGCCPS (8 minutes):
https://www.youtube.com/watch?v=2egu_Tlo8pc

