Strengthening the Early-College Minority Student Pipeline in Science with a Multi-faceted Program

MSP Project: Minority Student Pipeline MSP
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1. Questions(s) or issue(s) for dialogue at Learning Network Conference session:

Dual enrollment/early college access is defined as high school students enrolling in postsecondary institutions while still in high school. Such programs allow high school students to enroll in postsecondary courses, earning credit at both the high school and college levels. Students are generally taught by postsecondary faculty, either at the college campus or high school.

The question to be addressed by this study is: Does exposure to college-credit courses in high school increase the likelihood that underrepresented minorities will attend a postsecondary institution (2- or 4-year) and do opportunities to take college-level science courses in high school increase the likelihood that minority students will consider majoring in science or mathematics?

2. Context of the work within the STEM education literature and within your MSP project:

In a study conducted in Florida and New York in 2007, the National Research Center for Career and Technical Education (2007) found that dual enrollment was positively related to a student’s likelihood of earning a high school diploma, enrolling in a four-year institution, persisting to a second semester and second year in college, and achieving a higher grade point average in college than non-dual enrollment students. This study also found that the benefits for male and low-income students were even more substantial than for their peers. Supporting evidence from the NSF/NASA Model Institutions of Excellence program indicates that programs designed to bridge the transition from high school or community college into college or universities are particularly helpful for bringing first-generation and minority students to college with an interest in STEM majors (Institute for Higher Education Policy, 2007).

In addition, there is considerable evidence that underrepresented minority students benefit from early exposure to college credit courses while in high school (Hoffman, 2005).

The Minority Student Pipeline MSP, \((MSP)^2\), aims 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 into STEM fields in higher education. The partner institutions are:

- Bowie State University (BSU)
- Prince George’s Community College (PGCC)
Four separate strategies involving STEM faculty were designed, targeted at multiple populations (teachers and students): (1) Professional development for teachers of grades 4-8 designed around principles of teaching and learning through inquiry science; (2) summer research experiences for high-school teachers with embedded learning communities focused on adapting genuine scientific inquiry for the classroom; (3) early-college, dual enrollment opportunities in science for high-school students; and (4) experiences in teaching and research (in real classrooms and labs) for undergraduate science majors.

The third of these strands of the project is being led by Drs. Anisha Campbell and Elaine Davis of BSU, coordinating with Drs. Christine Barrow at PGCC and Bruce Katz at PGCPS. These leaders and their institutional colleagues are collaborating to develop multiple early college/dual enrollment courses for PGCPS high school students.

Under this project:
- PGCPS has identified four pilot high schools where early college and dual enrollment programs are expected to have the greatest possibility of success. PGCC now offers college credit courses in these schools, where PGCC science faculty come to teach the courses.
- BSU provides high school students a residential summer institute in science for college credit to 25 students each summer for a total of 125 students; BSU has run a similar program in the past involving both science and education faculty. This component also includes mathematics and college-skills courses which provide tools needed for academic success (e.g., study skills, time management, reading workshop).
- Tuition support is provided by the grant to 80 PGCPS high school students per year for dual enrollment science courses in partner higher education institutions (support for tuition, books and fees are included).

The unique structure of this intervention allows for some potentially interesting comparisons that make this study different from most others. A comparison will be made between the two types of dual-enrollment programs employed in this project to help determine what factors are most important for increasing postsecondary matriculation and choice of science major among underrepresented minorities.

PGCPS has also been developing a more formal “Early College” model in collaboration with BSU and PGCC, in which high-school students would spend the entire day on the college campus taking courses for both high school and college credit. The National Middle College High School Consortium Early College Initiative defines early college high schools this way:

The Early College High Schools blur the border between high school and the community college to create “blended institutions” that offer a dual degree program. Taking a mixture of high school and college courses, students work to attain both a high school diploma and associates degree in five years. Students are
actively supported and guided as they experience themselves as successful college-level learners. The schools are committed to working with students who have not traditionally thought of themselves as “college material,” and involve families and communities in the process. (NCREST, 2007)

Thirty such high schools were open as of 2007.

3. Claim(s) or hypothesis(es) examined in the work (anticipating that veteran projects will have claims, newer projects will have hypotheses):

Multiple different opportunities for secondary students to take early-college and dual-enrollment science courses increase the likelihood that students will attend college (2- or 4-year) and choose science majors.

4. Evaluation and/or research design, data collection and analysis:

A positive association has been documented between dual enrollment opportunities and college matriculation, retention, and graduation. We intend to test this association in the context of a large majority-minority school district with our early college intervention. Our primary means of evaluation will consist of a longitudinal unit-record database, tracking student participants (and appropriate control groups) through their high-school careers and (in many cases) into college. This database will include such indicators as:

- High-school courses taken, GPA, retention, and graduation rates
- Maryland High School Assessment scores in science
- Enrollment at partner IHEs or any other USM institution
- Declaration of STEM majors at partner IHEs or any other USM institution
- Retention and GPAs of STEM majors
- Enrollment in teacher certification programs a partner IHEs or any other USM institution

In addition, surveys will be administered to each student at the beginning and end of each early college course, focused on interest in science, in teaching, and in attending college. Focus group interviews on the same topics are planned for a subset of students.

All forms of data will also be collected from appropriate control groups in the same school district. Standard statistical analyses will be conducted on the quantitative data and any significant effects of the intervention will be documented. Focus group data will be used to validate and refine the written surveys as needed. Data from student participants will not only be compared with control groups, but also internally among students of the summer early-college courses at BSU, students taking early-college courses at their own schools (taught by PGCC faculty), and students who might take advantage of both opportunities.
We expect that both types of dual-enrollment opportunities increase the likelihood both of college attendance and of majoring in science, but a stronger effect may be seen with the summer residential program at BSU due to its longer duration.

5. **Key insights (retrospective for veteran projects, prospective for newer projects) that have value for the Learning Network:**

With this study, we hope to learn a great deal about how to help minority and other underrepresented students with a push toward college science. In particular, if we find differences in some measures between students of the summer early-college program and those of the in-school courses and can attribute it to the programs’ different structures, it would have implications for how best to structure dual enrollment programs for high-school students.

**References**

Hoffman, Nancy (2005) Add and Subtract Dual Enrollment as a State Strategy to Increase Postsecondary Success for Underrepresented Students, Jobs for the Future, Double the Numbers

