Why Students Change Majors
Plugging Leaks in the STEM Pipeline

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Remember Your Undergrad Years?

- How many of you changed your major?
- How many changed your major more than once?

Students Change Majors

- Nationally, at least half of baccalaureate students will change their major at least once
- Changing majors is normal; college is about exploration and self-discovery
- More students switch out of STEM than switch into STEM

Switches Into and Out of STEM Majors (2012-2014)

Increasing the Number of STEM Majors

- Encouraging students to switch into STEM is difficult
  - STEM majors usually require more units than other majors and often have unique prerequisites
- We need to find ways to “plug the leaks” and encourage students to remain in STEM

Why Do Students Change Majors?

I asked them
Who Was Asked?

- Over 2,200 CSU Stanislaus students changed majors in the past 2 years
- All were emailed a survey invitation
- 578 completed at least part of the survey (26% response rate)
- 75% of respondents were female (67% of switchers are female)

Limits ability to look for gender differences

Institutional Context

- Public university serving about 7,800 undergrads and 1,200 graduate students
- Most undergraduates are:
  - Eligible to receive a Pell grant
  - First generation college students
  - Community college transfer students
  - From an underrepresented minority (Latino is the largest ethnic group)
  - Female

STEM at CSU Stanislaus

Approximate Undergraduate Enrollment

<table>
<thead>
<tr>
<th>Major</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>700</td>
</tr>
<tr>
<td>Computer Science</td>
<td>150</td>
</tr>
<tr>
<td>Chemistry</td>
<td>130</td>
</tr>
<tr>
<td>Math</td>
<td>120</td>
</tr>
<tr>
<td>Geology, Physics,</td>
<td>50</td>
</tr>
<tr>
<td>and Physical Sciences</td>
<td></td>
</tr>
</tbody>
</table>

Movement Patterns for All Students (2012-2014)

Before changing

<table>
<thead>
<tr>
<th>Non-STEM</th>
<th>STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 1473</td>
<td></td>
</tr>
</tbody>
</table>

After changing

<table>
<thead>
<tr>
<th>Non-STEM</th>
<th>STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 70</td>
<td></td>
</tr>
</tbody>
</table>

Net loss of 96 students (8% of all STEM majors)

Movement Patterns for Survey Responders

Before changing

<table>
<thead>
<tr>
<th>Non-STEM</th>
<th>STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 229</td>
<td></td>
</tr>
</tbody>
</table>

After changing

<table>
<thead>
<tr>
<th>Non-STEM</th>
<th>STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 69</td>
<td>n = 19</td>
</tr>
</tbody>
</table>

Remember Your Undergrad Years?

- Why did you (or didn’t you) change your major?
- Was the decision simple or complicated?
There Are Many Reasons for Changing Majors

- "I originally started as a psychology major, but was scared away from it when my tutor told me that a bachelors degree in psychology will get you nowhere. I then decided to do Business Administration because at that time I wanted to become an entrepreneur. When I saw the costs of the books, I began to question my decision. I then declared undeclared, and decided to do a minor in Spanish. … [My advisor … helped me realize that Spanish was not for me. I spoke to him on how I was interested in criminal justice, and in the end I chose to major in psychology and minor in cj (I dropped my minor). My love for wanting to help people and curiosity of the human mind what helped me decide to stick with psychology."

How Many Reasons Were Cited?

- Average = 5.8
- Average = 5.5
- Average = 6.7
- Average = 5.0
- Average = 6.1

What Are the Reasons for Switching?

- I didn't enjoy the classes
  - 47%
  - 56%
  - 26%
  - 53%

- I didn't enjoy the subject matter
  - 57%
  - 75%
  - 52%
  - 74%

- I was concerned about my grades
  - 24%
  - 52%
  - 5%
  - 37%

- I was concerned about the workload
  - 26%
  - 57%
  - 12%
  - 37%

Reasons Provided on Survey

- Teaching and course content (5 options)
- Scheduling and workload (5 options)
- Career concerns (3 options)
- Input from others (5 options)
- "Other reasons" (open-ended option)
**What Are the Reasons for Switching?**

- I need fewer units for my new major: 14% non-STEM to non-STEM, 28% STEM to non-STEM, 2% non-STEM to STEM, 16% STEM to STEM. 12% for all students.

- My new major is more affordable: 11% non-STEM to non-STEM, 17% STEM to non-STEM, 5% non-STEM to STEM, 11% STEM to STEM. 12% for all students.

**Other Reasons**

- Other students suggested that I switch: 17% non-STEM to non-STEM, 27% STEM to non-STEM, 17% non-STEM to STEM, 37% STEM to STEM. 35% for all students.

- My family suggested that I switch: 33% non-STEM to non-STEM, 39% STEM to non-STEM, 40% non-STEM to STEM, 32% STEM to STEM. 35% for all students.

**Other Reasons**

- "I didn't previously think I was smart enough to pursue a degree in Biology but after reevaluating what I wanted in life I decided to try for it anyway." Switched from Criminal Justice to Biology.

- "I decided I did not want to become a veterinarian due to the hard courses that I knew I would not pass and that needed to be taken to major in Biological Sciences. I switched to Kinesiology because I feel like I have more chances to actually graduate with this degree, plus, there are a lot of careers you can take with this degree." Switched from Biology to Kinesiology.

**Other Reasons**

- "I was concerned about getting a job for all students: 48% non-STEM to non-STEM, 40% STEM to non-STEM, 60% non-STEM to STEM, 58% STEM to STEM.

- I was concerned about my salary: 24% non-STEM to non-STEM, 18% STEM to non-STEM, 52% non-STEM to STEM, 32% STEM to STEM.

**Other Reasons**

- "I wanted Biology as my major to begin with, but my parents said I should do Chemistry, so I applied as a Chemistry major even though I really wanted Biology. But then I realized that was dumb because I don't like Chemistry, so I switched it to what I wanted." Switched from Chemistry to Biology.

- "I found out that criminal justice was not my calling because it involved something that was not my strong point and really did not enjoy. As well as that business administration has classes that I know I will enjoy, such as math." Switched from Criminal Justice to Business.

- "No job openings under kinesiology and for criminal justice there are always emails sent out about jobs and internships the least i was is to have struggle through school and not have a good job." Switched from Kinesiology to Criminal Justice.

- "There are very few career opportunities in the science field." Switched from Biology to Liberal Studies.
What Are the Reasons for Switching?

- Why do students switch out of STEM?
  - No connection with the classroom and the subject matter
  - Concerned about workload and grades
  - Input from other students
  - Lack of self-confidence

- Why do students switch into STEM?
  - Salary and job prospects
  - Interest in the subject matter

Future Directions

- Tailor instruction and advising
  - Communicate passion for the discipline
  - Inform students about career opportunities
  - Help build self-confidence

- Target services to students at risk of switching
  - Match high risk students with faculty mentors
  - Direct high risk students to campus resources

Thanks for Listening!

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