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The Pathways and Performance of Undergraduate Engineering Transfer Students

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\section*{Introduction}

\subsection*{Pathways}

- Students who attend two or more post-secondary institutions, or transfer students, make up just over one-third of all U.S. students\textsuperscript{2}.
- Transfer students demonstrate lower retention\textsuperscript{2} and graduation rates\textsuperscript{3} than “native” students who start and remain at the same institution.
- Transfer students may change to an institution in the same state or transfer to a school in another state.
- Studies focusing on transfer students emphasize the 2-year to 4-year (“vertical”) transition, while few consider the “horizontal” pathway (transfer from a 2-year or 4-year institution to another similar institution).

\subsection*{Performance}

- When moving from one institution to another, math and science majors often experience a decrease in GPA (termed “GPA shock”), whereas other majors’ GPAs stay the same or even increase\textsuperscript{3} (known as “transfer ecstasy”\textsuperscript{4}).
- Understanding differences in pathways and performance is important, because the shrinking pool of U.S. engineering graduates jeopardizes America’s position in the global engineering and technology hierarchy\textsuperscript{5}.

\section*{Background to Our Study}

- Part of a larger, mixed-methods study involving a longitudinal analysis of the academic pathways of engineering undergraduate transfer students in the Multiple Institution Database for Investigating Engineering Longitudinal Development (MIDFIELD) partnership.
  - Database and partnership among 11 institutions.
  - Database includes records from the 1987-88 to the 2009-10 academic school years.
  - 1,000,000+ undergraduate student records total.
  - These include 200,000+ engineering student records.
- Quantitative methods: Statistical analyses of student records to model transfer student retention and success.
- Qualitative methods: In-depth interviews with ~20 undergraduate engineering transfer students at each of six MIDFIELD institutions.

\section*{Methods}

- Analysis of demographic data of prospective interviewees (n=126) at 4 MIDFIELD schools.
- Recruitment strategy: university personnel sent emails to qualifying engineering transfer students asking for their participation in a survey.
- Gathered information on prior institutions attended, degrees received, major, and GPA at sending and receiving (MIDFIELD) institutions.
- Students’ sending institutions were classified as two- or four-year institutions and as in- or out-of-state (compared to MIDFIELD school).

\section*{Results}

\subsection*{Type of sending institution}

<table>
<thead>
<tr>
<th>Type of sending institution</th>
<th>Number of students (126 total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-year in-state</td>
<td>30</td>
</tr>
<tr>
<td>4-year in-state</td>
<td>20</td>
</tr>
<tr>
<td>4-year out-of-state</td>
<td>10</td>
</tr>
<tr>
<td>2-year out-of-state</td>
<td>5</td>
</tr>
</tbody>
</table>

\subsection*{Transfer GPA vs. GPA shock}

<table>
<thead>
<tr>
<th>Transfer GPA</th>
<th>GPA shock</th>
<th>Same GPA or better</th>
<th>Post-GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 - 4.0</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>3.0 - 3.4</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>2.5 - 2.9</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

\subsection*{Number of students (N = 63 total)}

\section*{Discussion}

\subsection*{Pathways}

- We sought to characterize the transfer patterns (vertical vs. horizontal) in a sample of undergraduate engineering students to determine if the relative dearth of literature on the horizontal pathway compared to the often-studied vertical pathway was warranted.
- Almost half (46%) of the students in our sample transfer laterally from one 4-year institution to another. While horizontal transfer students do not make up a majority of the transfer students in our sample, our results indicate they are still underrepresented in the research on transfer students.
- A majority (80%) of students transferred to a receiving institution in the same state as their sending institution (see Figure 1).

\subsection*{Performance}

- A second goal of the study was to investigate the academic outcomes of the sample of students (see Figures 2 and 3).
- Half the total sample experienced a decline in their GPA (“GPA shock”).
- Students entering the MIDFIELD institution with lower GPAs (2.5-2.9) tended to earn GPAs in the same range or better at their new school. Students entering with a 3.0 to 3.49 were as likely to experience GPA shock as not.
- However, students transferring with high GPAs were more likely to experience GPA shock if they were vertical transfer students (from 2-year institutions).
- More vertical transfer students in our sample reported GPA shock than horizontal transfers, but only by a slight margin.

\section*{Implications}

- By specifically studying engineering transfers, we hope to increase the shrinking pool of engineering graduates.
- With more attention to, and understanding of, pathway differences, retention and graduation rates among transfer students may improve and time to degree completion rates may decrease.
- More research on horizontal transfers is necessary to help school personnel better prepare transfer students depending on their transfer pathway.
- Based on the findings about GPA shock, results suggest that 4-year institutions may better prepare students for academic transfer than 2-year institutions. Our future research will investigate this further.

\section*{References}

4. \textit{A major (80%) of students transferred to a receiving institution in the same state as their sending institution (see Figure 1).}
5. \textit{A second goal of the study was to investigate the academic outcomes of the sample of students (see Figures 2 and 3).}
6. \textit{Half the total sample experienced a decline in their GPA (“GPA shock”).}
7. \textit{Students entering the MIDFIELD institution with lower GPAs (2.5-2.9) tended to earn GPAs in the same range or better at their new school. Students entering with a 3.0 to 3.49 were as likely to experience GPA shock as not.}
8. \textit{However, students transferring with high GPAs were more likely to experience GPA shock if they were vertical transfer students (from 2-year institutions).}
9. \textit{More vertical transfer students in our sample reported GPA shock than horizontal transfers, but only by a slight margin.}

\textit{Figure 1. Transfer student pathways}

\textit{Figure 2. Two-year transfers-GPA outcomes}

\textit{Figure 3. Four-year transfers-GPA outcomes}