

# STEM Student Enrollment and Engagement through Connections

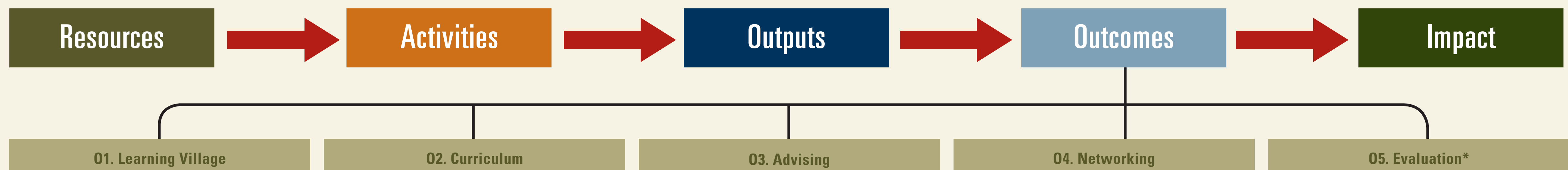
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## Project Highlights

### Project Goal

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.

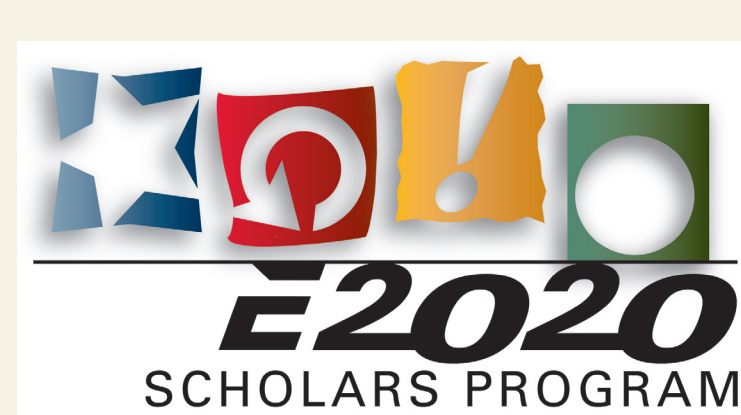
### Logic Model Planning



01. Learning Village	02. Curriculum	03. Advising	04. Networking	05. Evaluation*
<b>Objective:</b> To build a learning village that enhances student engagement and creates Iowa State connections for community college pre-engineering transfer students <b>Sustainable Outcomes:</b> 1. Engineering Admissions Partnership Program (E-APP) supports prospective engineering transfer students. 2. Transfer learning communities support engineering transfer students.	<b>Objective:</b> To enhance first- and second-year learning experiences, with an emphasis on student success and engagement and classroom climate <b>Sustainable Outcomes:</b> 1. DMACC's EGR 100 targets students with key learning experiences and professional development and its pre-engineering program allows engineering transfer students to complete the Basic Program courses prior to transfer. 2. Innovative curriculum created for the E2020 Scholars Program will be continued.	<b>Objective:</b> To develop and enhance academic advising and mentoring programs for precollege, community college, and university students <b>Sustainable Outcomes:</b> 1. Transfer students are entering engineering with a clear plan and connections that will assist them in making a smooth transition. 2. Iowa State and CC advisers and faculty are engaged in activities aimed at dissemination of student success reports, best practices, curriculum, and new resources.	<b>Objective:</b> 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 <b>Sustainable Outcomes:</b> 1. NAE Changing the Conversation-based E-TEC resource kits are available through ISU Extension for formal and informal educators to create engineering career awareness. 2. CYSTEM connects Iowa youth, parents, formal and informal educators to STEM resources in Iowa.	<b>Objective:</b> To evaluate project effectiveness that will enhance project activities <b>Sustainable Outcomes:</b> 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 freshman has been established. 2. Longitudinal qualitative and quantitative assessment and evaluation activities are in place.



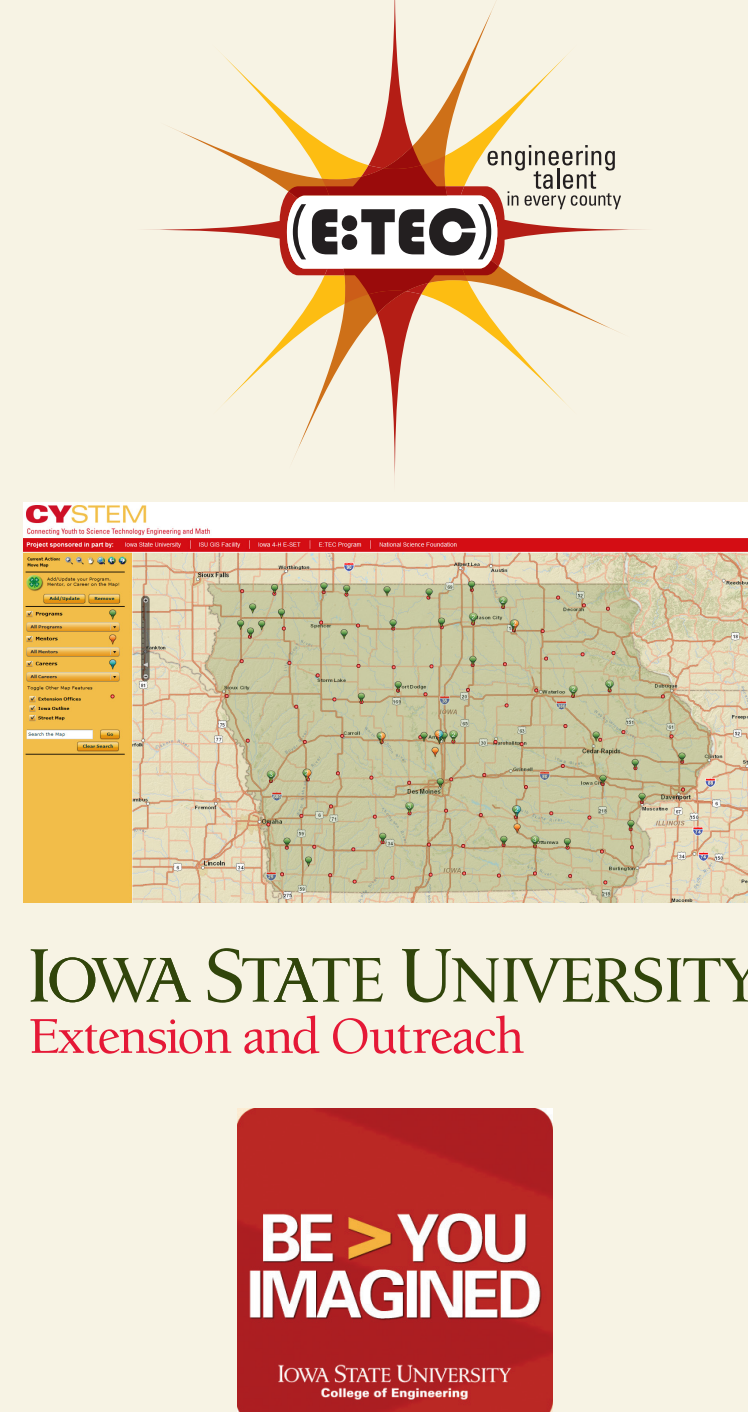
E-APP supports prospective engineering transfer students with curriculum planning, advising by Iowa State engineering advisers, peer mentoring, and more.



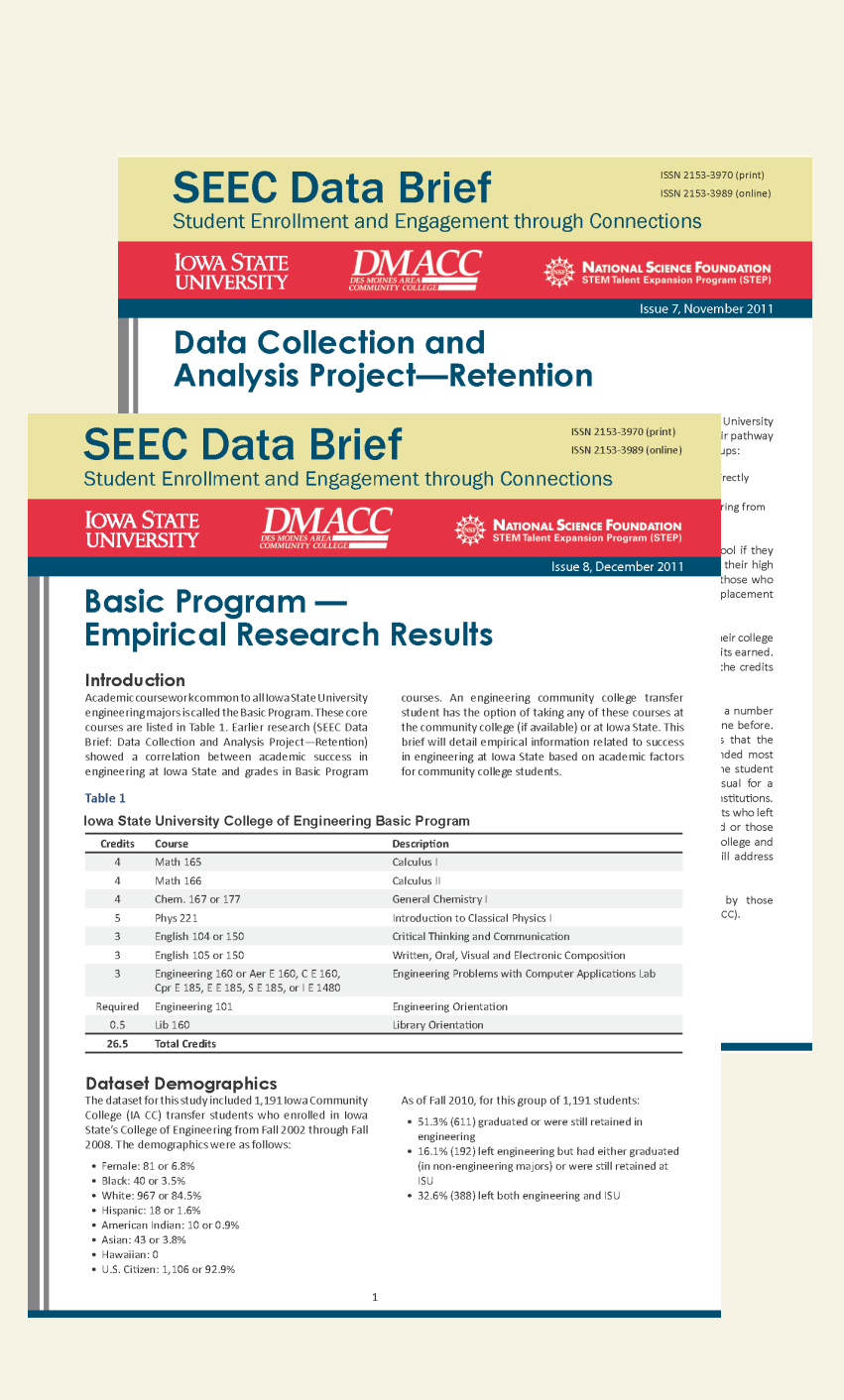
Innovative curriculum designed for the E2020 program will be continued.



DMACC's pre-engineering students have a formalized pathway to guide their transfer to Iowa State.



Formal and informal educators throughout Iowa are becoming aware of resources that create and promote interest in engineering careers.



Data Briefs share information with institutional stakeholders and are available to interested parties in print (ISSN 2153-3970) and online (2153-3989).

## Longer-term Outcomes

Building a culture that embraces transfer student programming through professional and program development

Leveraging learning community best practices to retain students at the second- and third-year levels, ultimately contributing to higher graduation rates

Using synergistic partnerships (e.g., with ISU Extension) to develop new resources and create interest in engineering study and careers

## Challenges

Recruiting and retaining women to make up 20% of engineering graduates

Measuring and documenting the SEEC Effect to improve and sustain effective practices and promote a culture of evidence

## Sustained Efforts

- Engineering Admissions Partnership (EAPP) continues as an established learning community at Iowa State University.
- New engineering messaging has been adopted in all recruiting materials at Iowa State.
- Engineering 100 continues to expand and is now offered on three DMACC campuses.
- Discover Engineering Days for high school students continue at DMACC and have expanded to include other career areas.

## Broader Impacts



Mary Darrow, Ph.D.  
School of Education  
Iowa State University

**Dissertation Title:**  
*Engineering transfer student leavers: Voices from the sidelines of the engineering playing field*

**ABSTRACT**  
The purpose of this phenomenological study was to understand and illuminate the experiences and stories of Midwestern Community College transfer students who entered and left engineering at a large Midwestern research university. Eight students participated in this qualitative study. The researcher encouraged the participants to share their perceptions and experiences of the various transitions involved in this phenomenological sequence of events. The following themes emerged: (a) Community college is like an extension of high school; (b) Inadequate community college advising; (c) Academic rigor; (d) "I can't/don't want to do this anymore..."; (e) Lack of academic support; (f) Variable quality of student-faculty interactions; (g) Sense of belonging; and (h) Challenges of being an older student.



Carlos Lopez, Ph.D.  
School of Education  
Iowa State University

**Dissertation Title:**  
*Transfer students in STEM majors at a Midwestern University: Academic and social involvement factors that influence student success*

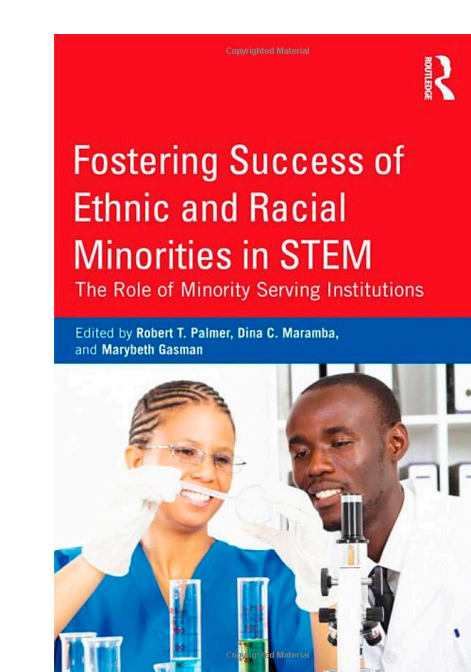
**ABSTRACT**  
America's community colleges play a critical role in educating and training women and underrepresented students for the STEM workforce. The purpose of this study was to investigate the perceptions of community college transfer students in STEM majors at Iowa State University. The research design included both quantitative and qualitative components, which provided an in-depth look at the experiences of STEM non-engineering and engineering students. The results of this study suggest that there is an association among the background characteristics, community college experiences, university experiences, and the overall adjustment and cumulative GPA of transfer students from STEM non-engineering and engineering majors. In addition, transfer students reported the importance of early experiences in science and mathematics and the extent to which these experiences inspired them to pursue a career in STEM.



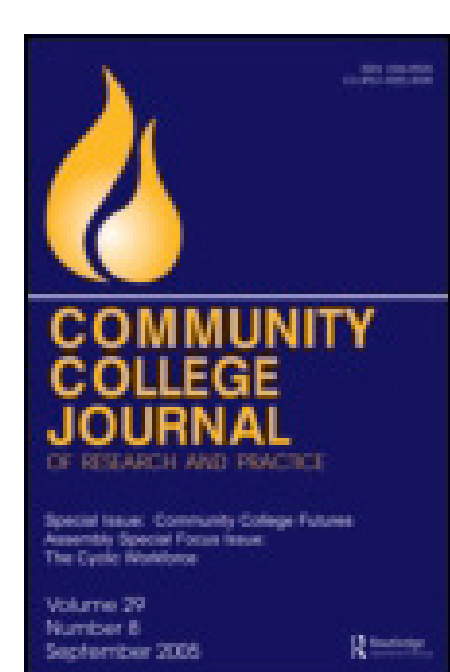
Marcia Laugerman, Ph.D.  
Agriculture and  
Biosystems Engineering  
Iowa State University

**Dissertation Title:**  
*Academic and social integration variables influencing the success of community college transfer students in undergraduate engineering programs*

**ABSTRACT**  
The purpose of this dissertation is to collect and analyze data to determine success strategies for community college (CC) transfers to engineering. It does so by analyzing transcript level data collected longitudinally over a 10-year period as community college transfer students' progress before and after transfer into an engineering program. Characteristics of successful students are identified in terms of the academic and social integration variables using descriptive and inferential statistics. In addition to providing data analysis, the results determine distinctive strategies to increase the success of community college transfers in engineering.



**Model Programs for STEM Student Success at Minority Serving Two-Year Colleges**  
Soko S. Starobin, Dimitra Jackson, and Frankie Santos Laanan



**Going and Passing Through Community Colleges: Examining the Effectiveness of Project Lead The Way in STEM Pathways**  
Soko S. Starobin, Tom Schenk Jr., Frankie Santos Laanan, David Rethwisch & Darin Moeller

### STEM Survey Tools

#### STEM Student Success Literacy (SSSL)

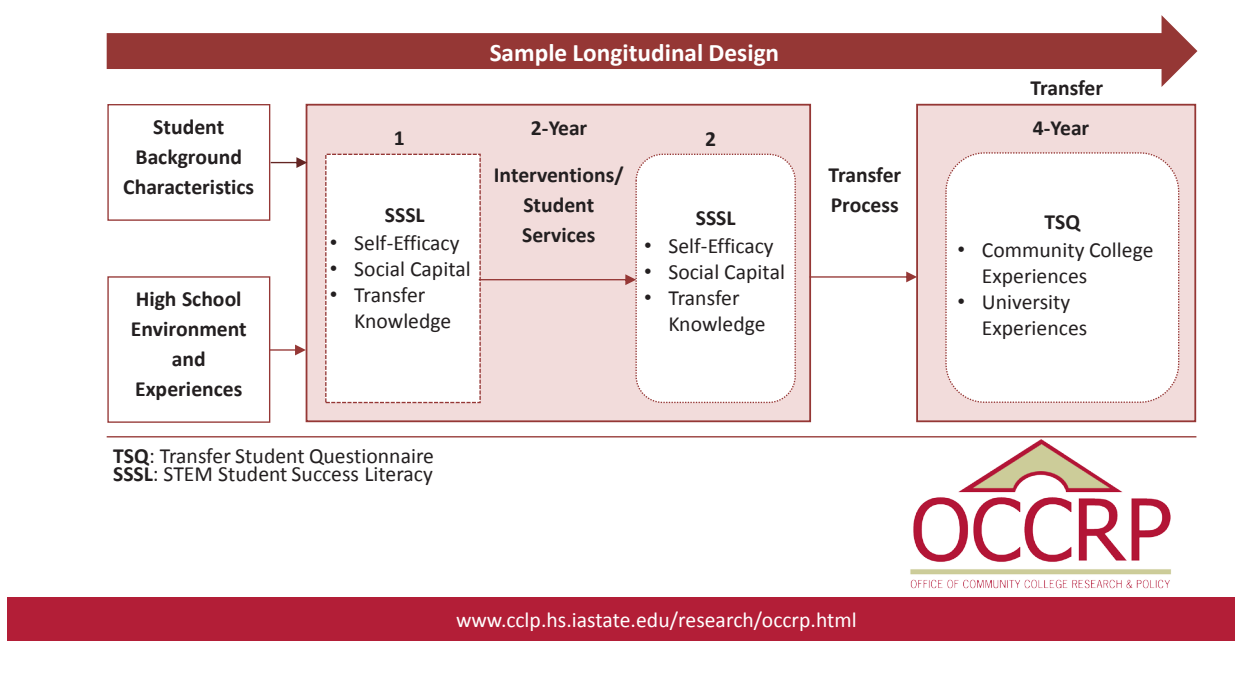
- Designed to examine STEM student success literacy.
- Three key factors are measured:  
Self Efficacy, Social Capital, Transfer Knowledge
- Demographic information and open-ended questions also included.
- A pilot study that adopt SSSL survey to measure STEM student success literacy at community colleges will be conducted.

#### Transfer Students Questionnaire (TSQ)

- Focusing on transfer students and their academic/social experiences at two year and two year institutions.
- Four sections are included:  
Background information, Community college experiences, University experiences, Open-ended questions
- Multiple studies have used/are using TSQ survey to examine academic and social experiences, transfer capital, and characteristics of transfer students.  
– Iowa State University  
– University of North Texas

### Research Design

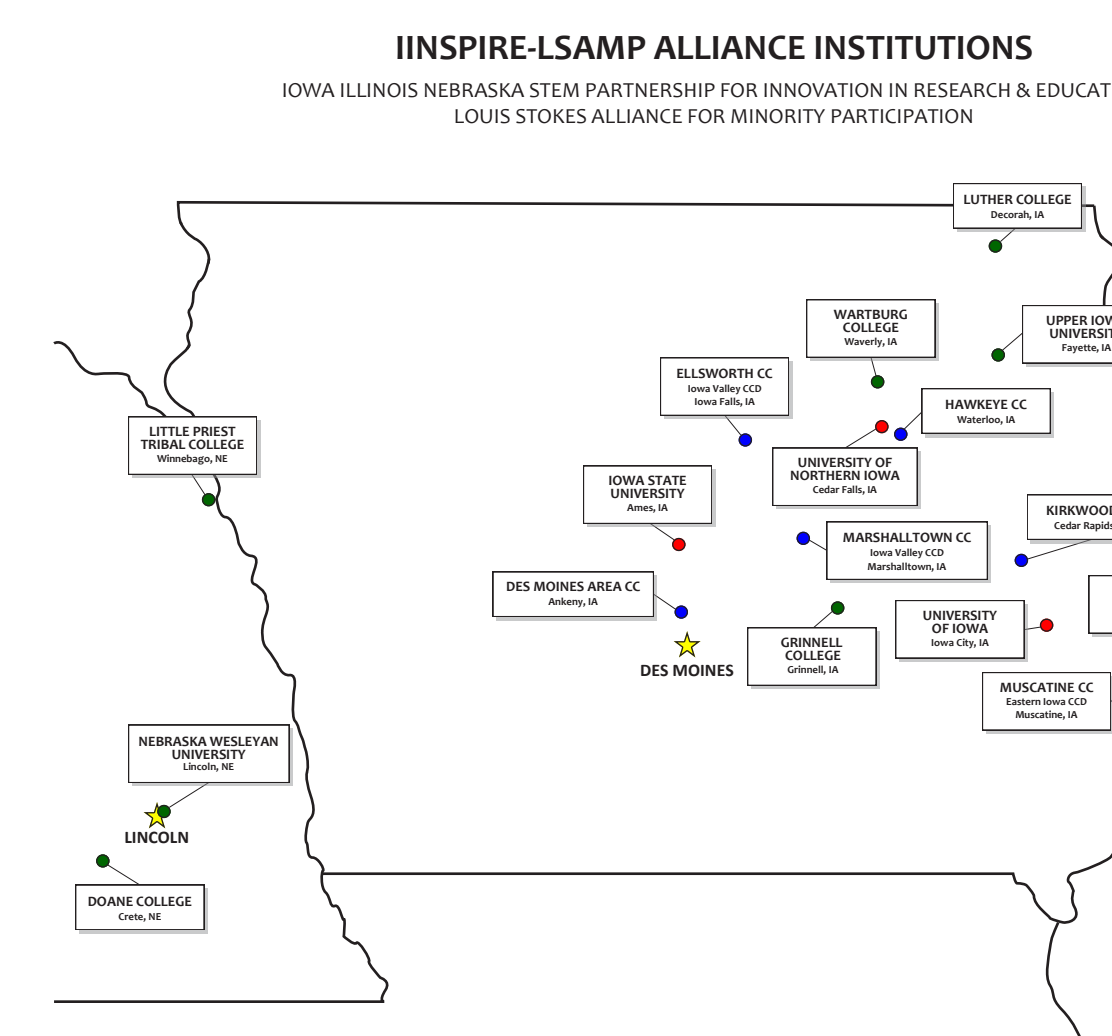
- Longitudinal Design
- Follow students from entry to the community college through the conclusion of their academic experience.



### Policy Briefs



### Continuing Work



## SEEC Team Members

<b>Principal Investigators</b> Diane Rover Harry McMaken  <b>Co-principal Investigators</b> Monica Bruning Frankie Santos Laanan Steven Mickelson Mack Shelley Kari Hensen	<b>Senior Personnel</b> Mary Darrow Mani Mina Derrick Rollins Andrew Ryder Karen Zunkel	<b>Other Personnel</b> Virginia Anderson Sandy Jennings-Hammond  <b>Team Members</b> Paul Castleberry Randy Gabriel Randall Jedele Joel Johnson Dave Kissinger	Marcia Laugerman Michael Lentsch Carlos Lopez Jay Staker James Stick	<b>Advisory Boards</b> <b>ISU Institutional Advisory Board</b> Chair: Jonathan Wickert Sandra Gahn Doug Gruenewald Connie Hargrave Thomas Hill Gary Mirka	<b>DMACC Institutional Advisory Board</b> Chair: Kim Linduska Ahmed Aggeman Randy Mead Randy Smith Carol (Renee) White Laurie Wolf	<b>External Advisory Board</b> Chair: James Melsa Professor & Dean Emeritus Iowa State College of Engineering Kimberly Douglas-Mankin Associate Professor, Industrial & Manufacturing Systems Engineering Kansas State University	Leigh Hagenson Thompson Technology Manager & Hardeners Platform Project Leader The Dow Chemical Company
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