The Math Mystique: Changing the Expectations for Underrepresented Students to Pursue STEM Fields

*NOSCA Spring 2013 Webinar Series*

**Presenters**

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Director  
National Office for School Counselor Advocacy

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Executive Director  
Advanced Placement Strategy and Product Development
Questions and comments may be submitted at any time during the presentation.

To submit a question:

- Click on the Question Mark icon (?) on the floating toolbar on your Web Session screen (as shown at the right).

- This will open the Q&A window on your computer only.

- Type your question into the small dialog box and click the Send Button.
Webinar’s Learning Outcomes:

Participants will:

1. Examine the nation’s education and workforce trends.

2. Understand the role of the school counselor in creating the Math Mystique.

3. Learn the skills to utilize school data to identify gaps in academic performance in mathematics.

4. Gain knowledge and skills on early college and career readiness activities, tools and resources developed by the College Board’s Advanced Placement Program to work with students, parents/families, and teachers.
“Beliefs and Behaviors” About Mathematics

1. Math was my favorite subject in school?
   Yes
   No

2. I was told that I was good in math?
   True
   False

3. I was told that I was a good writer?
   True
   False

4. I got good grades in the majority of my math courses?
   Yes
   No

5. I took Algebra I in ______ Grade?
   6th Grade 8th Grade 10th Grade 12th Grade 1st Year of College
   7th Grade 9th Grade 11th Grade Never took Algebra I

6. I was encouraged to take rigorous math courses (i.e. Gifted Talented, Honors, AP or IB) in school?
   True
   False

7. I majored in a STEM discipline in college?
   Yes
   No
For years governors and education policy leaders have been working to strengthen science, technology, engineering and mathematics (STEM) education throughout the states.

Goals:

1) Expand the number of students prepared to enter postsecondary study and pursue careers in the areas of science, technology, engineering, and mathematics.

2) Boost the proficiency of all students in basic STEM knowledge.

Source: National Governors Association, December 2011
National Education and Workforce Trends
Education Level

STEM Jobs Required

65%
Graduate & Bachelor’s Degree

35%
Below Bachelor’s Degree

Source: STEM Science, Technology, Engineering & Mathematics by Anthony P. Carnevale, Nicole Smith, & Michelle Melton, 2010
Advanced Math Improves Earnings

*Opens the door to the most sought after careers in 21st century
*Skills essential to life

Source: Defining a 21st Century Education by Craig D Jerald, 2009
Girls Begin to Question their Ability Because of their Gender

When asked to indicate their gender on a test, girls scored 20% lower.

Percentage of girls that feel confident about themselves

<table>
<thead>
<tr>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Scores 100%</td>
<td></td>
</tr>
</tbody>
</table>

Not Asked to Mark Gender on a Test

Asked to Mark Gender on a Test

Self-esteem drops

Percentage of girls that feel confident about themselves

72% in 6th grade

55% in 10th grade

Self-Assessment of Ability When Subjects are Told

Young women lose confidence in their abilities

Men are Better at the task

There is no Gender Difference in Performing the Task

Source: engineeringdegree.net
Representation in STEM, by Race/Ethnicity: Minorities are Underrepresented

<table>
<thead>
<tr>
<th></th>
<th>WHITE</th>
<th>AFRICAN-AMERICAN</th>
<th>LATINO</th>
<th>ASIAN</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportions of workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in STEM occupations by race (%)</td>
<td>71</td>
<td>6</td>
<td>6</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Proportions of workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in all occupations by race (%)</td>
<td>65</td>
<td>12</td>
<td>16</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: STEM Science, Technology, Engineering & Mathematics by Anthony P. Carnevale, Nicole Smith, & Michelle Melton, 2010
An initiative created to increase the number of traditionally underrepresented minority and female high school students that participate in Advanced Placement® (AP) courses in STEM (science, technology, engineering and math) disciplines.

Website: www.collegeboard.org/ap-stem-access-program
The Research: AP and College Success

- **High college GPA**
  (Hargrove, Godin, & Dodd, 2008, Patterson, Packman, & Kobrin, 2011)

- **Same or higher performance in intermediate-level college courses**
  (Morgan & Klaric, 2007)

- **Higher likelihood of majoring in the subject of their AP course, especially STEM subjects**
  (Mattern, Shaw, & Ewing, 2011)

- **Higher four year-bachelor’s degree attainment rates**
  (Hargrove, Godin, & Dodd, 2008)

Source: AP Report to the Nation, 2013 Press Presentation
Advanced Placement Math and Science Courses

Biology
Calculus AB
Calculus BC
Chemistry
Computer Science A
Environmental Science
Physics B
Physics C: Electricity and Magnetism
Physics C: Mechanics
Statistics

Website: apcentral.collegeboard.com
While participation and success increased compared to the class of 2011, many high school students with potential for success in college-level AP courses still lack access.

60% are not participating in any of the AP math courses for which they have high potential
40% are participating

Source: AP Report to the Nation, 2013 Press Presentation
Among students with potential for success in AP mathematics courses, only:

6 out of 10 Asian/Asian American/Pacific Islander students
4 out of 10 white students
3 out of 10 Hispanic/Latino students
3 out of 10 black/African American students
2 out of 10 American Indian/Alaska Native students

...took any such AP math course.

Source: AP Report to the Nation, 2013 Press Presentation
“The Math Mystique”

The Role of the School Counselor in Creating a School Climate that Encourages Mathematics Achievement and Supports Students’ Exploration in STEM Careers.
Calvin and Hobbes
Using Data to Focus Your Work on Underrepresented Students

Data Elements for the Eight Components of College and Career Readiness Counseling

The chart below shows key data elements for each of the Eight Components.

<table>
<thead>
<tr>
<th>Data Elements, By Component</th>
<th>Elementary School</th>
<th>Middle School</th>
<th>High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Academic Planning for College and Career Readiness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students reading on grade level in grade 3</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Proficiency in state tests for English, math and science</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Students enrolled in and completing Algebra I</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Students enrolled in and completing AP courses</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Students enrolled in and completing courses required for in-state university admission</td>
<td></td>
<td></td>
<td>●</td>
</tr>
</tbody>
</table>

Source: nosca.collegeboard.org.
Using Data to Promote Students’ Access & Success in Mathematics

1. Who’s left out?

2. Who’s not making it through?
Implementing Activities that Focus on Underrepresented Populations

- Student
- Teacher(s)
- Families

Focusing Your Delivery
Focus on Three (3) Components

Component #1
1. College Aspirations

Component #2
2. Academic Planning for College and Career Readiness

Component #4
4. College and Career Exploration and Selection Processes

3 of the 8 Components of College and Career Readiness Counseling
“Building a Foundation for Success”
A K-12 Systemic Approach
Component #1
Building Students’ Aspirations

College Who Me?

I got plenty of time to get ready?

None of my people go to college

Rigorous Math Classes?
Don’t need it! I’ll be Rich!

I won’t be using computers for what I plan to do!
Aspects of Building Students’ Aspirations

- Belief in Self
  - Achievement Ceremonies
  - Enrichment Programs
- Networking/Relationships
  - Panel of Speakers
  - Mentors
- College/Career Knowledge
  - Junior/Senior College Workshops
  - Math/Science Field Trips
- Skills to Navigate
  - Self-Advocacy Skill Building Workshops
AP Student Activation Campaign
Student Campaign

Postcards

CURIOSITY
CREATIVITY
COMMITMENT

It's part of you.

Maybe you didn't know this part of what it takes
to take an AP course
is something that's
already in you.

Believe in yourself.
You've got the strength
and the determination.
You've got the heart,
the mind and the voice.
It's in you to tackle AP.

So talk to your counselors
and teachers.
Let's explore AP and short
a course to your future.

Dear


Envelope

AP Potential Letters

You've shown that you have
the potential to succeed in AP.
Find out what that means for
your future.

AP


Brochure

What it takes
to take AP
It's part of you

Think about the challenges you
tackle every day. With each day.
You build patient endurance in your
efforts. That's what AP is about.
AP course may be tough — but bring the
tougher experience to your high school
also — but they also help you develop
skills and knowledge that you can
use in your future life. Even better,
their instruction in future
possibilities — in college, in career
options and in yourself.

What AP course
is right for me?

1. Think about what interests you:
2. Ask your counselor or teacher the following questions:
3. Find out what AP schools at your school.

What steps do I need to take?

Talk to your counselors and
teachers as a team. Check
the availability at your school.

Website: www.exploreap.org
Student Campaign

School Posters

CURIOSITY

It’s part of you. It’s part of you.
It’s part of you.

CREATIVITY

It’s part of you. It’s part of you.
It’s part of you.

COMMITMENT

It’s part of you. It’s part of you.
It’s part of you.

AP Website-Explore AP

Turning Curiosity into a Science

Twitter/Facebook/Youtube

Website: www.exploreap.org
Component #4: College and Career Exploration

What must I do to make my college and career goals a reality?

“If one does not know to which port one is sailing, no wind is favorable.”

Seneca
Interest/Values vs Abilities/Skills/Knowledge

Source: STEM Science, Technology, Engineering & Mathematics by Anthony P. Carnevale, Nicole Smith, & Michelle Melton
The Benefits of Integrating Rigorous Academic Courses and Career Exploration

16 Career Clusters
www.careerclusters.org
Math and Science Related Careers

I, _______________________, understand that withdrawing from Advance Math & Science courses could stop me from reaching my career goals.

**Computer Science Careers**
- Computer Operator
- Computer Programmer
- Computer Software Engineer
- Computer Support Specialist
- Database manager
- Information System Manager
- System Analyst
- Website Developer

**Business Careers**
- Accountant
- Bank Manager
- Bank Teller
- Cost Estimator
- Financial Manager
- Insurance Agent
- Loan Officer
- Market Researcher
- Mortgage Broker
- Realtor
- Stockbroker

**The Skilled Trades**
- Automotive Technician
- Aviation Mechanic
- Draftsman
- Electrician
- Heating and AC Technician
- Machinist
- Plumber
- Surveyor

**Math Related Science Careers**
- Astronomer
- Chemist
- EKG Technician
- Forensic Scientist
- Physician
- Pharmacist
- Optometrist
- Zoologist
- Meteorologist
- Medical Lab Technician

**Engineering**
- Aerospace
- Biomedical
- Chemical
- Civil
- Computer
- Electrical
- Environmental
- Industrial
- Nuclear

______________________________
Student Signature

______________________________
Parent Signature
MyCollegeQuickStart

On-line Tool

Website: www.professionals.collegeboard.com/k-12/prepare/quickstart/resources
Component #2: Academic Planning & Development

How do I get students, administrators, teachers and parents and families to understand what it will take to be academically prepared for the 21st Century:

1. Survive in technological society
2. Participate in global community
3. Attain future careers that will allow them to support their families and live a comfortable life.
My career goal is to become a rapper, pro-ball player and a forensic scientist like on CSI.

<table>
<thead>
<tr>
<th>Career Choices</th>
<th>Skills Needed</th>
<th>School Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pro-Ball Player</td>
<td>agility, athletic, critical thinking, math, science/motion, negotiation skills</td>
<td>PE, Dance, Alg I, Geometry, Alg II, Physiology, English, Chemistry, Health</td>
</tr>
<tr>
<td>Forensic Scientist</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Goal Setting
• College/Career Exploration
• 4,5,6 Yr MS/HS Academic Plans
• 2/4 Yr Post Secondary Plans
The Student’s Program of Study Should Align with a Postsecondary Career Pathway and/or College Entrance

<table>
<thead>
<tr>
<th>College Prep Curriculum &amp; Minimum requirements</th>
<th>More Advance Courses</th>
<th>Other Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• English (4 yrs) I, II, III, IV</td>
<td>• Include Honors, AP, IB courses</td>
<td>• Minimum GPA</td>
</tr>
<tr>
<td>• Math: (3 yrs) including Alg I, Geometry, Alg II, History (3 yrs)</td>
<td>• 4 yrs Math &amp; Science (Trig/Anal, Pre-Calculus, AP Calculus, Physics, AP Physics, AP Chemistry)</td>
<td>• Admission</td>
</tr>
<tr>
<td>• Science (3 yrs) including 2 lab sciences (Biology, Chemistry)</td>
<td>• AP History</td>
<td>• Test Scores (SAT, ACT)</td>
</tr>
<tr>
<td>• Foreign Language (2 yrs) same language</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Is there a distinction between your college preparatory courses and advance courses?

2. How do you help parents and families know the difference?
AP Professional Toolkit
A Preview of the Components

• Overview of AP Resources

• Tips for Planning AP Night Informational Events

• Customizable AP Night Power Point Presentations- in English and Spanish

• “The Parent Perspective” parent brochure- in English and Spanish

• Tools from Student Campaign

• Digital Tools & Resources for In-School AP Outreach
  • Email
  • Banner ads for school websites
  • Voicemail scripts
Tools and Resources

Fee Reduction for Advanced Placement: Exams
http://professionals.collegeboard.com/testing/waivers/guidelines/ap

How to Launch a New Advanced Placement Course:
www.collegeboard.org/startapcourse

Advanced Placement Explore Website
www.exploreap.org

Advanced Placement Professional Toolkit
www.collegeboard.org/shareap

Advanced Placement Videos
http://www.youtube.com/user/collegeboard

NOSCA’s Eight Components of College and Career Readiness
http://nosca.collegeboard.org/eight-components

Data Elements for the Eight Components of College and Career Readiness Counseling
http://nosca.collegeboard.org/eight-components/high-school-guide
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Today’s Presenters

Jennifer A. Dunn
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Theodore J. (Ted) Gardella
Executive Director
Advanced Placement Strategy and Product Development
NOSCA’s “Own the Turf Campaign

11,500+ Campaign Members

A national advocacy campaign to **galvanize** and **mobilize** school counselors to “own the turf” of college and career readiness counseling and **take the lead** in establishing a college-going culture in their schools, districts, communities and/or states.
Own the Turf!

Sign Up Today

Join the 11,500+ Campaign Members
Who Are Part of this National Movement.

nosca.collegeboard.org
JOIN US IN NEW ORLEANS!

Destination Equity 2013:
Charting Bright Futures for All Students

April 12–13, 2013 | Marriott New Orleans | New Orleans, LA

Join the National Office for School Counselor Advocacy (NOSCA)

DestinationEquity collegiateboard.org

Join us for NOSCA's 6th Annual National Conference.
nosca.collegeboard.org

destinationequity.collegeboard.org
Strategic and Savvy: School Counselor Action Steps for Equitable College and Career Readiness Outcomes

Wednesday, April 25, 2013, 1–2 p.m. EDT
This webinar will highlight NOSCA's School Counselor Strategic Planning Tool to give school counselors concrete strategies to focus on their students' college and career readiness outcomes. Aligned to school improvement plans, strategic planning is an effective way for school counselors to be strong leaders in building a college-going culture in their schools.

Presenter:
Vivian Lee, Senior Director, NOSCA, The College Board
For More Information

**Website:** nosca.collegeboard.org

**Email:** nosca@collegeboard.org