USING RESEARCH FINDINGS ON INTEREST GENERATION TO HELP US PROVIDE EQUAL ACCESS TO QUALITY STEM EXPERIENCES

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STEM Smart Workshop – Baltimore, MD
WHO IS IN THE AUDIENCE?

1) Informal Educators
2) Elementary School Educators
3) Middle School Educators
4) High School Educators
5) School Administrators
6) University STEM Educators
7) University Education Faculty
8) Others
WHAT IS YOUR PRIMARY WORK ZIP CODE?
WHAT IS YOUR MAIN GOAL?

1) To increase advanced training and careers in STEM fields – expand the number of students who pursue advanced degrees and careers in STEM, including greater participation of underrepresented groups

2) To expand the STEM capable workforce, including greater participation of underrepresented groups

3) To increase scientific literacy among the general public
• Calls at all levels for increasing the numbers of students graduating college
  • Particular focus on earning degrees in STEM

• Estimates indicate that small changes in persistence/graduation rate can lead to sizable changes in overall numbers of graduates
Prior work suggests the importance of interest beyond performance

Some evidence that changing trajectories of interest during high school lead some students to enter and some to leave pathways to STEM

Evidence that students within the same class can have differential outcomes
After school Comparison Study (N~2200)
- National sample of 6th-8th grade students
- Groups from urban, rural and suburban settings
- Surveyed students at beginning and end of 2 consecutive school years

Early Interest – Scientific American Survey (N~7000)
- Sample of colleges and universities from across US
- Focus on collecting data on initiation and maintenance of interest; includes comparison group
Desire to do Science

Grade Timing

- Desire to do Science
- Black
- Hispanic
- White
- Multi

6.25 6.75 7.25 7.75 8.25 8.75
Science Anxiety

![Graph showing Science Anxiety levels for Black, Hispanic, White, and Multi students across different grade timings. The graph indicates trends and comparisons among the groups.](image)
Science Teacher

Graph showing the science teacher's performance over grade timing for different ethnic groups:

- Black
- Hispanic
- White
- Multi
EARLY INTEREST
What type of experience first sparked your interest in STEM?

1. A visit to a museum, zoo, aquarium or nature reserve
2. Books or magazines
3. Building / Tinkering / Taking apart mechanical objects or electronics
4. Class at school
5. Interest in math problems/logic games
6. No specific event - I remember ALWAYS being intrinsically interested
7. Playing or spending time outdoors
8. Science Club / Math Team
9. Science Fair
10. Television show or movie
What do you think is the event most commonly reported by participants when asked:

What type of experience first sparked your interest in STEM?

1. A visit to a museum, zoo, aquarium or nature reserve
2. Books or magazines
3. Building / Tinkering / Taking apart mechanical objects or electronics
4. Class at school
5. Interest in math problems/logic games
6. No specific event - I remember ALWAYS being intrinsically interested
7. Playing or spending time outdoors
8. Science Club / Math Team
9. Science Fair
10. Television show or movie
<table>
<thead>
<tr>
<th>Event</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class at school</td>
<td>24.4%</td>
</tr>
<tr>
<td>No specific event - I remember ALWAYS being intrinsically interested</td>
<td>16.8%</td>
</tr>
<tr>
<td>Building / Tinkering / Taking apart mechanical objects or electronics</td>
<td>10.3%</td>
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<tr>
<td>Books or magazines</td>
<td>8.3%</td>
</tr>
<tr>
<td>Interest in math problems/logic games</td>
<td>8.2%</td>
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<tr>
<td>Playing or spending time outdoors</td>
<td>6.7%</td>
</tr>
<tr>
<td>A visit to a museum, zoo, aquarium or nature reserve</td>
<td>4.9%</td>
</tr>
<tr>
<td>Television show or movie</td>
<td>4.0%</td>
</tr>
<tr>
<td>Science Club / Math Team</td>
<td>2.3%</td>
</tr>
<tr>
<td>Science Fair</td>
<td>2.1%</td>
</tr>
<tr>
<td>Computer programming/building &amp; Internet</td>
<td>1.6%</td>
</tr>
<tr>
<td>Activity</td>
<td>Male</td>
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<td>------------------------------------------------------------</td>
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<tr>
<td>Class at school</td>
<td>18.7%</td>
</tr>
<tr>
<td>No specific event - I remember ALWAYS being intrinsically interested</td>
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</table>
1. Think about how these results support or challenge notions you held for the generation and maintenance of STEM interest

2. Think about two explicit ways you can apply these results toward improving equitable access in your work context

3. Organize into groups based on Informal / Formal (ES/MS/HS/Coll)
CAREER INTEREST
Interest in STEM jobs

Black avg. n= 119  Hispanic avg. n= 160  Multi avg. n= 116  White avg. n= 505
Teacher discuss careers in Science?

- Black
- Hispanic
- Multi
- White
Do you know a scientist?

- Black
- Hispanic
- Multi
- White
What do you think the top career choice is for FEMALES?

1. Arts, Communications, and Tourism (like chefs, artists, fashion designers, newscasters, travel agents)
2. Education and Counseling (like teachers, librarians, psychologists, social workers)
3. Entertainment & Sports
4. Finance (like bank tellers, economists, financial managers, insurance agents)
5. Government, Law, Security (like lawyers, police, inspectors, politicians, postal clerks, mail carriers)
6. Journalism (like reporters, television news announcers, news photographers)
7. Medicine & Veterinary Care
8. Military (like soldiers, sailors, Marines)
9. Science and Engineering (like scientists, engineers, computer programmers)
What do you think the top career choice is for MALES?

1. Arts, Communications, and Tourism (like chefs, artists, fashion designers, newscasters, travel agents)
2. Education and Counseling (like teachers, librarians, psychologists, social workers)
3. Entertainment & Sports
4. Finance (like bank tellers, economists, financial managers, insurance agents)
5. Government, Law, Security (like lawyers, police, inspectors, politicians, postal clerks, mail carriers)
6. Journalism (like reporters, television news announcers, news photographers)
7. Medicine & Veterinary Care
8. Military (like soldiers, sailors, Marines)
9. Science and Engineering (like scientists, engineers, computer programmers)
Career Interest & Readiness

Top Career choices for MS/HS students

• Females:
  • Medicine/Veterinary Science (36%)
  • Entertainment & Sports (12%)
  • Arts & Communication (11%)

• Males:
  • Entertainment & Sports (25%)
  • Government, Law & Military (15%)
  • Science & Engineering (12%)
**NEW DATA**

**Medicine**

- Male
- Female

**Science & Engineering**

Graphs showing trends in grade levels for Medicine and Science & Engineering.
Medicine + Veterinary
1. Think about two explicit ways you can improve student knowledge of STEM careers, especially those in their home communities.

2. Think about two explicit ways you can improve student interest in STEM careers.

3. Organize into discipline groups (S,T,E,M).
• In practice, how is sparking interest different from maintaining interest?

• Is fostering STEM interest the same as interest in STEM careers?

• What programmatic success stories exist out there?

• Other questions?
Thank you!

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NSF

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Scientific American

Indiana University

If you have any questions or comments, please contact me at:

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IN HS & COLLEGE DATA

• Data from 79,000 students who completed AS or BS degrees in STEM

• High Schools with Above Average production of STEM degrees had:
  • Smaller enrollments / Smaller % FRL & Minority
  • Smaller % taking SAT
  • Not very large differences in terms of performance, but improved math seems to hold for state tests and SAT scores (only for BS)