IOWA STATE UNIVERSITY

DMACC
DES MOINES AREA COMMUNITY COLLEGE

NATIONAL SCIENCE FOUNDATION
STEM Talent Expansion Program (STEP)

STEM Student Enrollment and Engagement through Connections

Strategies to Increase Transfer Students in Engineering

Conference on Diversity in Science, Technology, Engineering and Math
Creating Linkages to Serve All Students in STEM Career Pathways

April 22, 2011
FFA Enrichment Center
Des Moines Area Community College

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STEM Student Enrollment and Engagement through Connections

Presenters

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STEM Student Enrollment and Engagement through Connections

Objectives

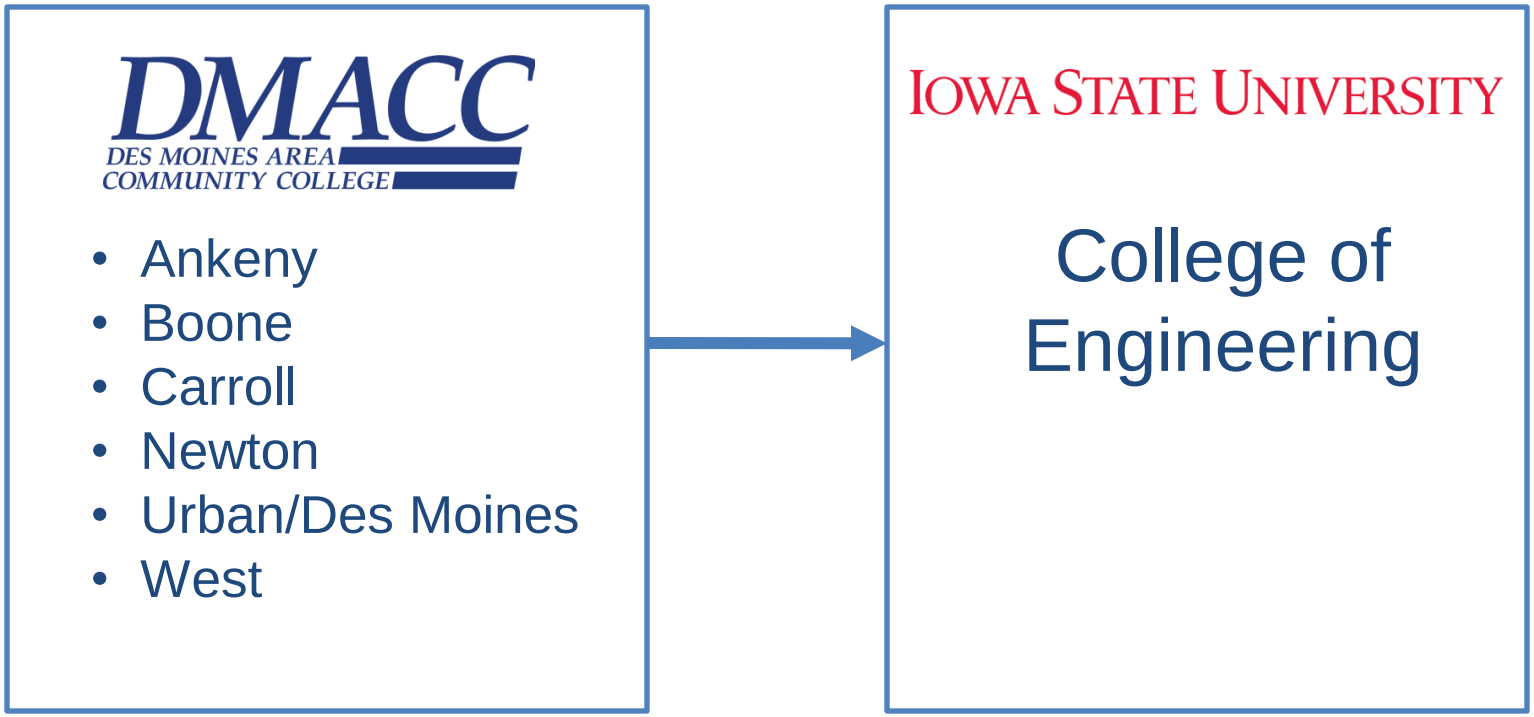
This session will discuss the National Science Foundation (NSF) funded project called “STEM Student Enrollment and Engagement through Connections (SEEC)” collaboration between Des Moines Area Community College (DMACC) and Iowa State University College of Engineering.

- Collaboration goals and objectives;
- Logic model and evaluation strategies;
- Transfer student programs and data including enrollment, retention, success outcomes; and
- Implications for increasing women and underrepresented minority students in engineering

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.

STEM Student Enrollment and Engagement through Connections



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Project Goals

Increase the number of engineering graduates at Iowa State by 100 per year to approximately 900 graduates annually. Included with this goal are increases in the percentages of women and minority graduates in engineering at Iowa State and the number of pre-engineering students at Des Moines Area Community College.

Logic Model Planning

01. Learning Village

Objectives:
To build a learning village that enhances student engagement and creates Iowa State connections for community college pre-engineering transfer students

2011 Highlighted Short-Term Outcomes:

1. The college has customized Iowa State's Admissions Partnership Program (APP) with Iowa community colleges to support prospective transfer students in engineering, called E-APP.
2. The Transfer Peer Mentor Program includes a web-based professional network which promotes multiple points of engagement for community college students. Transfer peer mentors serve as leaders in E2020 (S-STEM) transfer cohort seminars.
3. All Iowa State engineering departments have learning communities, and some have started transfer learning communities.

02. Curriculum

Objectives:
To enhance first- and second-year learning experiences, with an emphasis on student success and engagement and classroom climate

2011 Highlighted Short-Term Outcomes:

1. Targeted program offerings provide pre-engineering and engineering students with key learning experiences and professional development (e.g., ENGR 110 and 210 E2020 courses, bioengineering minor, and DMACC/EGR 100).
2. Departments are interested in the transfer student transition and curricular aspects (e.g., transfer learning communities, sophomore courses, and 2+2 programs).
3. A university-wide student success summit and continued SEEC project emphasis on data analysis of students' academic performance and success will inform department activities.

03. Advising

Objectives:
To develop and enhance academic advising and mentoring programs for precollege, community college, and university students

2011 Highlighted Short-Term Outcomes:

1. Transfer students are entering engineering with a clear plan and connections that will assist them in making a smooth transition.
2. ISU and CC advisers and faculty are engaged in activities aimed at dissemination of student success reports, best practices, curriculum and new resources.

04. Networking

Objectives:
To establish a recruiting and outreach network across Iowa to tap into diverse communities of students, and to improve the awareness and understanding of engineering among those who influence student choice

2011 Highlighted Short-Term Outcomes:

1. CYSTEM (Connecting Youth with Science, Technology, Engineering and Math), an interactive, web-based GIS map/information repository was launched to connect Iowa youth, parents, and formal and informal educators to STEM resources (programming, mentors, and introduction to engineering jobs) in Iowa.
2. Partnerships and networking continue with University Extension, academic departments, Program for Women in Science and Engineering, Iowa State Admissions, industrial boards, and alumni and educator networks.

05. Evaluation*

Objectives:
To evaluate project effectiveness that will enhance project activities

2011 Highlighted Short-Term Outcomes:

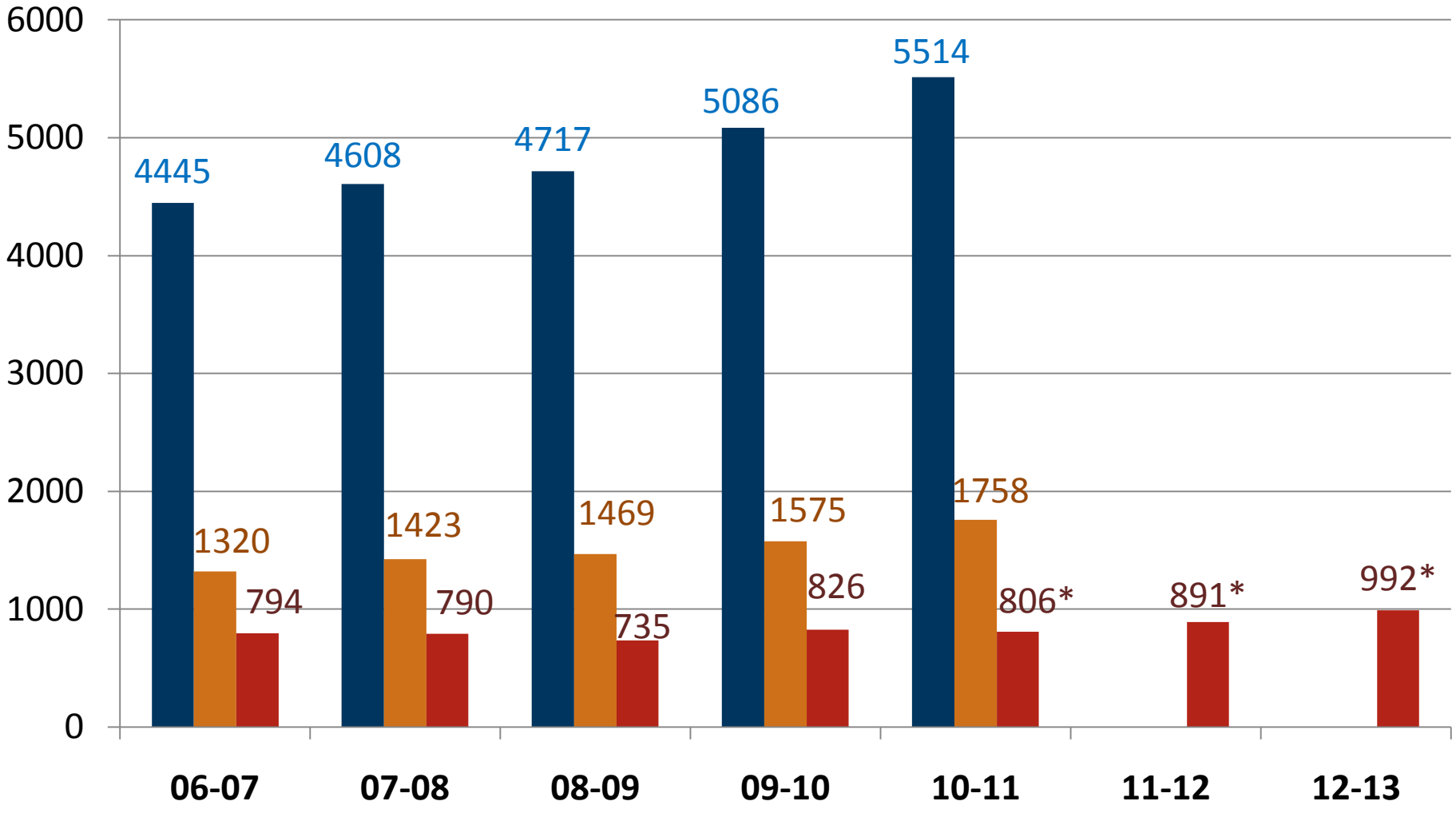
1. Data sources and procedures for continuous tracking of retention and enrollment of College of Engineering students with a focus on DMACC transfers and new freshmen has been established.
2. Longitudinal qualitative and quantitative assessment and evaluation activities are in place.

* *Led by Iowa State University Research Institute for Studies in Education (RISE)*

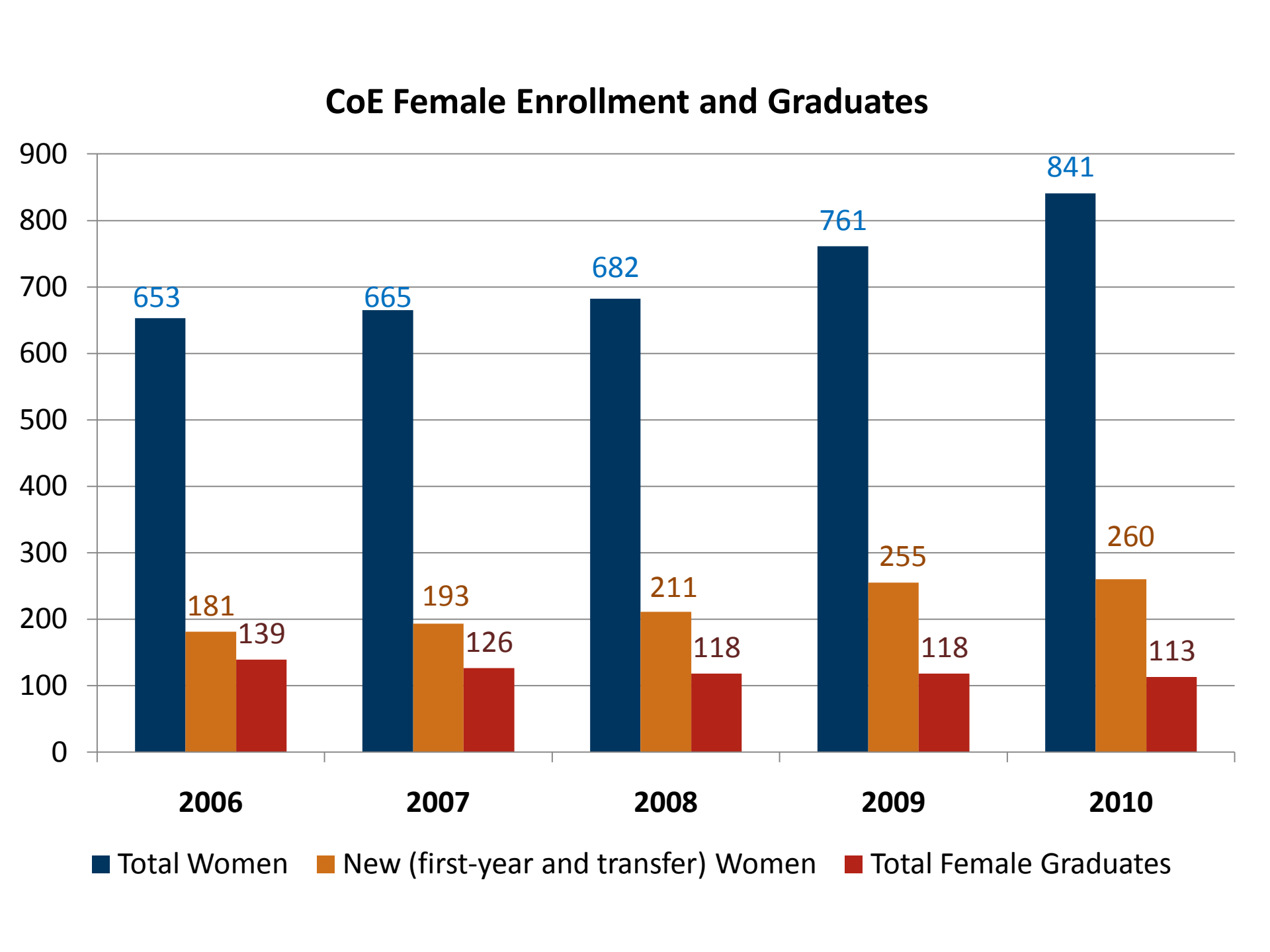
Enrollment and Graduate Data

Source: College of Engineering Data Analysis. Prepared by Marcia Laugerman and Jason Pontius. Iowa State University, March 2011.

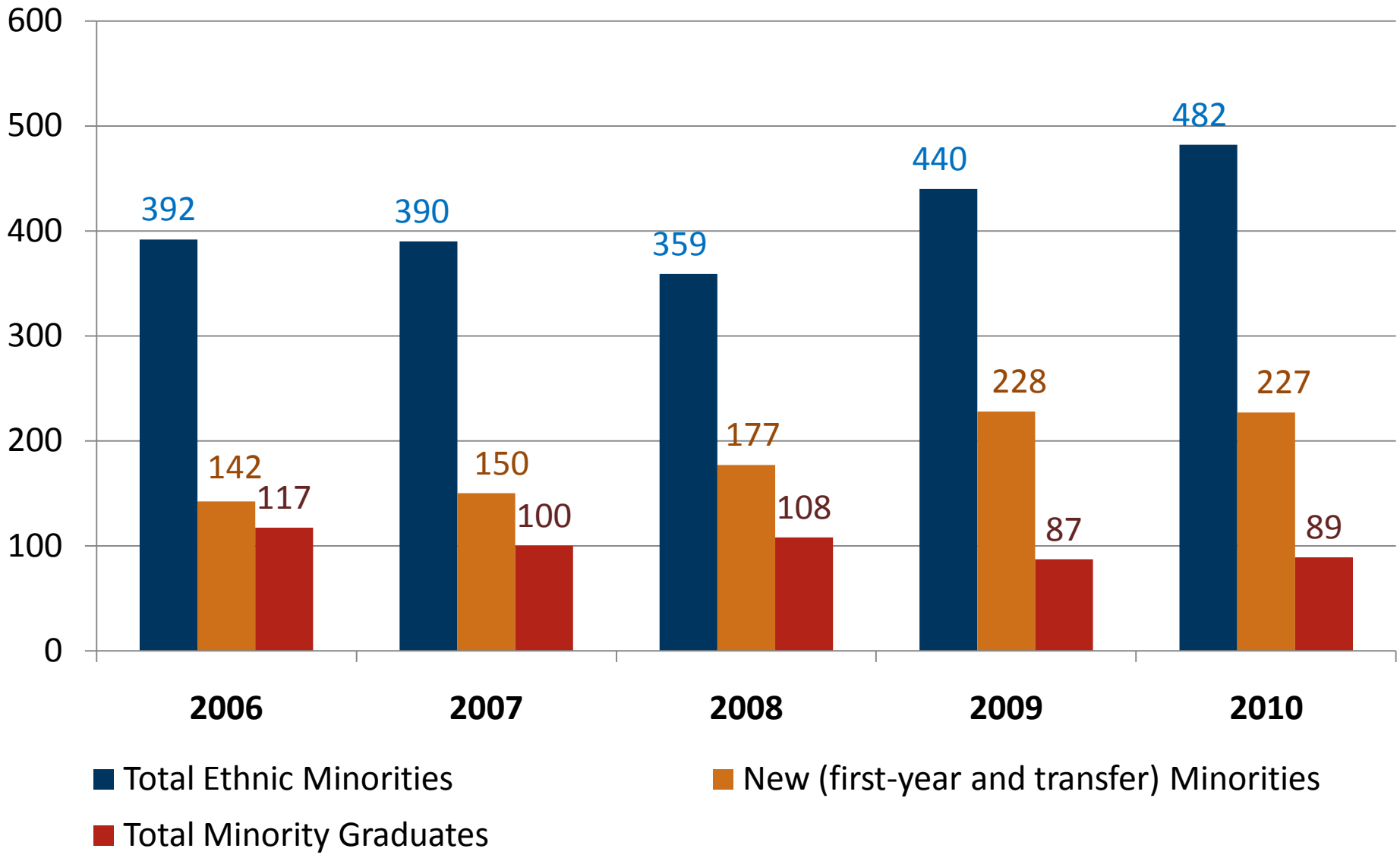
CoE Total Enrollment and Graduates



*Predicted – Based on Iowa State University Institutional Research

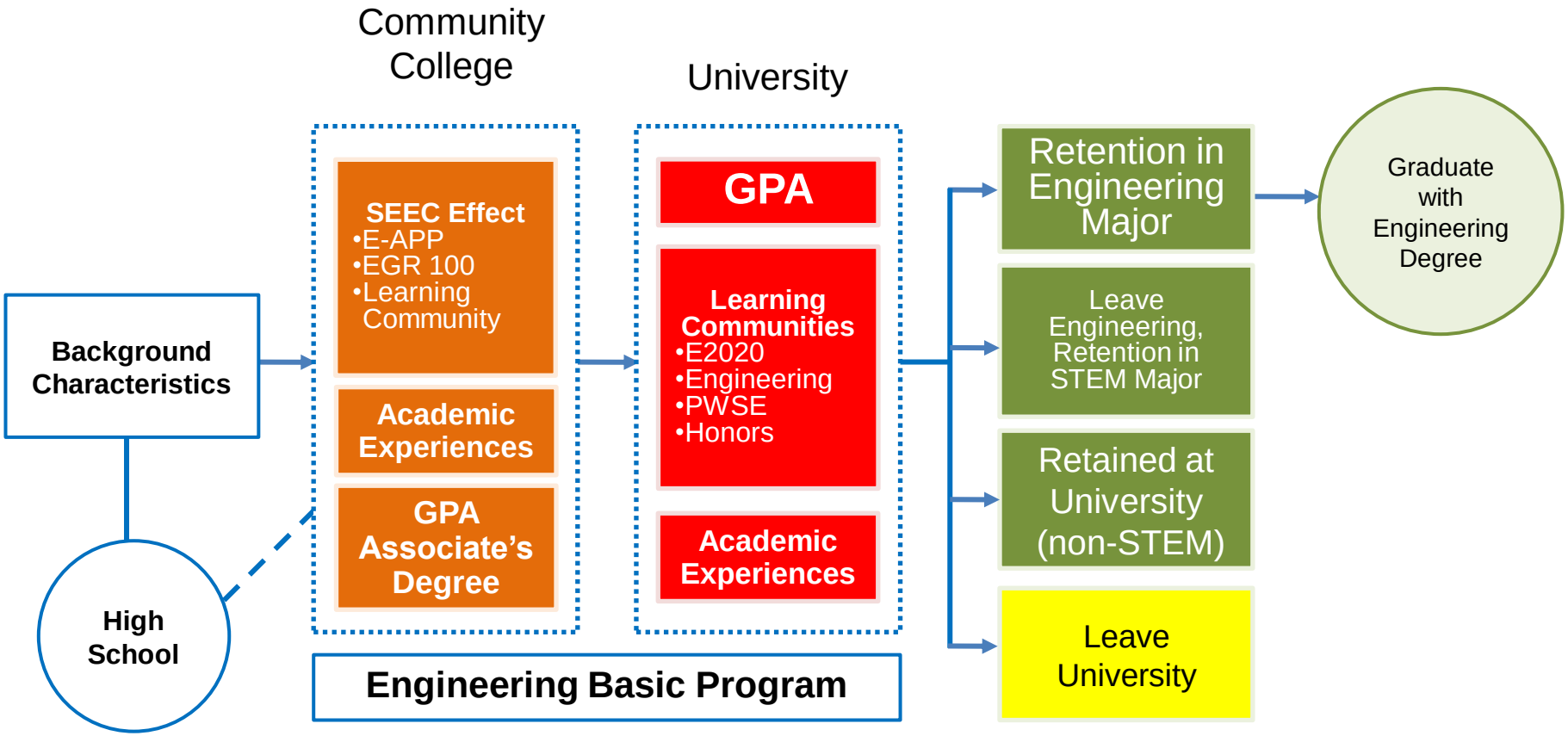

CoE Female Enrollment and Graduates
900
800
700
600
500
400
300
200
100
0
653
181
139
665
193
126
682
211
118
761
255
118
841
260
113
2006
2007
2008
2009
2010
Total Women
New (first-year and transfer) Women
Total Female Graduates

CoE Minority Student Enrollment and Graduates



STEM Student Enrollment and Engagement through Connections

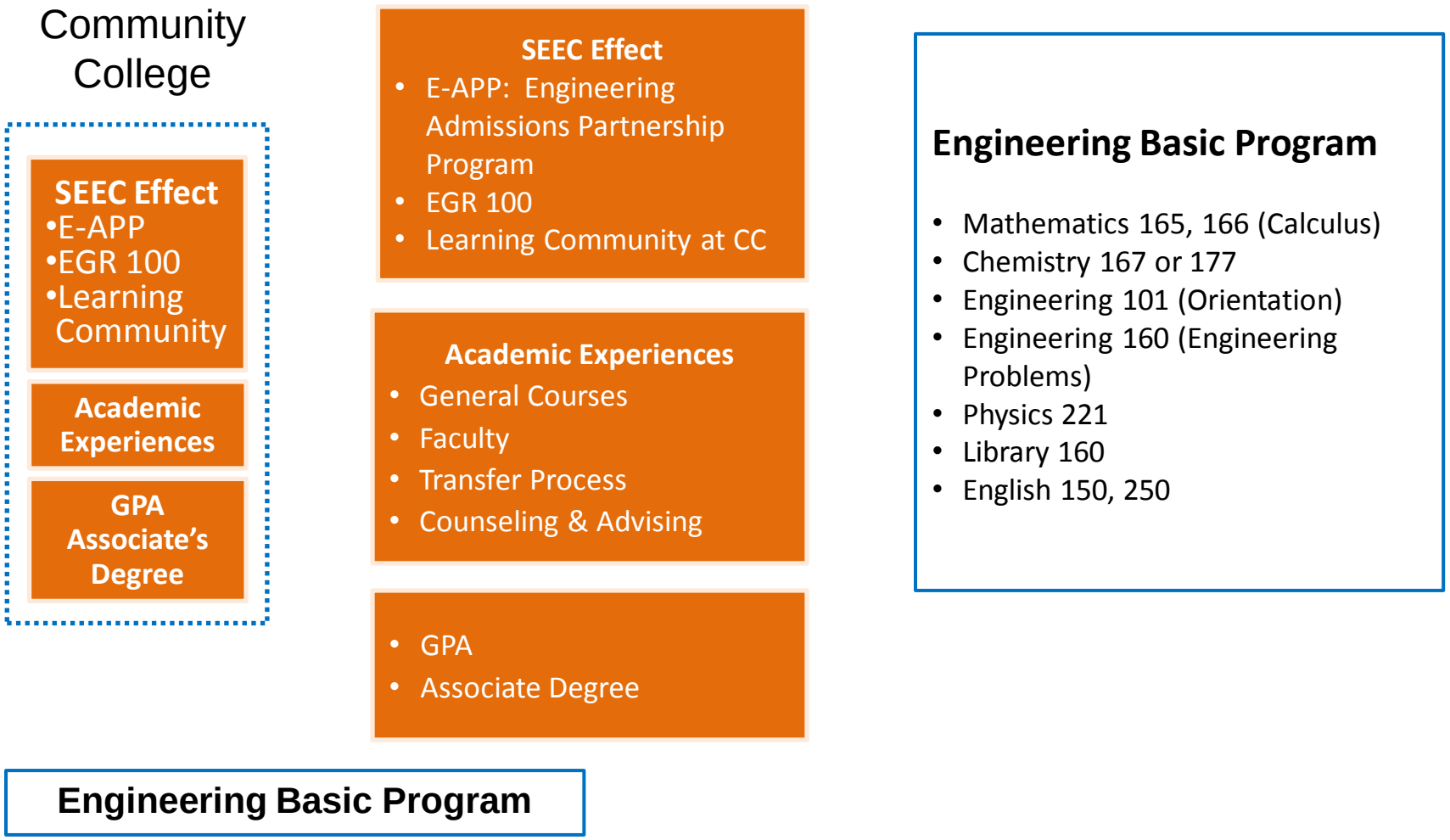
Figure 1. Conceptual Model of SEEC Effect Engineering Transfer Student Retention and Success

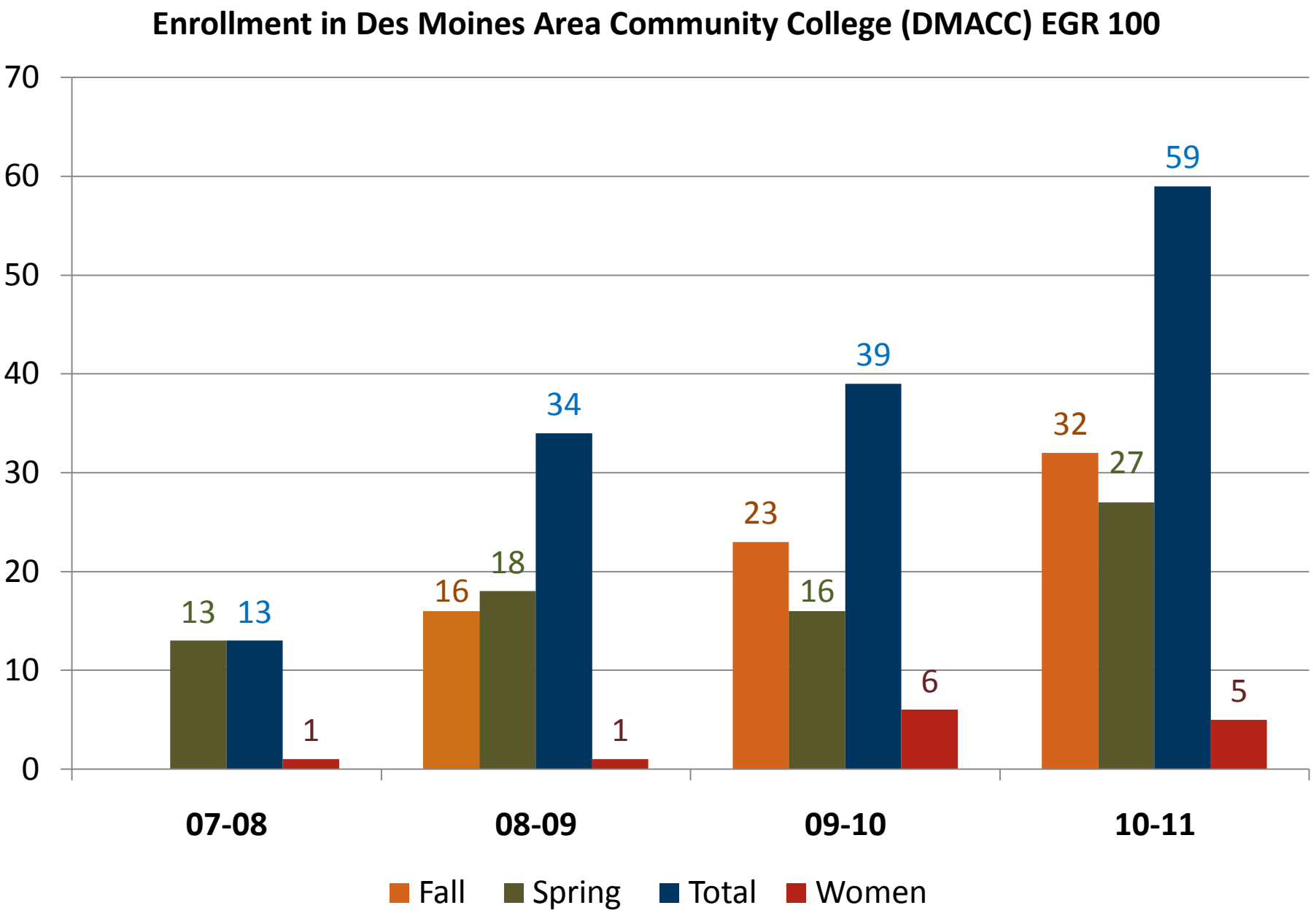


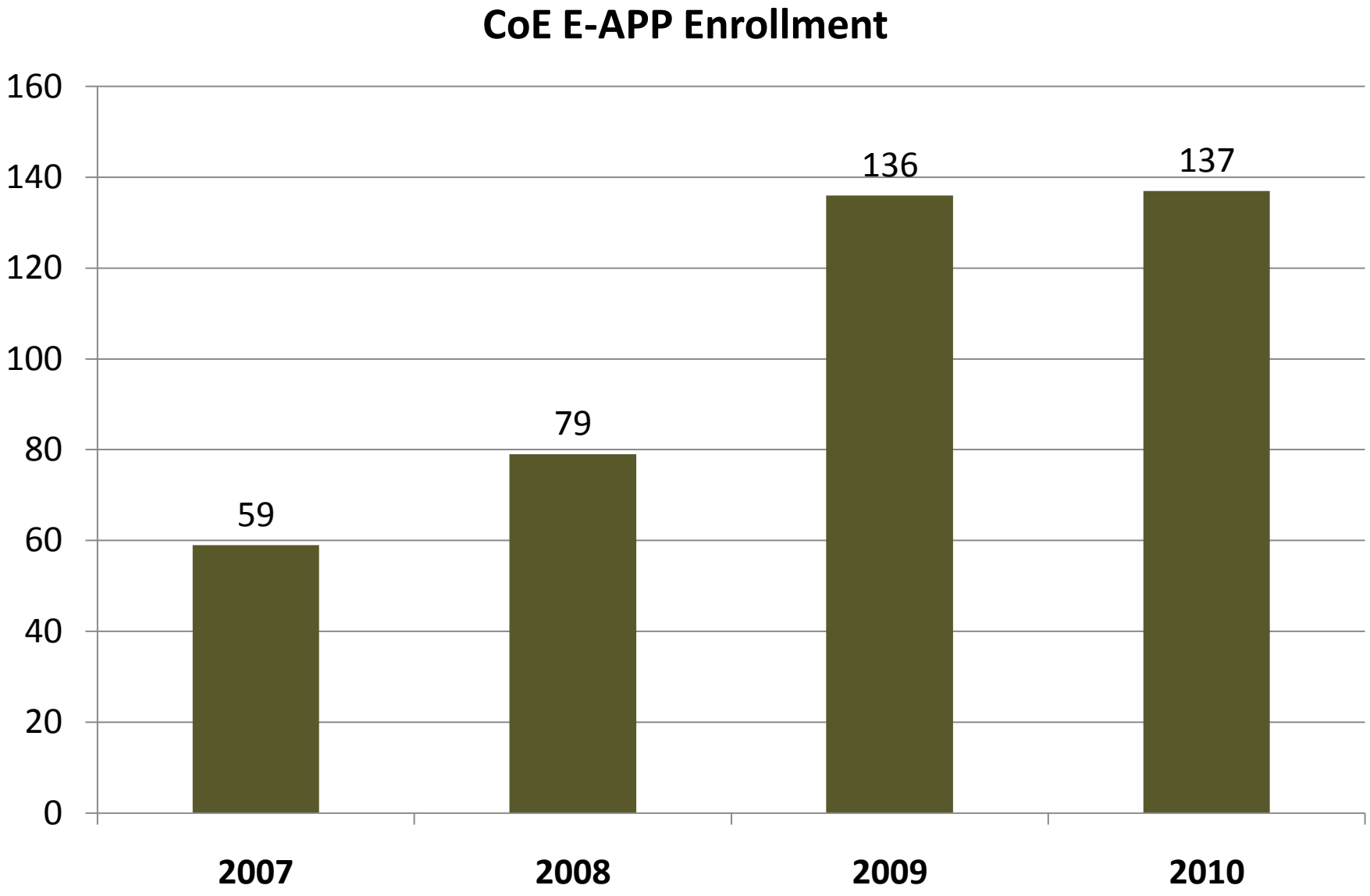
Source: Laanan, F., Rover, D., Bruning, M., Mickelson, S., & Shelley, M. (2011). Iowa State University.

STEM Student Enrollment and Engagement through Connections

Figure 2. Conceptual Model of SEEC Effect Community College Environment

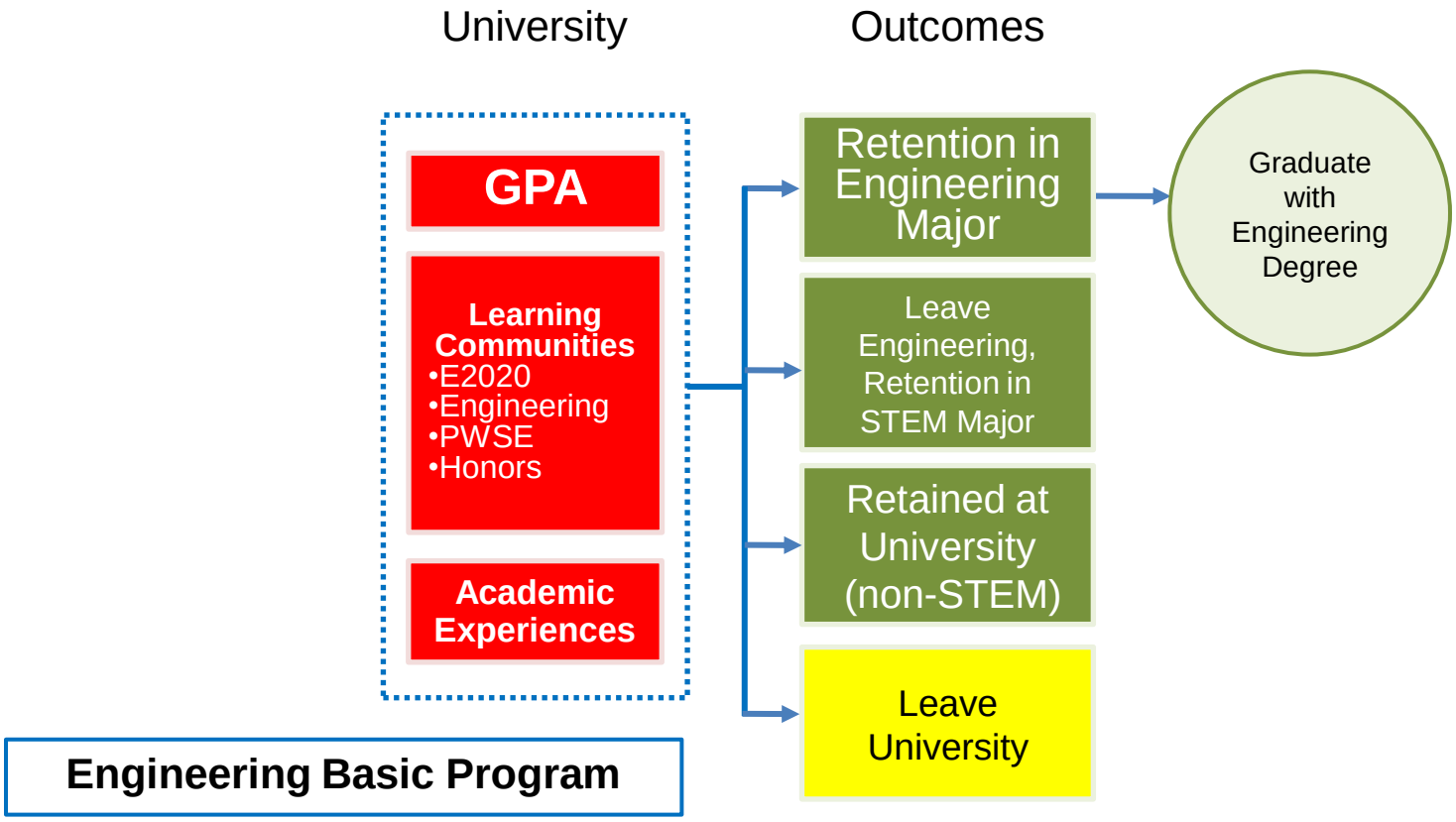



Enrollment in Des Moines Area Community College (DMACC) EGR 100
70
60
50
40
30
20
10
0
13
13
1
16
18
34
1
23
16
39
6
32
27
59
5
07-08
08-09
09-10
10-11
Fall
Spring
Total
Women

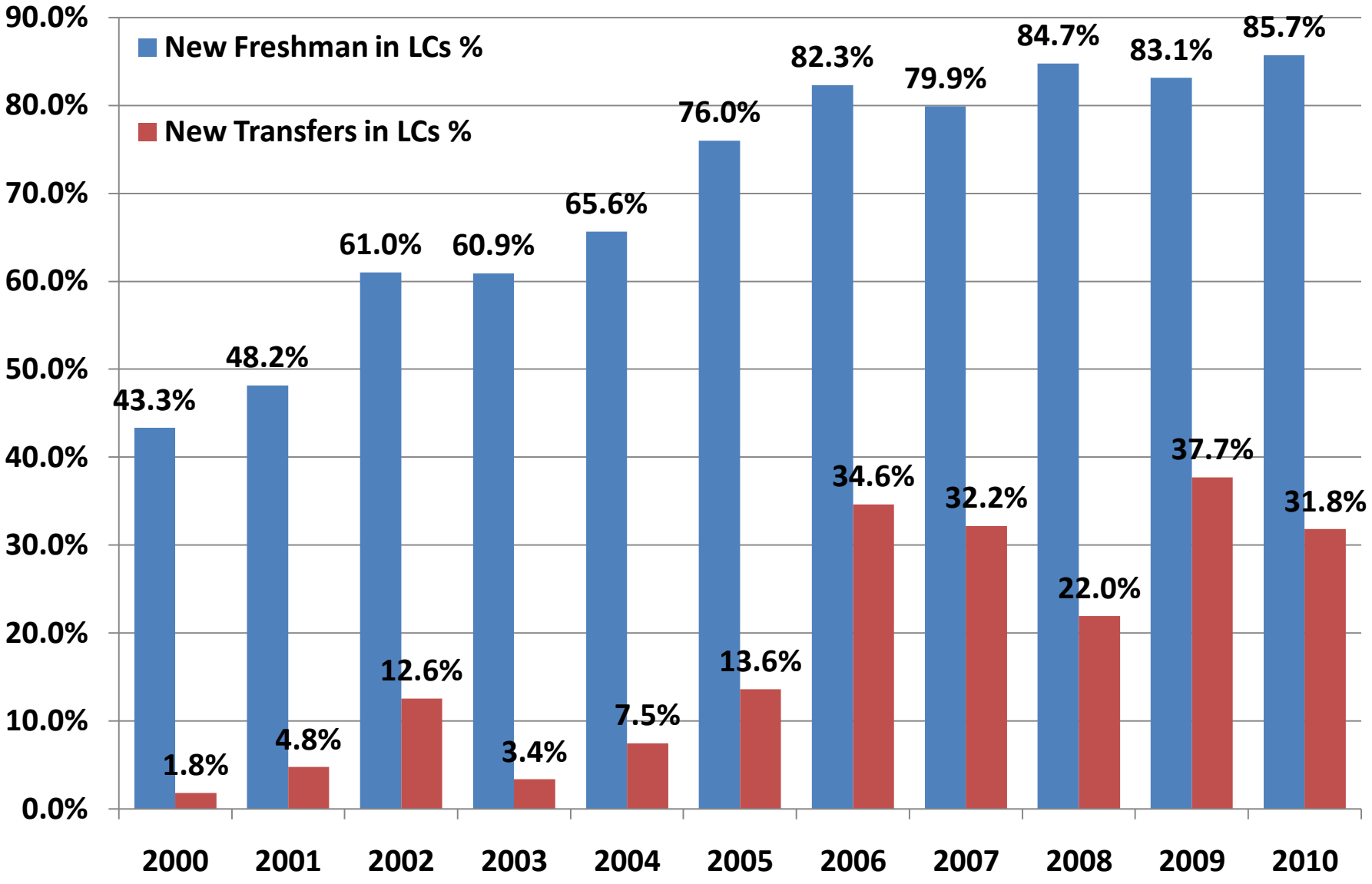

CoE E-APP Enrollment
160
140
120
100
80
60
40
20
0
59
79
136
137
2007
2008
2009
2010

STEM Student Enrollment and Engagement through Connections

Figure 3. Conceptual Model of SEEC Effect
University Environment



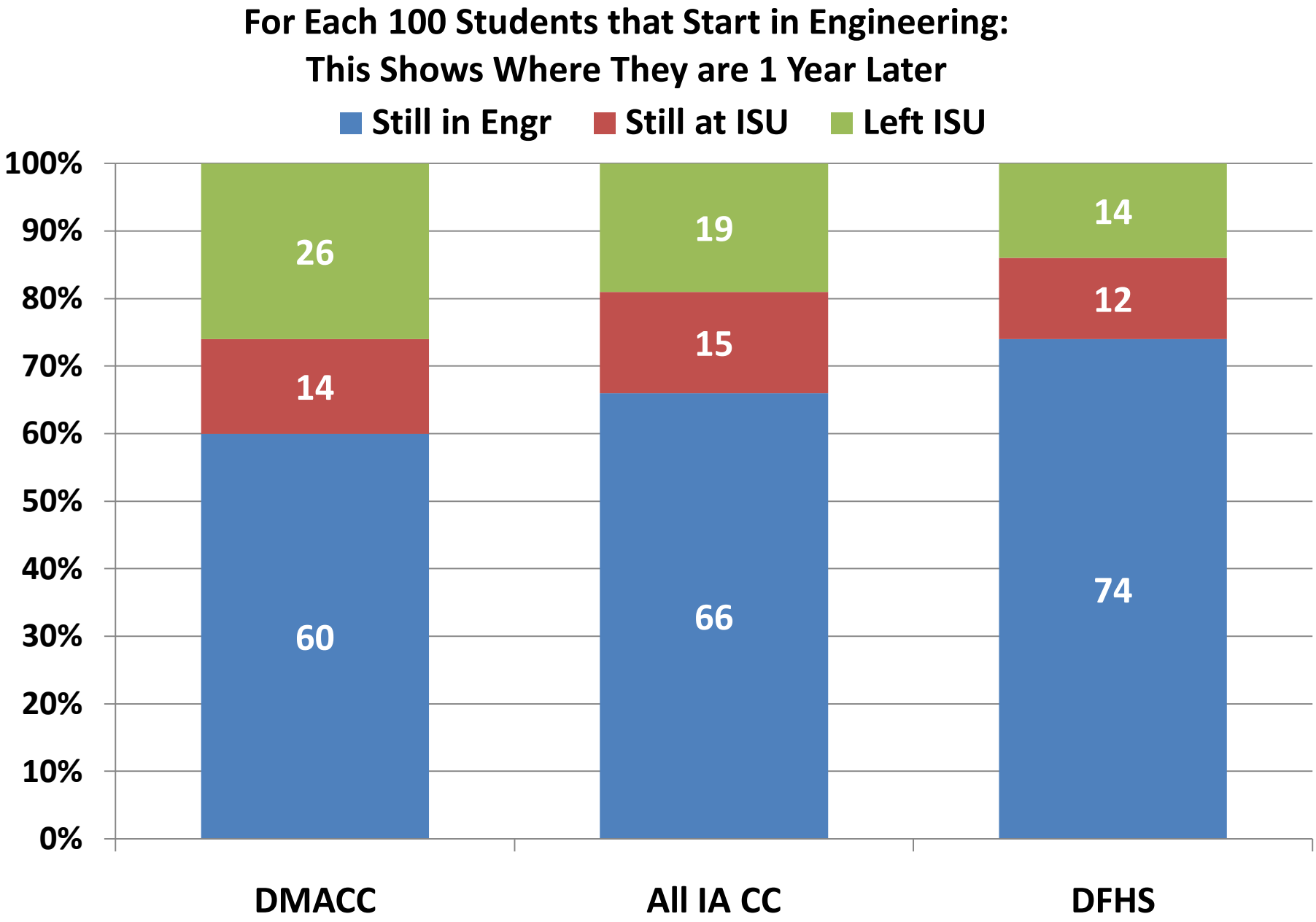
CoE Learning Community Participation



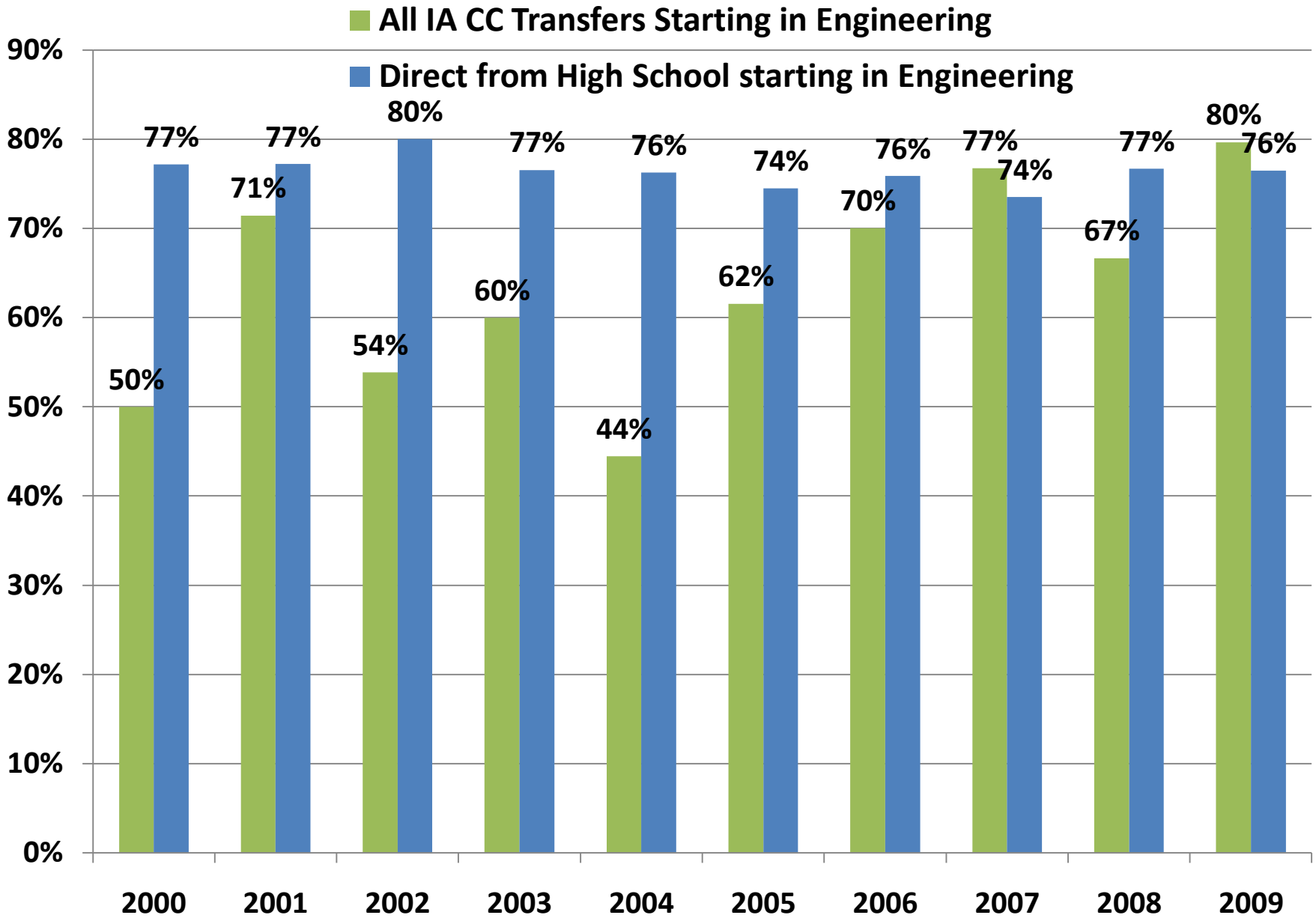
E-APP and Retention

- 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.

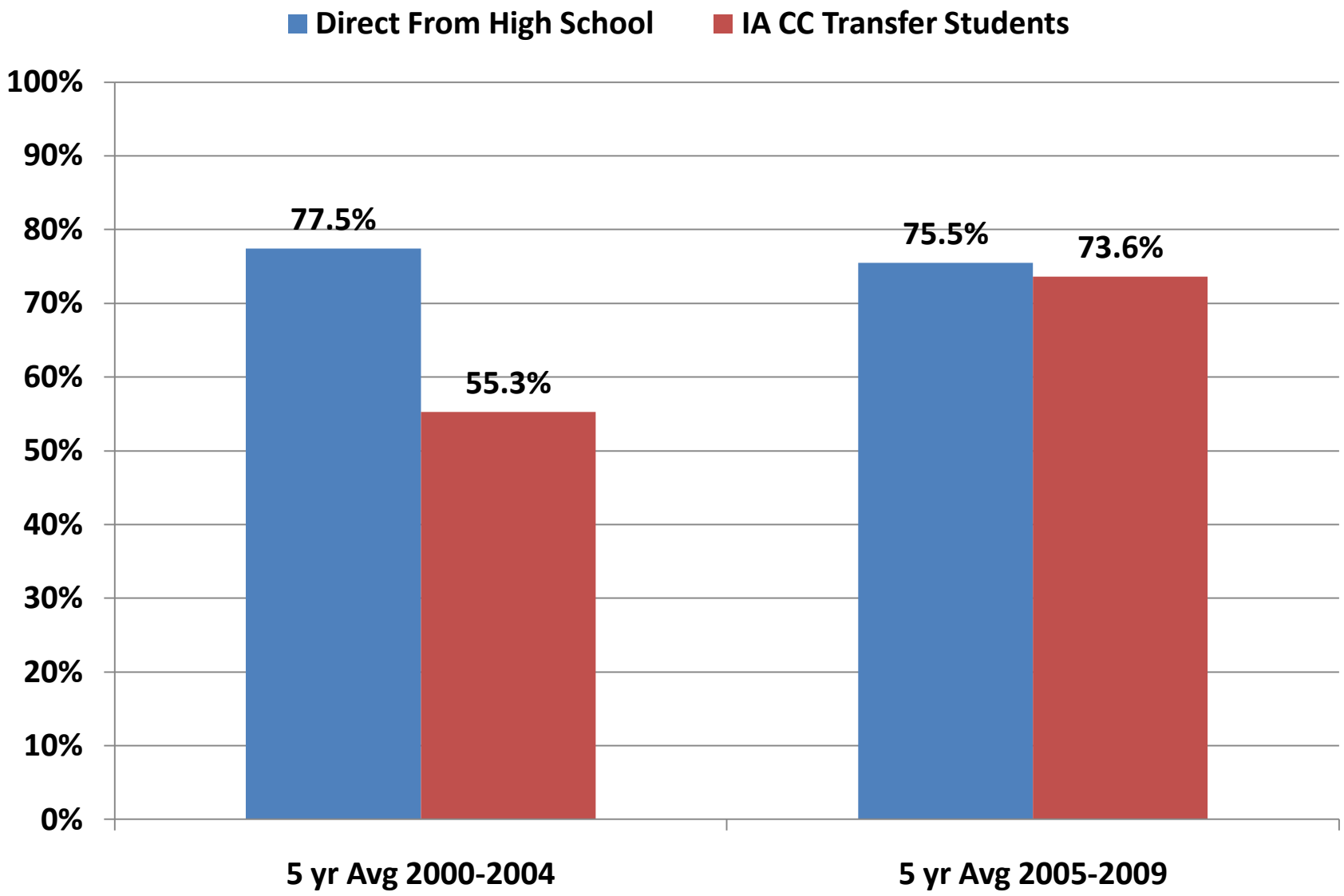
10 Year Averages for Retention: One Year



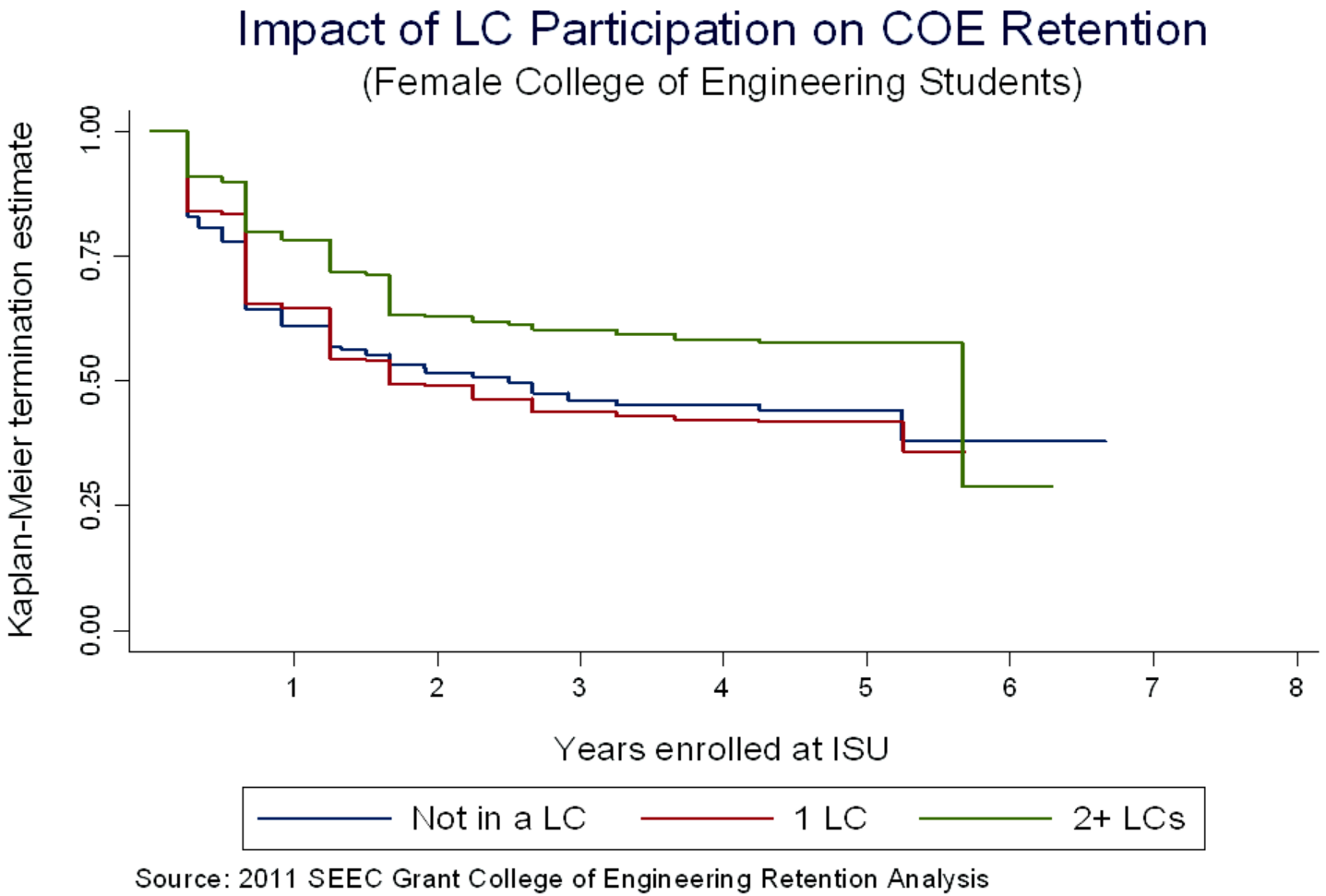
CoE LC One Year Retention Rates in Engr



CoE One Year LC Retention in Engr



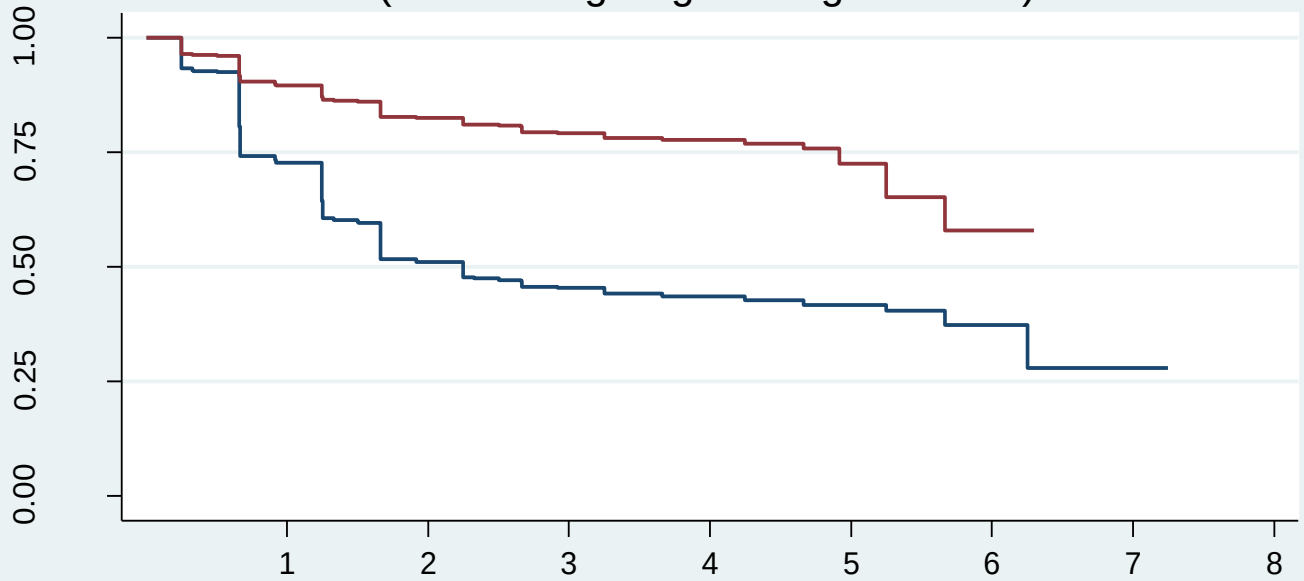
Multiple-Learning Community Effect on Retention of Women in Engineering



Source: 2011 SEEC Grant College of Engineering Retention Analysis

ENGR 160 Student Retention within COE

(All Entering Engineering Students)



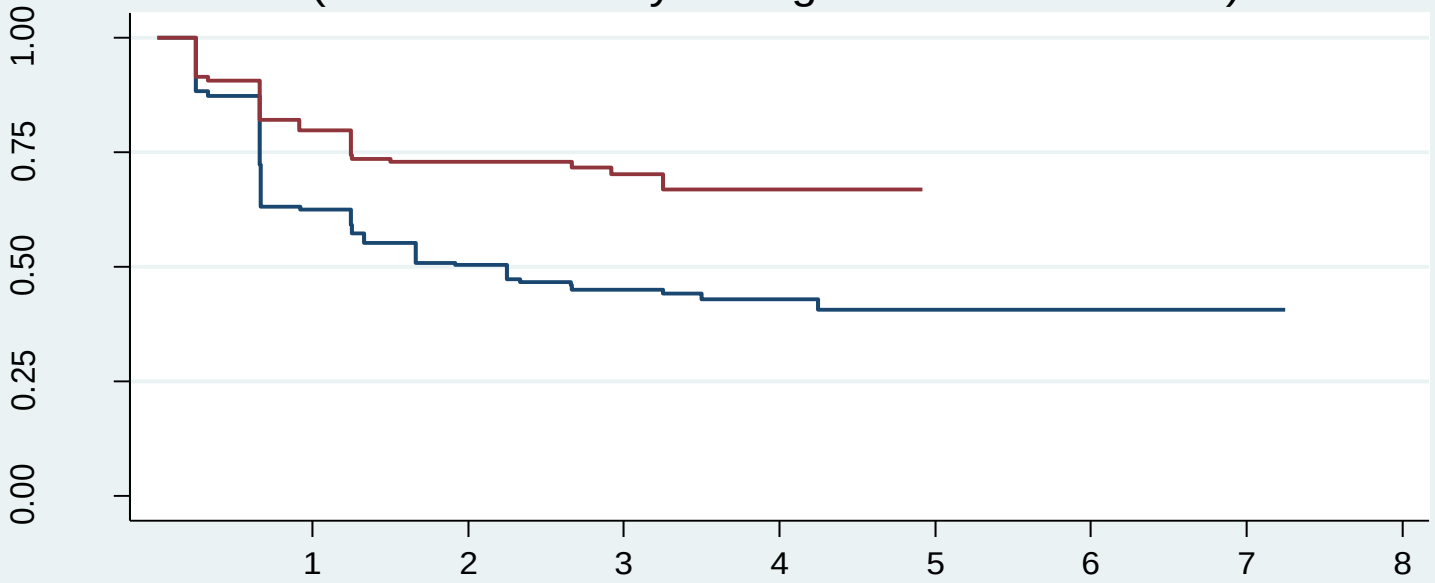
Number at risk								
engr160hilo = 0	1288	895	736	514	69	8	1	0
engr160hilo = 1	1144	1029	895	545	32	3	0	0

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								
engr160hilo = 0	129	99	61	19	5	1	1	0
engr160hilo = 1	103	88	42	11	0	0	0	0

0.00 - 3.00 GPA 3.01 - 4.00 GPA

Source: 2011 College of Engineering Retention Analysis

Other Assessment Approaches

E-TSQ: Engineering Transfer Student Questionnaire

- Online survey instrument; 133-item and open-ended questions
- Adapted from L-TSQ (Laanan, 1998, 2004)
- Comprehensive instrument that collects demographic information about transfer student and their academic and social experiences at the 2- and 4-year environments.
- Ability to link E-TSQ with student academic transcripts

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E-TSQ: Engineering Transfer Student Questionnaire

Demographics

Community College Experiences

- General Courses
- Academic Advising/Counseling Services
- Transfer Process
- Course Learning
- Experience with Faculty
- Learning and Study Skills

University Experiences

- Reasons for Attending University
- Course Learning
- Experiences with Faculty
- General Perceptions
- Adjustment Process
- College Satisfaction

Open-Ended Questions

- What factors helped you adjust to university?
- What might the community college have done to enhance your success or ease the transition?
- If you could give some advice to community college students, what would that advice be?
- What have we not asked that you would like us to know about your experience at the community college or university?

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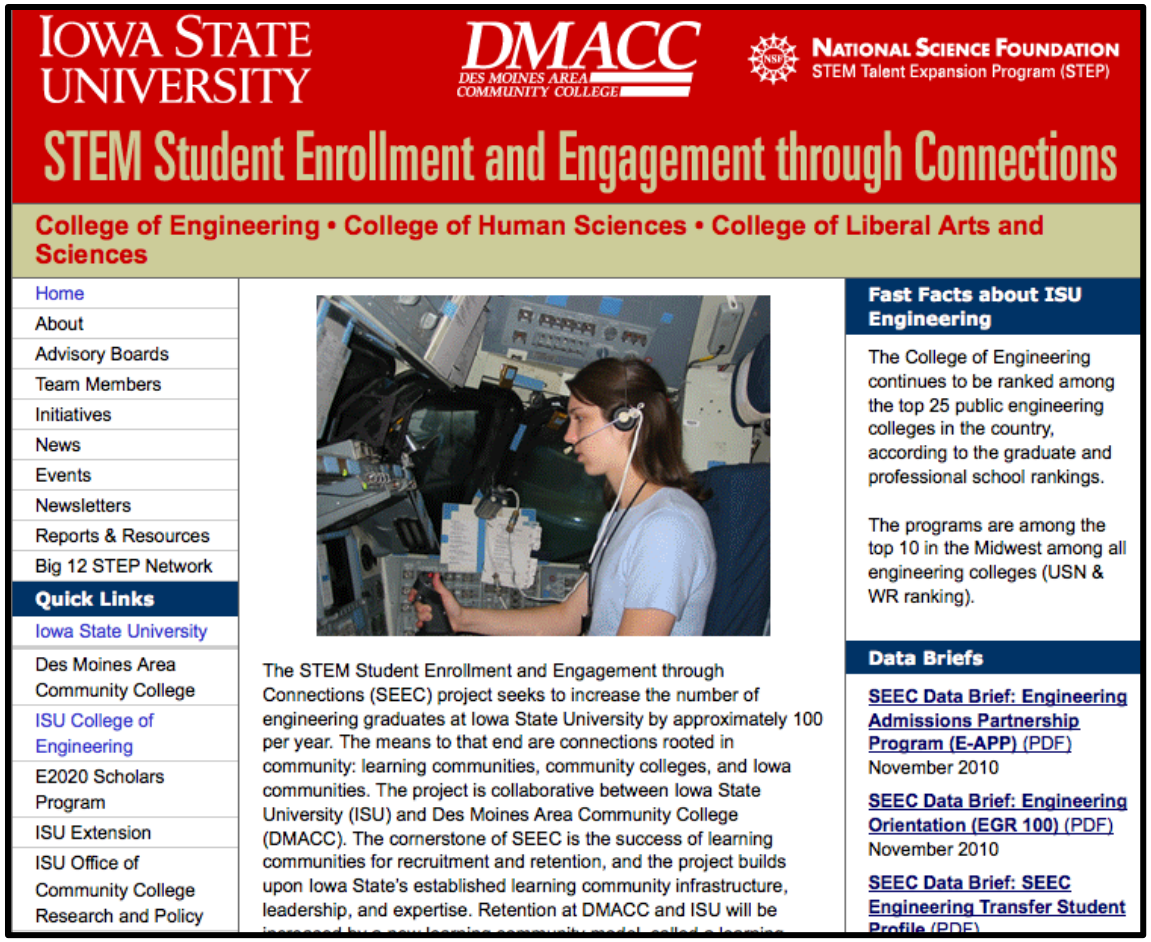

www.eng.iastate.edu/seec