Engineering Transfer Students:

*Understanding Factors that Facilitate Student Success*

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Creating Pathways for STEM Transfer Student Success
National Institute for the Study of Transfer Students (NISTS)
September 12, 2011
Asheville, NC
Welcome to the Community College Leadership Program (CCLP) website. Here you will find information about graduate programs and professional development opportunities for community college professionals, as well as information about the Office of Community College Research and Policy (OCCR P).
About OCCRP

• The Office of Community College Research and Policy (OCCRP) at Iowa State University is focused on *creating, sharing, and applying knowledge in the context of community college education.*

• The mission of the OCCRP is to *articulate and analyze the issues affecting policy and practice* by conducting rigorous research which impacts students, faculty, administrators, and policymakers.

• The OCCRP is *committed to sharing our research with diverse constituents* through dissemination efforts such as publications, conference presentations, and professional workshops.
Research Projects

SEEC: Student Enrollment and Engagement through Connections
STEM Talent Expansion Program

Pathway to a STEM Degree
Gender in Science and Engineering

Student and Organizational Learning: Preparing the 21st Century Technicians
Advanced Technological Education

Evaluation of Project Lead The Way in Iowa
The Kern Family Foundation and the Iowa Mathematics and Science Education Partnership (IMSEP)
Why Transfer? Why Now?

- Community colleges are the *largest postsecondary education segment* and its share of the undergraduate population is likely to increase.
- Community college students *want to transfer*.
- Community colleges will *prepare more students for transfer* in the future, especially students from middle-class backgrounds.
- Community colleges *attract students from underserved groups* in greater numbers than four-year colleges and universities.
- Community colleges *cost less to attend* than four-year institutions.
- Community colleges are *more accessible* than four-year institutions.

Figure 1. Conceptual Framework of Educational Trajectories via Community College

High School -> Community College

- Dual Credit
- Joint Enrollment

Community College

- G.E.D.
- Developmental Education
- Certificate
- Family Literacy
- A.A. Degree Transfer
- A.S. Degree
- A.A.S. Degree

Four-Year University

Employment

Employment
Why study transfer students?

- Demographics of students who begin at Iowa’s public community colleges
- Academic preparation and degree completion
- Community college effect
- Retention and graduation rates
- STEM Pathways
- University experience and student success
- Use data to inform practice, policy and future research.
Iowa Community College Transfer Students: Enrollment by Regent Universities

Fall Semester

- ISU
- UNI
- U of I
Transfer Students

• Completion of an associate degree and attainment of a high transfer GPA appear to be related to higher retention and graduation rates at the Regent universities for transfer students.

• Students who transferred from Iowa community colleges in Fall 2008:
  – AA or other associate degree: higher one-year retention rate (83.3%)
  – No associate degree: (76.6%)

Transfer Students

• Students who transferred from Iowa community colleges in Fall 2005:
  – AA or other associate degree: higher four-year graduation rate (64.2%)
  – No associate degree: (56.1%)

Transfer Students

• There is a significant difference in one-year retention rates when transfer GPA is considered.

• Students in the entering class of Fall 2008:
  – 3.50-4.00: 88.6%
  – 3.00-3.24: 78.4%
  – 2.50-2.74: 77.1%
  – 2.00-2.24: 60.3%

• Minority students in 2008 entering class had a lower one-year retention rate (78.1%) than non-minority students (80.0%).

Transfer Students

- The number of transfer students at the Regent universities increased by 124 students (+3.2%) from 3,851 in Fall 2009 to 3,975 in Fall 2010.
- Approximately 62% (2,458) of all transfer students at the Regent universities in Fall 2010 were from Iowa public community colleges.
- In Fall 2009, there were 100,736 students enrolled in Iowa community colleges; approximately 64% were enrolled in college parallel (transfer programs).
- During FY 2009, there were 4,817 Iowa CC students who received an AA award; and 1,165 Iowa CCs received an A.S. award.

Figure 12-8: Three-year Transfer Rates by Award Type: 2002 Cohort

SOURCE: Iowa Department of Education, Division of Community Colleges and Workforce Preparation, Community College MIS and National Student Clearinghouse, see Table 12-16.
Figure 12-9: Retention Rate for Transfer Students at Public Universities: 1991-2007

Source: Iowa Department of Education, Division of Community Colleges and Workforce Preparation, Community College MIS, and National Student Clearinghouse, see Table 12-17.
Figure 12-10: Graduation Rate for Transfer Students at Public Universities: 1991-2004

SOURCE: Iowa Department of Education, Division of Community Colleges and Workforce Preparation, Community College MIS, and National Student Clearinghouse, see Table 12-18.
Iowa Community College Transfer Students
Profiles, Experiences, and Perceptions
Transfer Student Questionnaire (TSQ)

- Measure transfer students’ community college and university experiences
- Survey developed by Laanan (1998)
- Online survey
- Administered to Iowa CC transfer students at Iowa State University (ISU)
- Data for over 2,000 transfer students
Transfer Student Questionnaire (TSQ)

- Background Characteristics
- Community College Experiences
  - General Courses
  - Academic Advising/Counseling Services
  - Transfer Process
  - Course Learning
  - Experience with Faculty
  - Learning and Study Skills
- University Experiences
  - Reasons that influence decision to attend ISU
  - Course Learning
  - Experiences with Faculty
  - General Perceptions of ISU
  - Adjustment Process
  - College Satisfaction
- Open-Ended Questions

Online Survey instruments:
TSQ
E-TSQ
## Percent Responding Somewhat Agree-Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>Community College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consulted with AA regarding transfer</td>
<td>67.5</td>
</tr>
<tr>
<td>Information received was helpful in the transfer process</td>
<td>62.5</td>
</tr>
<tr>
<td>Met with AA on a regular basis</td>
<td>38.2</td>
</tr>
<tr>
<td>Talked with AA about courses to take, requirements, educational plans</td>
<td>67.5</td>
</tr>
<tr>
<td>Discussed plans with AA for transferring to 4-year college or university</td>
<td>66.9</td>
</tr>
<tr>
<td>AA identified courses needed to meet the GE requirements, major, etc.</td>
<td>60.5</td>
</tr>
</tbody>
</table>
## Transfer Process

### Percent Responding Somewhat Agree-Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>Community College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researched various aspects of university to get a better understanding of environment and academic expectations</td>
<td>67.8</td>
</tr>
<tr>
<td>I knew what to expect at the university in terms of academics</td>
<td>62.4</td>
</tr>
<tr>
<td>Visited the university campus to learn where offices and departments were located</td>
<td>76.5</td>
</tr>
<tr>
<td>Spoke to academic counselor at university about transferring and major requirements</td>
<td>63.1</td>
</tr>
<tr>
<td>Visited the admissions office at university</td>
<td>63.1</td>
</tr>
<tr>
<td>Spoke to former CC transfer students to gain insight about their adjustment experiences</td>
<td>31.8</td>
</tr>
</tbody>
</table>
## Course Learning

### Percent Responding Often-Very Often

<table>
<thead>
<tr>
<th>Question</th>
<th>Community College</th>
<th>Iowa State University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Took detailed notes</td>
<td><strong>70.0</strong></td>
<td>86.0</td>
</tr>
<tr>
<td>Participated in class discussions</td>
<td><strong>67.6</strong></td>
<td>50.0</td>
</tr>
<tr>
<td>Tried to see how different facts and ideas fit together</td>
<td><strong>79.7</strong></td>
<td>84.6</td>
</tr>
<tr>
<td>Thought about practical applications of the material</td>
<td><strong>77.0</strong></td>
<td>90.9</td>
</tr>
<tr>
<td>Integrated ideas from different sources into projects</td>
<td><strong>66.8</strong></td>
<td>76.3</td>
</tr>
<tr>
<td>Explained material to another student or friend</td>
<td><strong>71.0</strong></td>
<td>78.5</td>
</tr>
</tbody>
</table>
## Experiences with Faculty

### Percent Responding Often-Very Often

<table>
<thead>
<tr>
<th>Question</th>
<th>Community College</th>
<th>Iowa State University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visited faculty and sought advice on class projects</td>
<td>39.2</td>
<td>38.2</td>
</tr>
<tr>
<td>Felt comfortable approaching faculty outside of class</td>
<td>67.6</td>
<td>43.1</td>
</tr>
<tr>
<td>Asked my instructor for information related to a course</td>
<td>55.4</td>
<td>45.8</td>
</tr>
<tr>
<td>Visited informally and briefly with an instructor after class</td>
<td>48.7</td>
<td>23.8</td>
</tr>
<tr>
<td>Discussed my career plans and ambitions with a faculty member</td>
<td>34.6</td>
<td>19.4</td>
</tr>
<tr>
<td>Asked my instructor for comments and criticisms about my work</td>
<td>37.2</td>
<td>23.6</td>
</tr>
</tbody>
</table>
### General Perceptions of ISU

#### Percent Responding Somewhat Agree-Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>Iowa State University</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISU faculty are easy to approach</td>
<td>70.4</td>
</tr>
<tr>
<td>ISU faculty tend to be accessible to students</td>
<td>68.3</td>
</tr>
<tr>
<td>Because I am a community college transfer, most faculty tend to underestimate my abilities</td>
<td>22.2</td>
</tr>
<tr>
<td>Because I am a community college transfer, most students tend to underestimate my abilities</td>
<td>32.6</td>
</tr>
<tr>
<td>ISU is an intellectually stimulating and often exciting place to be</td>
<td>85.5</td>
</tr>
<tr>
<td>If I could start over again, I still would go to ISU</td>
<td>90.0</td>
</tr>
<tr>
<td>I would recommend to other transfer students to come to ISU</td>
<td>91.0</td>
</tr>
</tbody>
</table>
Open-Ended Questions

What factors helped you adjust to the university?

• Making friends
• Family and friends
• Advisement
• Provide more rigorous and transferable classes
• Study skills
• Prepare for large university setting (reduce transfer shock/transition)
If you could give some advice to CC students who will be transferring, what would that advice be?

- Consult with academic counselor
- Get involved
- Make sure classes transfer
- Enhance study skills/form study groups
- Be prepared and ask for help
The STEM Student Enrollment and Engagement through Connections (SEEC) project seeks to increase the number of engineering graduates at Iowa State University by approximately 100 per year. The means to that end are connections rooted in community: learning communities, community colleges, and Iowa communities. The project is collaborative between Iowa State University (ISU) and Des Moines Area Community College (DMACC). The cornerstone of SEEC is the success of learning communities for recruitment and retention, and the project builds upon Iowa State’s established learning community infrastructure, leadership, and expertise. Retention at DMACC and ISU will be increased by transitioning community college students into SEEC.

Fast Facts about ISU Engineering

The College of Engineering continues to be ranked among the top 25 public engineering colleges in the country, according to the graduate and professional school rankings.

The programs are among the top 10 in the Midwest among all engineering colleges (USN & WR ranking).

Data Briefs

SEEC Data Brief: Engineering Admissions Partnership Program (E-APP) (PDF) November 2010

SEEC Data Brief: Engineering Orientation (EGR 100) (PDF) November 2010

SEEC Data Brief: SEEC Engineering Transfer Student Profile (PDF)
Overall Grant Goal

Increase College of Engineering graduates to 900, by approximately 100 per year. Included with this goal are increases in the number of pre-engineering students at DMACC and in the percentages of women and minority students in engineering at ISU and DMACC.
SEEC: STEM Student Enrollment and Engagement through Connections

- Ankeny
- Boone
- Carroll
- Newton
- Urban/Des Moines
- West

College of Engineering
Figure 1. Conceptual Model of SEEC Effect
Engineering Transfer Student Retention and Success

Figure 2. Conceptual Model of SEEC Effect: Community College Environment

**SEEC Effect**
- E-APP: Engineering Admissions Partnership Program
- EGR 100
- Learning Community at CC

**Academic Experiences**
- General Courses
- Faculty
- Transfer Process
- Counseling & Advising

**GPA Associate’s Degree**
- GPA
- Associate Degree

**Engineering Basic Program**
- Mathematics 165, 166 (Calculus)
- Chemistry 167 or 177
- Engineering 101 (Orientation)
- Engineering 160 (Engineering Problems)
- Physics 221
- Library 160
- English 150, 250
CoE E-APP Enrollment

Year | Enrollment
---|---
2007 | 59
2008 | 79
2009 | 136
2010 | 137
Enrollment in Des Moines Area Community College (DMACC) EGR 100

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Spring</th>
<th>Total</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>07-08</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>08-09</td>
<td>16</td>
<td>18</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>09-10</td>
<td>23</td>
<td>16</td>
<td>39</td>
<td>6</td>
</tr>
<tr>
<td>10-11</td>
<td>32</td>
<td>27</td>
<td>59</td>
<td>5</td>
</tr>
</tbody>
</table>
Figure 3. Conceptual Model of SEEC Effect: University of Environment

Engineering Basic Program

University

- GPA
- Learning Communities
  - E2020
  - Engineering
  - PWSE
  - Honors
- Academic Experiences

Outcomes

- Retention in Engineering Major
- Leave Engineering, Retention in STEM Major
- Retained at University (non-STEM)
- Leave University

Graduate with Engineering Degree
CoE Learning Community Participation

- **New Freshman in LCs %**
  - 2000: 43.3%
  - 2001: 48.2%
  - 2002: 61.0%
  - 2003: 60.9%
  - 2004: 65.6%
  - 2005: 76.0%
  - 2006: 82.3%
  - 2007: 79.9%
  - 2008: 84.7%
  - 2009: 83.1%
  - 2010: 85.7%

- **New Transfers in LCs %**
  - 2000: 1.8%
  - 2001: 4.8%
  - 2002: 12.6%
  - 2003: 3.4%
  - 2004: 7.5%
  - 2005: 13.6%
  - 2006: 34.6%
  - 2007: 32.2%
  - 2008: 22.0%
  - 2009: 37.7%
  - 2010: 31.8%
E-APP and Retention

• E-APP students are retained at significantly higher levels than non-E-APP students.
• E-APP significantly improves retention over Non-E-APP in early studies.
• E-APP is statistically significant for improving retention even when controlling for transfer GPA and basic program GPA.
• This is especially true for DMACC students.
10 Year Averages for Retention: One Year

For Each 100 Students that Start in Engineering:
This Shows Where They are 1 Year Later

- **Still in Engr**
- **Still at ISU**
- **Left ISU**

<table>
<thead>
<tr>
<th></th>
<th>DMACC</th>
<th>All IA CC</th>
<th>DFHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Still in Engr</td>
<td>60</td>
<td>66</td>
<td>74</td>
</tr>
<tr>
<td>Still at ISU</td>
<td>14</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Left ISU</td>
<td>19</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>
CoE LC One Year Retention Rates in Engr

- All IA CC Transfers Starting in Engineering
- Direct from High School starting in Engineering

<table>
<thead>
<tr>
<th>Year</th>
<th>All IA CC Transfers</th>
<th>Direct from High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>77%</td>
<td>50%</td>
</tr>
<tr>
<td>2001</td>
<td>77%</td>
<td>71%</td>
</tr>
<tr>
<td>2002</td>
<td>80%</td>
<td>54%</td>
</tr>
<tr>
<td>2003</td>
<td>77%</td>
<td>60%</td>
</tr>
<tr>
<td>2004</td>
<td>74%</td>
<td>44%</td>
</tr>
<tr>
<td>2005</td>
<td>76%</td>
<td>62%</td>
</tr>
<tr>
<td>2006</td>
<td>74%</td>
<td>70%</td>
</tr>
<tr>
<td>2007</td>
<td>77%</td>
<td>77%</td>
</tr>
<tr>
<td>2008</td>
<td>77%</td>
<td>67%</td>
</tr>
<tr>
<td>2009</td>
<td>80%</td>
<td>76%</td>
</tr>
</tbody>
</table>
CoE One Year LC Retention in Engr

- **5 yr Avg 2000-2004**
  - Direct From High School: 77.5%
  - IA CC Transfer Students: 55.3%

- **5 yr Avg 2005-2009**
  - Direct From High School: 75.5%
  - IA CC Transfer Students: 73.6%
Multiple-Learning Community Effect on Retention of Women in Engineering

Impact of LC Participation on COE Retention
(Female College of Engineering Students)

Kaplan-Meier termination estimate

Years enrolled at ISU

Source: 2011 SEEC Grant College of Engineering Retention Analysis
ENGR 160 Student Retention within COE
(All Entering Engineering Students)

Number at risk
engr160hilo = 0 1288 895 736 514 69 8 1 0
engr160hilo = 1 1144 1029 895 545 32 3 0 0

0.00 - 3.00 GPA  3.01 - 4.00 GPA

Source: 2011 College of Engineering Retention Analysis
ENGR 160 Student Retention within COE
(Iowa Community College Transfer Students)

Number at risk

<table>
<thead>
<tr>
<th>GPA</th>
<th>0.00 - 3.00 GPA</th>
<th>3.01 - 4.00 GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>engr160hilo = 0</td>
<td>129</td>
<td>99</td>
</tr>
<tr>
<td>engr160hilo = 1</td>
<td>103</td>
<td>88</td>
</tr>
</tbody>
</table>

Years enrolled at ISU

Source: 2011 College of Engineering Retention Analysis
Future Research

• Utilize Engineering-Transfer Students’ Questionnaire (E-TSQ).
• Connect survey with students’ academic transcript.
• Identify challenges regarding progression to complete engineering major.
• Explore and understand the experiences of women and URMs.
• Secure larger sample size
• Employ E-TSQ at more universities
Questions

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