



Engineering Transfer Student— Graduate Profile

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Introduction

The SEEC project is a collaborative between Iowa State University and Des Moines Area Community College (DMACC). In order to better understand the engineering transfer student, it is useful to know whether their placement status differs from those entering engineering at Iowa State directly from high school (DFHS). Placement status is determined by the student’s employment status, work experience, salary, GPA, gender, and ethnicity upon graduation.

The data was divided into two groups, those students entering Iowa State engineering direct from high school (DFHS) and those who transferred from an Iowa community college (IA CC). A student is considered direct from high school if they enter Iowa State in the semester that follows their high school graduation. This designation includes those who bring credits for dual enrolled or advanced placement courses. A student is considered a transfer student if the credits earned were after high school graduation. This defines a transfer student by the timing of their college credits rather than the number of college credits transferred.

The Project

Data for this project were collected from Iowa State University’s Engineering Career Services. It includes five semesters of data for approximately 1,700 students who graduated from the College of Engineering from fall of 2008 through fall of 2010. This data was combined with data from Institutional Research to identify admission status. Details about these data are described in the SEEC Data Brief: Data Collection and Analysis Project—Retention.

Approximately 95% of Iowa State engineering students report their employment status at graduation. Of the DFHS group, approximately 96% report this while approximately 92% of IA CC transfers report. This provides us with enough data to draw valid conclusions. The table below summarizes the graduation parameters that were not significantly different between the groups of graduates.

Table 1

Five Semester Summary of Parameters that are Not Significantly Different

Graduation Parameter	n	Direct Entry from HS	n	Entry from State CC	P value on Difference
Starting Salary*	401	\$57,123.72	33	\$55,390.21	0.2121
Ethnicity-Other than White	1336	9.1%	133	8.3%	0.7414
Coop Work Experience	1414	2.5%	145	2.1%	0.7625
Intern Work Experience**	1414	35.9%	145	29.0%	0.0981
Summer Work Experience	1414	39.7%	145	37.2%	0.5569
No Work Experience	1414	17.0%	145	20.0%	0.3703
Employed	1353	49.9%	134	44.0%	0.1956

*Self-Reported

**This difference is significant at 0.10 level of significance

Note: Experiential education can take the form of a cooperative work experience, internship work experience and summer work experience. Coop work experience includes alternating semesters of classes with periods of engineering full-time work. An internship is a single work period in engineering—full-time employment of at least one semester. Summer work experience is a single work experience of at least 10 weeks.

This chart shows that, upon graduation, starting salary, ethnicity, individual work experiences, and employment status is not significantly different between those entering engineering from a community college and those entering directly from high school. These are factors to sustain. Table 2 below, however, shows that a number of graduation parameters are significantly different at graduation.

Table 2
Five Semester Summary of Significantly Different Parameters

Graduation Parameter	n	Direct Entry from HS	n	Entry from State CC	P value on Difference
Total with Work Experience	1414	78.1%	145	68.3%	0.00742
Graduate School	1353	15.5%	134	6.0%	0.00287
Placed**	1353	65.4%	134	50.0%	0.00039
Seeking Jobs	1353	34.6%	134	50.0%	0.00039
GPA at Graduation	1414	3.19	145	2.92	<0.0001
GPA Employed	675	3.24	59	3.06	<0.0001
GPA Seeking Jobs	468	2.99	67	2.78	<0.0001
Employed in State	541	41.2%	49	75.5%	<0.0001
Female Graduates	1408	15.6%	145	3.4%	<0.0001

**Employed or Graduate School

This table shows that, for the IA CC graduates in engineering, the amount of combined work experiences, grade point averages and percent of female graduates are significantly lower than those who were admitted directly from high school. These results warrant continued monitoring and further investigation to understand why these differences exist. The percent seeking jobs at graduation are also higher for IA CC graduates. Some of the differences in employment might be explained by lower combined work experiences and lower grade-point-averages. However, a much higher percent of IA CC graduates select jobs in state, a positive factor for our state economy.

Among all graduates, employers distinguish most between GPA and work experience, preferring higher grades and more work experience among graduates. Since these are two areas where IA CC graduates lag behind those who enter directly from high school, they may explain the higher percent of IA CC graduates seeking work. The grade point differences for all engineers who

are employed compared to those that are seeking work are as follows:

- Average GPA for an employed engineer: 3.1
- Average GPA an engineer seeking work at graduation: 2.8

A detailed analysis of transfer grades for engineering courses is underway to examine GPA differences further. This will be the focus of the SEEC data brief on Basic Program (Core) courses in engineering.

There was no adjustment made for background characteristics of the graduates, since all of them had the successful outcome of graduating in engineering. This study targets both areas for sustainment and areas for improvement.. Additional research that adjusts for background characteristics will be part of the Basic Program (Core) courses in engineering study.

Table 3
Graduation Comparisons by Majors

Five Semester Summary

Engineering Major	n	Direct Entry from HS	n	Entry from State CC	P Value
Mechanical	352	24.9%	53	36.6%	0.00230
Electrical	113	8.0%	20	13.8%	0.01723
Civil	172	12.2%	17	11.7%	0.87716
Construction	129	9.1%	14	9.7%	0.83256
Industrial	94	6.6%	13	9.0%	0.29313
Agricultural	69	4.9%	9	6.2%	0.48511
Aerospace	164	11.6%	9	6.2%	0.04901
Chemical	132	9.3%	5	3.4%	0.01710
Computer	100	7.1%	3	2.1%	-
Material	72	5.1%	2	1.4%	-
Software	17	1.2%	0	0.00%	-

This table shows that a higher percent of IA CC transfers graduate in Mechanical and Electrical engineering than students who enter directly from high school. These

are the majors that should receive the most support for programs aimed at IA CC transfer student retention.

Table 4
Summary: Most Common Degrees of IA CC Transfers Who Left Engineering

Major	Percent
Business & Econ	39
Industrial and Ag Technology	31
Others Combined	30
	100

This table summarizes the most common majors for IA CC students who entered in engineering, but graduated in a

different major at Iowa State.

Table 5
Semesters to Degree for IA CC Engineering Transfers

Variable	Obs	Mean	SD	Min	Max
2005 cohort, ENGR degree	59	6.69	1.66	3.35	11.19
2002-2007 cohorts, ENGR degree	325	6.76	1.87	2.58	15.87

The average time to degree for IA CC engineering transfers is about seven semesters after transfer. Time to

degree information for each cohort variable is broken out in Charts 1 and 2 below.

Figure 1

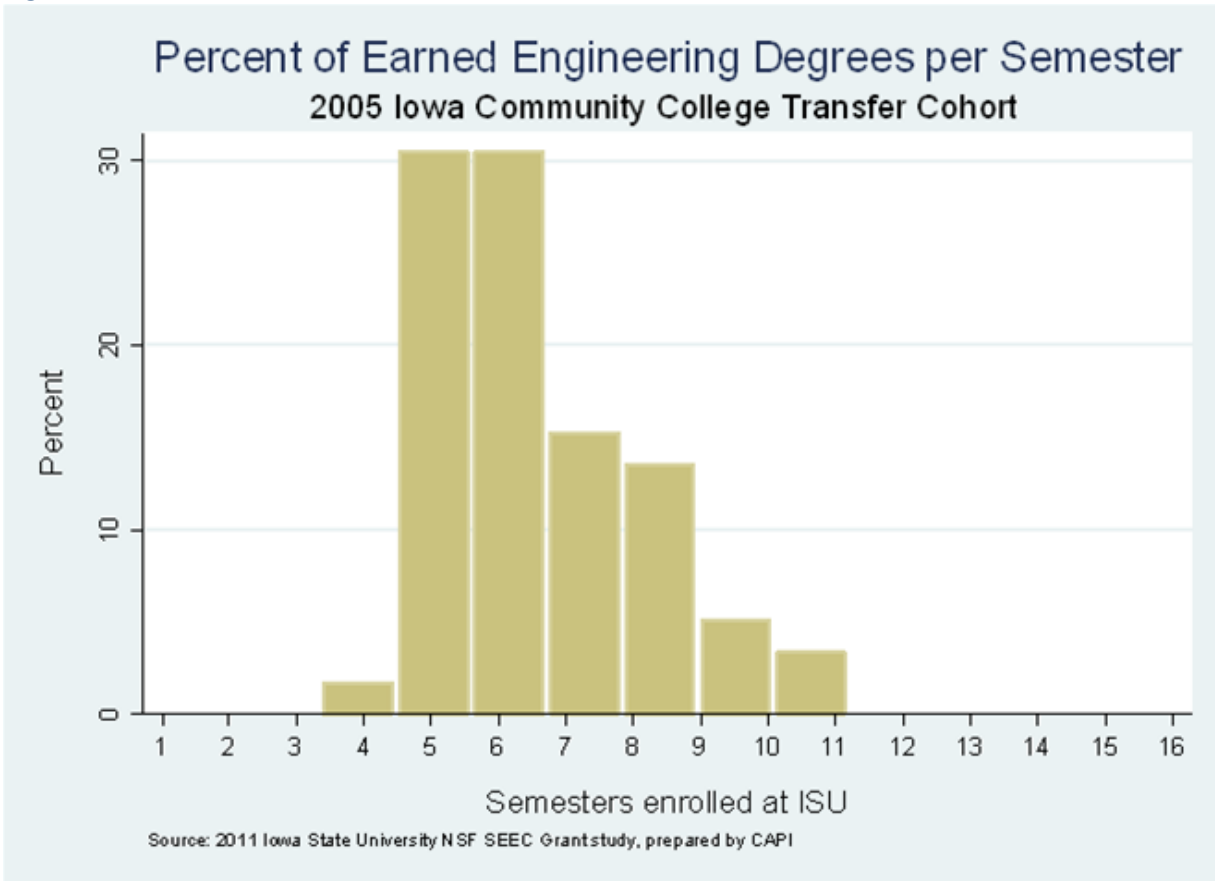
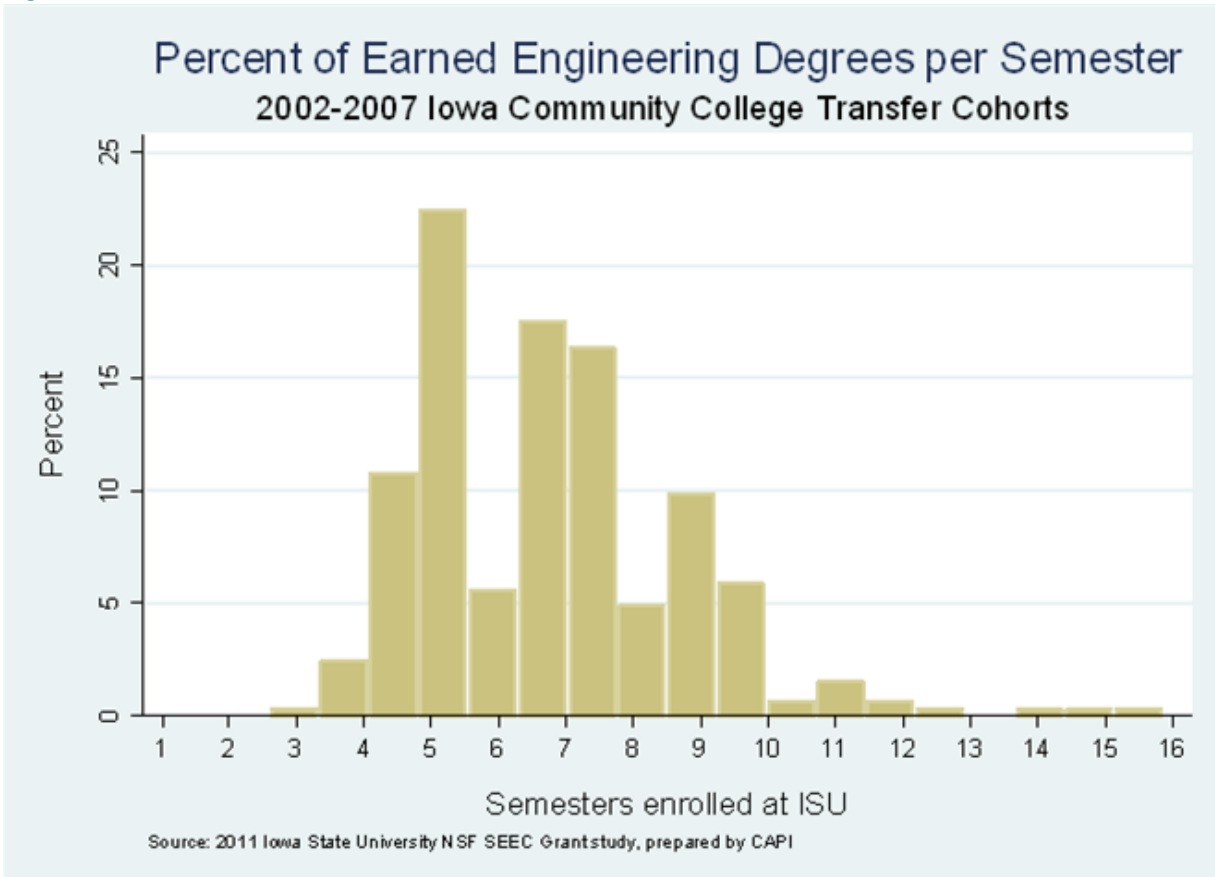


Figure 2



Summary: Profile of an IA CC Engineering Graduate

- Most Graduate in ME (37%)
- 82% select these majors:
ME (37%), EE (14%), CE (12%), Con E (10%), and IE (9%)
- Most take jobs in Iowa (76% or more)
- 98% are residents of Iowa
- The average student transfers 60 credits
- The average transfer GPA is 3.2
- The average ISU GPA at Graduation is 2.9
- 3.4% are female
- 8.3 % are non-white US citizens
- 44% are employed at graduation (50% in Sp '11)
- 6% go to graduate school following graduation
- 50% are seeking jobs at graduation (44% in Sp '11)
- The average age of the graduate is only slightly older than the DFHS graduate
- The average time to graduation is about 7 semesters after admission

Summary

This research identifies positive characteristics of transfer students that need to be sustained to ensure that differentiation does not arise in the future. These positive characteristics indicate that once an IA CC student makes a successful transition to the university, no further differentiation exits at graduation. This research also identified negative distinctions that need further study to discover ways to reduce or eliminate them.

Information for this data brief was obtained from the paper: CHARACTERISTICS OF COMMUNITY COLLEGE TRANSFERSTUDENTS THAT SUCCESSFULLY MATRICULATE AND GRADUATE IN ENGINEERING by Marcia Laugerman and Steve Mickelson presented this summer the American Society of Engineering Education National Conference In Vancouver, Canada.

About the SEEC project

The Student Enrollment and Engagement through Connections (SEEC) project is collaboration between Iowa State University and Des Moines Area Community College (DMACC) funded by the National Science Foundation's STEM Talent Expansion Program. The goal of the project is to increase the number of engineering graduates at Iowa State University by approximately 100 per year. The percentage of women and minority graduates will approach 20% and 10%, respectively. One of the strategies used to meet this goal is to build upon Iowa State's established learning community infrastructure.

Additional Resources

SEEC (www.eng.iastate.edu/seec)

Pathway2STEM Degree (www.pathway2stemdegree.org)

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The work reported herein is supported by the National Science Foundation, Science, Technology, Engineering and Mathematics Talent Expansion Program (STEP), Directorate for Education and Human Resources, Division of Undergraduate Education, Grant No. 0653236.

The SEEC Data Brief is published by the College of Engineering in collaboration with the Office of Community College Research & Policy (OCCRP) at Iowa State University. Established in 2004, the mission of OCCRP is to articulate and analyze the issues affecting policy and practice by conducting rigorous research which impacts students, faculty, administrators, and policymakers.

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