Community Colleges Routes to STEM: Many Pathways...

- **TRANSFER** route to bachelor’s
  - Includes associate degree and transfer, transfer without degree, or selected coursework

- **ENTRY** into the workforce
  - Includes associate degrees, long-term and short-term certificates, or coursework leading to STEM jobs; also transfer

- **UPGRADING** for current workers
Challenges of the Community College

Context

- Low completion rates
- Diverse student population
- Basic skills deficiencies
- Complexity of programs and pathways
- Limited resources for STEM education
Research Questions

- Who are community college STEM students?
- What are their pathways?
- What are their outcomes?
Data

- National Center on Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS: 04/09)

- Nationally representative of college students enrolled in 03/04

- Baseline survey and follow up 1, 3 & 6 years after enrollment

- Field of study based on interviews and transcripts
Student Characteristics
## CC and 4 Year STEM Students’ Demographic Characteristics

<table>
<thead>
<tr>
<th>Demographic Group</th>
<th>Community College STEM Students</th>
<th>Four-Year STEM Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>65</td>
<td>67</td>
</tr>
<tr>
<td>Black or African-American</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Asian</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>All Other</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>Pell Grant Recipients</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Disabled</td>
<td>12</td>
<td>7</td>
</tr>
</tbody>
</table>
## More Community College STEM Students are Nontraditional

<table>
<thead>
<tr>
<th></th>
<th>Community College STEM Students</th>
<th>Four-Year STEM Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age Upon Enrollment</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Percent Working While Enrolled</td>
<td>76%</td>
<td>55%</td>
</tr>
<tr>
<td>Average Hours Worked (Among Those Working)</td>
<td>30</td>
<td>19</td>
</tr>
<tr>
<td>Percent with Dependent Children</td>
<td>17%</td>
<td>2%</td>
</tr>
<tr>
<td>Percent Veteran</td>
<td>4%</td>
<td>Not Available</td>
</tr>
<tr>
<td>Percent Enrolled Part-time</td>
<td>67%</td>
<td>32%</td>
</tr>
</tbody>
</table>
Pathways and Outcomes
Fewer Students Complete in STEM Than Initially Interested But....

![Bar chart showing percentage of students completing STEM degrees.]

- **Community College**: 8.8% initial interest, 6.0% complete STEM degree.
- **Four-Year**: 16.8% initial interest, 13.3% complete STEM degree.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Initial Interest</th>
<th>Complete STEM Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community College</td>
<td>8.8%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Four-Year</td>
<td>16.8%</td>
<td>13.3%</td>
</tr>
</tbody>
</table>
Pathways Are Complex

All Students

Community College

Four-Year

Late Entrant, Drop-out
Late Entrant, Switch to Non-STEM
Late Entrant, Stay in STEM
Initial Interest, Drop-out
Initial Interest, Switch to Non-STEM
Initial Interest, Stay in STEM

Initial Interest = Reported major in 1st year
Late Entrant = Reported or completed major 3 or 6 years after enrollment
Many CC Students Switch to Non-STEM Fields

Students Initially Interested in STEM

Six year status of students who start in STEM ("In Field" = complete degree or still enrolled)
Many CC STEM Completers are Late Entrants

Students who Complete STEM Degree

- Community College:
  - Late Entrants to STEM: 53%
  - Initial Interest in STEM: 47%

- Four-Year:
  - Late Entrants to STEM: 40%
  - Initial Interest in STEM: 60%
Many CC STEM Late Entrants are Initially Undecided

Community College STEM Late Entrants

0% 10% 20% 30% 40% 50% 60% 70% 80%

Undeclared: 51%
Business: 5%
Education: 3%
Health professions: 12%
Protective services: 2%
Mechanic/repair: 18%
Philosophy: 2%
Other: 7%

Initial Fields of Study
CC STEM Students Persist but Complete at Low Rates

Community College Students Ever Interested in STEM

- BA Goal: 68%
- Transfer in STEM: 25%
- BA in STEM: 9%
- AA/AS or Cert Goal: 28%
- AA/AS or Cert in STEM: 9%
- Still Enrolled in STEM: 16%
Conclusions

- CC STEM reforms must incorporate needs and constraints of nontraditional students.

- Delayed decision making in CC STEM needs to be understood to develop reform strategies.

- Lengthy persistence requires different strategies
  - Good news: CC STEM students persist
  - Bad news: New routes to completion needed
Next Steps

- Compare characteristics of students with initial interest in STEM vs. late entrants to STEM

- Examine CC STEM student pathways by broad fields of study, i.e. workforce and academic

- Examine institutional differences in CC STEM student pathways
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