STEM Mentorship: Preparing Students for Postsecondary Success

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Outcomes

1. Participants will learn what research shows are essential to success for students pursuing STEM.

2. Participants will learn about various successful STEM preparation programs.

3. Participants will identify components that can be integrated into existing programs and next steps related to establishing successful STEM programming.

4. Additional Outcomes

OST Challenges

The STEM Challenge

- The National Science Board's Report regarding critical needs in STEM discuss the need for the development of all future employees for a competitive workforce (National Science Board, 2007).

- The national directive to educate in order to complete will theoretically ensure a talented and diverse workforce prepared and capable of pursuing STEM disciplines in post-secondary education.

- By the sixth year of college, only 27 percent of underrepresented students who entered as STEM majors graduate, as compared to 46 percent of majority students (Hayes, 2007).

- National Science Board. 2007. A National Action Plan for Addressing the Critical Needs of the United States Science, Technology, Engineering, and Mathematics Education System
- Hayes, R. (2007, September). Science, technology, engineering and mathematics: Review of the latest CSRDE STEM retention study.

Demographic Shift

- United States Census projections indicate:
  - African-American, Hispanic, and Asian populations will comprise 50 percent of the population of the United States by 2050 (Palmer, Davis, Moore, Hilton, 2010).
  - Ethnic minorities have the lowest college going rates of other groups.
  - The total number of bachelor's degrees awarded annually in the United States has tripled over the last 40 years.
  - However degrees in STEM have not experienced such dramatic growth (Maltese & Tai, 2011).

Self-Efficacy

- Self-efficacy – used to determine behavior where there are barriers present to achieving ones desired outcome
  - Vicarious experiences - individual believes in their own ability to succeed as a result of the observation of someone similar to them engaging in or experiencing a task of significance
  - Mastery experiences - the possession of the knowledge, skills, and experiences required to complete a task or reach a goal
  - Social persuasion - influence of others, either covertly or overtly as it relates to accomplishing tasks or achieving goals
  - physiological states - stress, tensions, or anxiety about individual capabilities

The Research

- Vicarious Experiences
  - Noble (2011)
    - Positive teacher relationship, Peers and family members as role models
  - Zeldin and Pajares (2000)
    - Family as role models or modeling skills needed
    - Early Exposure to content areas
    - Verbal affirmation of abilities

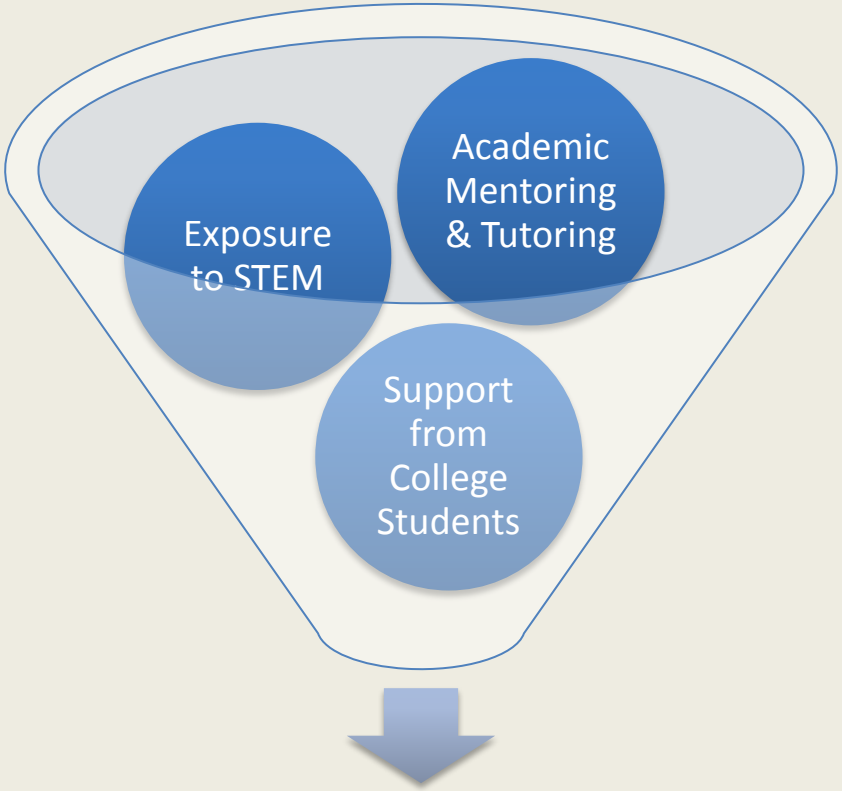
The Research

- Mastery Experiences
  - Noble (2011) – African-American men
    - Grades in school, course selection, ease of courses
  - Zeldin, Britner, and Pjares (2008) – Caucasian men
    - Independent mastery experiences
    - Referred less often to vicarious, social persuasion, and encouragement
- Social Persuasion
  - Men – They possessed the desire, outsiders affirmed it
  - Women– verbal support from outsiders was sigh and significant

What can we do?

- Provide exposure
- Encouragement
- Role Models
- Mastery Experiences

Our Program



Postsecondary Success

Our Results

Cohort 1 - Class of 2009

- 25 students
- 92% attend a 2 or 4 year college or university
- 52% major in STEM fields

Cohort 2 - Class of 2010

- 65 students
- 89% attend a 2 or 4 year college or university
- 55% major in STEM fields

Cohort 3 - Class of 2011

- 75 students
- 92% attend a 2 or 4 year college or university
- 56% major in STEM fields

Cohort 4 - Class of 2012

- 75 students
- 90% attend a 2 or 4 year college
- 46% major in STEM fields

Scholarships

- 10 Gates Millennium Scholars
- 3 Posse Scholars
- 1 MLK Scholar at Emory University

Elementary Components

- Shore up the foundational mathematics skills
  - Build up the toolkit
- Reading skills are essential
  - Learning to Read → Reading to Learn
- Exposure through hands-on-activities
- Role models
  - Teachers
  - College Students
  - Professionals

Focus Areas

Grade	Focus Areas in Support of Rich Instruction and Expectations of Fluency and Conceptual Understanding
K–2	Addition and subtraction - concepts, skills, and problem solving and place value
3–5	Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving
6	Ratios and proportional reasoning; early expressions and equations
7	Ratios and proportional reasoning; arithmetic of rational numbers
8	Linear algebra

Middle School Components

- Encouragement and support are needed
- Advanced math classes when possible
- Role Models
  - Discussions about high school and college
- Tracking
- Project Based Activities
- Engagement
  - Role models
  - Group mentoring
  - Themed STEM Exposure

High School Components

- Course Selection is key
- Specialized Mentoring
  - 9th – Study Skills & Goal Setting & Scholarships
  - 10th – College Searches & Career Exploration
  - 11th – SAT/ACT Prep & Application Preparation
  - 12th – College & Scholarship Applications
- Research Experiences
- Exposure

Breakout

Select a table with participants at the same level as your students:

- Elementary
- Middle
- High
- Multi-level

Within Your Group

- Identify:
  - Challenges
  - Resources you have
  - What do you need?
  - Untapped Resources

Next Steps

- How can you provide:
  - Mastery experiences
  - Social persuasion
  - Vicarious experiences

Resources

- **People**
  - Fraternities & sororities
  - College students: work-study, service-learning, community service
  - Professional Organizations

- **Supplies**
  - Household Items

Thank You!

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