

**Annual Report for Period:**07/2009 - 06/2010

**Submitted on:** 06/30/2010

**Principal Investigator:** Rover, Diane T.

**Award ID:** 0807051

**Organization:** Iowa State University

**Submitted By:**

Rover, Diane - Principal Investigator

**Title:**

E2020 Scholars: Advancing the NAE Vision

### Project Participants

#### Senior Personnel

**Name:** Rover, Diane

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Coordinated project planning and meetings. Co-leader of the Curriculum/Assessment Group. Coordinated E2020 pillar group planning and meetings. Participated in scholar review and selection.

**Name:** Shelley, Mack

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Participated in project planning and meetings. Informed, guided and conducted project assessment and evaluation activities.

**Name:** Mickelson, Steven

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Participated in project planning and meetings. Co-leader of the Community Group. Facilitated and guided E2020 learning community and course development. Participated in E2020 pillar group planning and meetings. Contributed to project evaluation.

**Name:** Bruning, Monica

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Participated in project planning and meetings. Co-leader of the Scholarship Group. Co-coordinator for the cohort program. Facilitated the first-year cohort experience. Managed the scholarship application, review, and selection process.

**Name:** Athreya, Krishna

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Participated in project planning and meetings. Contributed lectures/activities on leadership to the E2020 seminar course.

**Name:** Castleberry, Paul

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Team member and co-leader of the Community Group with co-PI Mickelson. This responsibility aligns with his position in the College of Engineering as Learning Communities Coordinator. Member of the Systems Thinking pillar group.

**Name:** Johnson, Joel

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Team member and co-leader of the Scholarship Group with co-PI Bruning. This responsibility aligns with his position in the College of Engineering as director of the Engineering Scholarship Program. Member of the E2020 scholarship selection committee. Member of the Leadership pillar group.

**Name:** Brumm, Tom

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Team member and co-leader of the Curriculum/Assessment Group with PI Rover. This responsibility aligns with his appointment in the College as director of assessment. Participated in project planning and meetings. Participated in E2020 pillar group planning and meetings.

## Post-doc

### Graduate Student

**Name:** Martinez, Nico

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Graduate student working with diversity programs. Member of the E2020 scholarship selection committee.

**Name:** Joines, Amy

**Worked for more than 160 Hours:** No

**Contribution to Project:**

2009-10: Student director of the Engineering Leadership Program. Member of the E2020 scholarship selection committee.

**Name:** Laingen, Mark

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Participated in project planning and meetings. Co-coordinator of E2020 cohort program. Coordinator for the transfer cohort. Instructor for E2020 seminar course. Member of the Global Awareness pillar group. Sources of support for graduate assistantship include the college and an NSF STEP grant.

### Undergraduate Student

**Name:** Williams, Ana

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Student coordinator for cohort program and peer mentor for E2020 first-year cohort. This position is paid by the project.

**Name:** McLaurin, Elease

**Worked for more than 160 Hours:** No

**Contribution to Project:**

E2020 peer mentor. Assisted with summer orientation for new students. Started in May 2010.

**Name:** Sevcik, Joshua

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

E2020 peer mentor for transfer student cohort. Supported by this project and an NSF STEP project. Member of the Innovation pillar group.

**Name:** Mulloy, Patrick

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

E2020 peer mentor for transfer student cohort. Supported by this project. Member of the Systems Thinking pillar group.

### Technician, Programmer

**Name:** Hill, Gloria

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Assistant to the Associate Dean. Assists the PI with meetings, budgeting, and other project management activities.

**Name:** Stowe, Jane

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Secretary for the Engineering Scholarship Program. Assists the director of the program.

**Name:** Spurlock, Cindy

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Enrollment Services Office Coordinator. Assists team members with prospective student information.

**Name:** Prouty, Tina

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Scholarship Program Coordinator. Assists the director with data management and analysis.

**Name:** Centeno-Diaz, Laura

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Diversity Programs Coordinator. Member of the E2020 scholarship selection committee.

**Name:** Darrow, Mary

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Member of the E2020 scholarship selection committee. Contributed to the transfer cohort experience. This involvement aligns with her activities on an NSF STEP project. She was paid from that project as a project coordinator and transfer student program/services coordinator.

**Other Participant**

**Name:** Jacobson, Doug

**Worked for more than 160 Hours:** No

**Contribution to Project:**

E2020 pillar group leader for Innovation. Contributed lectures/activities for the E2020 seminar course. University Professor in Electrical and Computer Engineering.

**Name:** Kaleita, Amy

**Worked for more than 160 Hours:** No

**Contribution to Project:**

E2020 pillar group leader for Global Awareness. Contributed lectures/activities for the E2020 seminar course. Associate Professor in Agricultural and Biosystems Engineering.

**Name:** Rehmann, Chris

**Worked for more than 160 Hours:** No

**Contribution to Project:**

E2020 pillar group leader for Systems Thinking. Contributed lectures/activities for the E2020 seminar course. Professor in Civil, Construction, and Environmental Engineering.

**Name:** Rollins, Derrick

**Worked for more than 160 Hours:** No

**Contribution to Project:**

On professional development leave during spring 2010.

**Research Experience for Undergraduates**

**Organizational Partners**

**Sandy Jennings-Hammond**

The project uses the services of the outside individual as a communications specialist for selected project needs.

### **3M**

The 3M Corporation has financially supported the Engineering Leadership Program, which is the program after which the E2020 Scholars Program is being modeled. 3M wrote a letter of support for the grant and remains interested in the project.

### **Rockwell Collins**

Rockwell Collins has financially supported the Engineering Leadership Program, which is the program after which the E2020 Scholars Program is being modeled. Rockwell Collins wrote a letter of support for the grant and remains interested in the project.

### **Other Collaborators or Contacts**

Engineering Communications and Marketing staff: Redesigned and maintained the E2020 project and scholarship website, and supported the online application process and portals for students. Provided technical support to the Scholarship Group for applications and score cards.

Learning Communities Task Team (a college-wide committee comprised of advising staff and faculty from each department): Participated as members of the pillar groups in the four developmental areas of the project.

Student Learning Task Force (a college-wide committee comprised of faculty from each department): Participated as members of the pillar groups in the four developmental areas of the project.

Approximately 12 engineering faculty and staff, in addition to those listed above, are collaborating as members of the pillar groups.

### **Activities and Findings**

**Research and Education Activities: (See PDF version submitted by PI at the end of the report)**

**Findings: (See PDF version submitted by PI at the end of the report)**

#### **Training and Development:**

The 2009-10 E2020 cohort, both first-year and transfer students, has participated in program activities to advance their academic and professional development. During spring 2010, the students attended a seminar course that introduced them to knowledge, skills and abilities in each of the four developmental areas of the program (also called pillars: leadership, systems thinking, innovation, and global awareness).

Undergraduate peer mentors have been introduced to the NAE's vision for the engineer of 2020 and have facilitated scholar understanding and development.

The seminar course instructor, faculty pillar group leaders, and project team members have begun to explore, collect, and develop materials to support curriculum and assessment of the four developmental areas of the program.

Information has been shared across groups in the project, leading to expanding the awareness and knowledge base of every team member in some way.

#### **Outreach Activities:**

Refer to Activities attachment.

### **Journal Publications**

### **Books or Other One-time Publications**

**Web/Internet Site****URL(s):**

<http://www.engineering.iastate.edu/e2020>

**Description:**

This website was redesigned and expanded this year. Its design matches the new design created for the prospective student website for the College of Engineering. This design was developed through ISU's NSF STEP project as part of its objective to enhance communications and recruiting. The E2020 website provides an overview of the project intended to inform prospective students as well as interested persons inside and outside the university. It also provides information about the E2020 scholarship and program, and supports the application process.

**Other Specific Products****Contributions****Contributions within Discipline:**

Resources and materials are being identified, collected, and developed to teach students about engineering leadership, innovation and entrepreneurship, systems thinking, and global awareness. An intranet repository has been created for internal project use by faculty and staff in engineering. This will continue to be expanded on as the project continues. Resources will be made available to other engineering educators in the future.

**Contributions to Other Disciplines:**

We expect that the curriculum and assessment resources will use and contribute to the larger body of knowledge in the four development areas. There are various leadership programs and initiatives on campus and in the education community. There is an entrepreneurship program in the College of Business and various activities across colleges. Global awareness and systems thinking are also important areas across disciplines.

**Contributions to Human Resource Development:**

The goal of this project is human resource development. Scholarships supported a cohort of undergraduate student scholars, including transfer students and underrepresented students. Peer mentors were trained, and along with the scholars, gained new knowledge, skills and abilities in the four development areas of the E2020 program. Faculty and staff also acquired new information about student development.

**Contributions to Resources for Research and Education:**

Information resources are under development to support teaching and learning in the four developmental areas of the project.

**Contributions Beyond Science and Engineering:****Conference Proceedings****Special Requirements**

**Special reporting requirements:** None

**Change in Objectives or Scope:** None

**Animal, Human Subjects, Biohazards:** None

**Categories for which nothing is reported:**

Any Journal

Any Book

Any Product

Contributions: To Any Beyond Science and Engineering

Any Conference

# Annual Report for Year 2

## E2020 Scholars

### NSF S-STEM Program

#### Award #0807051



## Activities

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### Project Goals and Objectives

The E2020 Scholars Program offers scholarships for cohorts of undergraduate engineering students within the college's established learning community infrastructure, giving specific attention to the aspirations and attributes of the National Academy of Engineering's (NAE) vision for the engineer of 2020. The project has outlined a set of student development and learning opportunities consistent with this vision to be integrated into curricular and co-curricular activities: leadership development, global awareness and understanding, systems-thinking, and innovation. The scholarship program will promote student engagement and development centered on these E2020 outcomes.

The E2020 Scholars Program is pursuing the goals of the S-STEM program through four objectives:

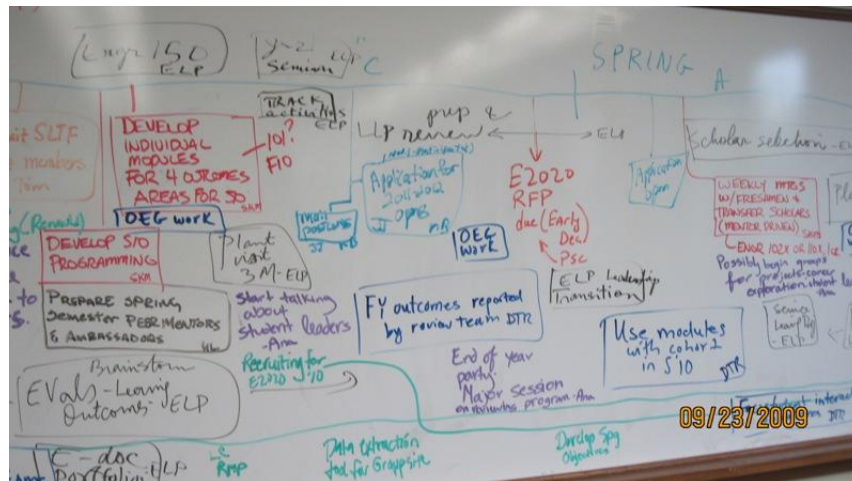
- Provide opportunities of the Engineering Leadership Program to greater numbers of students and create learning outcomes consistent with the E2020 vision.
- Engage students in new learning opportunities through cohorts and communities focusing on E2020 concepts.
- Involve greater numbers of students in the Engineering Leadership Program and use E2020 scholarships in coordination with new programs being developed in a related NSF STEP grant.
- Use the E2020 focus in coordination with the NSF STEP grant to prepare more graduates to fulfill the NAE and college vision.

The objectives of the E2020 Scholars Program will be achieved by leveraging two highly successful programs in the College of Engineering: the Engineering Scholarship Program and the Engineering Leadership Program. In addition, the opportunities for students will be enhanced by offering new learning experiences based on the E2020 vision. The program will benefit from the application of successful, research-based practices, alignment with national recommendations, institutional and team strengths, and expert evaluation.

The program proposed to select 25 scholars during year one for students entering Fall 2009, split approximately evenly between incoming freshmen students and transfer students; and to select 23 scholars during year two for students entering Fall 2010.

## Project Management and Communications

- The project team held meetings twice monthly to plan, review strategies and progress, and share information. These team members include Diane Rover, Steve Mickelson, Mack Shelley, Monica Bruning, Krishna Athreya, Tom Brumm, Joel Johnson, Paul Castleberry, Mark Laingen, Ana Williams, Robyn Cooper, and Gloria Hill.
- Four subgroups were used to manage project activities: Scholarships Group, Community Group, Curriculum/Assessment Group, and Evaluation Group. Project PI's serve as leaders of these groups, and collaborators and active stakeholders have been identified as needed to facilitate the work of each group.
  - During Fall 2009, group leaders conducted planning meetings and developed a master plan for the year that identifies key activities and timing for each subgroup. A section of the whiteboard from the collaborative planning session is shown in the photo below. The resulting plan served as a reference for the team throughout the year.



- Active stakeholders in the project include engineering faculty and staff in Engineering Diversity Programs, the Learning Communities Task Team, and the Student Learning Task Force. Several members were directly involved in project activities.
- Four groups were formed, one for each of the student development areas, or student learning outcomes, of the program: leadership, global awareness, systems thinking, and innovation. These groups are referred to as outcome expert groups, or simply, pillar groups. A pillar group will provide guidance with E2020 programming, curriculum development, resource collection/identification, and assessment. The pillar groups are listed below. Members consist of faculty, staff, and students, including key stakeholders as well as scholars. Pillar group activities are described in the section on Curriculum and Assessment.

Name	Pillar	Role	Department	Other Affiliation
<b>Amy Kaleita</b>	<b>Global Awareness</b>	<b>Faculty Leader</b>	ABE	Honors Program Committee Chair
Doug Gemmill	Global Awareness	Faculty	IMSE	Student Learning Task Force
Kevin Osgerby	Global Awareness	Staff	ME	Learning Communities Task Team
Julia Apple-Smith	Global Awareness	Staff	COE	Engineering International Programs
Devna Popejoy-Sheriff	Global Awareness	Staff	IE	Learning Communities Task Team
Mark Laingen	Global Awareness	Mentor/Instructor	ABE	E2020 Team
Chris Jolley	Global Awareness	Scholar	CE	E2020 Scholar
Steve Mickelson	Global Awareness	Project Liaison	CELT/ABE	E2020 Team
<b>Doug Jacobson</b>	<b>Innovation</b>	<b>Faculty Leader</b>	ECE	Student Learning Task Force
LeQuetia Ancar	Innovation	Staff	ABE	Learning Communities Task Team
Roger Bentley	Innovation	Staff	ECS	Learning Communities Task Team
Josh Sevcik	Innovation	Peer Mentor	EE	E2020 Peer Mentor
John King	Innovation	Scholar	CBE	E2020 Scholar (Transfer)
Alicia Fleege	Innovation	Scholar	ME	E2020 Scholar
Tom Brumm	Innovation	Project Liaison	COE/ABE	E2020 Team, SLTF
<b>Krishna Athreya</b>	<b>Leadership</b>	<b>Faculty Leader</b>	COE/MSE	Engineering Leadership Program
Beth Hartmann	Leadership	Faculty	CCEE	Learning Communities Task Team
Qingze Zou	Leadership	Faculty	ME	Student Learning Task Force
Kristin Mauro	Leadership	Staff	CCEE	Learning Communities Task Team
Joel Johnson	Leadership	Staff	ESS/ESPP	Engineering Student Council Advisor
Emily Kuster	Leadership	Peer Mentor	MatE	ELP
Alexander Carr	Leadership	Scholar	AerE	E2020 Scholar
Eric Schulte	Leadership	Scholar	CE	E2020 Scholar (Transfer)
Steve Mickelson	Leadership	Project Liaison	ABE	E2020 Team, LCTT, CELT
<b>Chris Rehmann</b>	<b>Systems Thinking</b>	<b>Faculty Leader</b>	CCEE	none
Ambar Mitra	Systems Thinking	Faculty	AerE	Student Learning Task Force
Sue Ziegenbusch	Systems Thinking	Staff	ABE	Learning Communities Task Team
Kathy Platts	Systems Thinking	Staff	AerE	Learning Communities Task Team
Paul Castleberry	Systems Thinking	Staff	ESS	Learning Communities Task Team
Patrick Mulloy	Systems Thinking	Peer Mentor	ConE	E2020 Peer Mentor
Ethan McGuire	Systems Thinking	Scholar	CBE	E2020 Scholar (Transfer)
Justin Wenger	Systems Thinking	Scholar	ConE	E2020 Scholar
Diane Rover	Systems Thinking	Project Liaison	COE/ECE	E2020 Team

- A Sharepoint intranet site is used as a tool to maintain and share project information, such as meeting minutes, documents, readings, curriculum materials, pillar group documents and resources, scholarship applications, etc.
- The E2020 Program website, <http://www.engineering.iastate.edu/e2020>, was redesigned and expanded this year. Its design matches the new design created for the prospective student website for the College of Engineering. This design was developed through ISU's NSF STEP



project as part of its objective to enhance communications and recruiting. The E2020 website provides an overview of the project for prospective students, including information about the E2020 scholarship and program. The updated website provides more comprehensive and user-friendly web pages for those seeking information about the program and for those applying to the program. The scholarship application is online through the website. See Findings, Products, and Contributions for a screenshot of the website.

- The new class of E2020 Scholars is announced through a press release and appears in, for example, the College of Engineering's *E-News* and *Alumni E-News* newsletters, which reach audiences of over 500 and 19,500 respectively. Another release is written for E2020 Scholars to use in their local newspapers to announce their acceptance into the program and receipt of an E2020 scholarship.
- The E2020 Scholars Program is being managed in coordination with an NSF STEP-funded project, SEEC: <http://www.eng.iastate.edu/seec/>. The SEEC project objectives will enhance the programs and services available to students receiving E2020 scholarships, especially transfer students. All but a few E2020 team members are also SEEC team members. SEEC newsletters include a link to the E2020 project website.
- Data entry at the S-STEM Scholarship Reporting Site is partially completed for 2009-10 scholars.

## Scholarships

- Program and COE student affairs staff shared information about the program and scholarships at various COE recruitment events throughout the year.
- The project team reviewed the ELP scholarship award model and implementation.
- The Scholarships Group reviewed the results of the initial selection process, refined the process as needed, and developed a checklist for scholarship promotion/marketing and selection. The same award criteria were used.
  - Students must demonstrate financial need as determined by filing the FAFSA.
  - Students must be US citizens.
  - Students must be accepted for admission.
  - Students must complete an online application.
  - Students must possess the potential to succeed. Demonstrated academic ability should include the following:
    - First year students
      - 3.0 GPA on a 4.0 scale
      - Top 30% class rank
      - ACT sub-scores for Math-24 or Higher; SAT 1 math above 560
    - Transfer students
      - 24 transferrable hours or meet first year student criteria
      - 3.00 GPA on 4.0 scale
- An online application form collects personal information, academic information, extracurricular activities, and essays. The essay questions were:
  - I wish to be considered for an E2020 scholarship because...

- Given the challenges we face as a nation (see the COE 2050 Challenge and the NAE Grand Challenges) and considering the focus of the E2020 Scholars Program, some ideas that I would like to act upon as an engineer include...
- A selection committee conducted a review process and made final decisions on students selected as E2020 Scholars for the fall 2010 entry year. The committee included faculty/administrators, student affairs staff, and students. Every application was reviewed by several committee members. The committee met, discussed and iterated on the top applicants based on scores and other attributes to arrive at a finalist list and alternate list. Offers were made from the finalist list. Several alternates were offered, after students withdrew application for admission by the nationally recognized May 1 deadline.
- Demographic data are available on all applicants and new scholars. These are summarized in the Findings of this report.

## **Cohort and Community Development**

- Community Group leaders updated the Learning Communities Task Team (a college-wide committee) about the project and scholar participation in learning communities.
- A cohort coordination group was formed to organize and manage the first year cohort and transfer cohort activities. This group was led by project team members: Monica Bruning for the first year cohort, and Mark Laingen for the transfer cohort. The group also includes peer mentors for each cohort. Ana Williams represented the peer mentors at project team meetings. The goal of the efforts throughout the cohorts' first year of the E2020 program was to create a sense of community and introduce scholars to the E2020 concepts.
- Students actively participated in an engineering (or related) learning community available from their academic department or other program during the first year.
- The 2009-10 E2020 cohort, both first-year and transfer students, participated in program activities to advance their academic and professional development. E2020 cohort activities were informal during the first (fall 2009) semester consisting of various meetings and events. All E2020 scholars participated in a one-credit seminar course, ENGR 110X, during the second (spring 2010) semester. Students explored each of the E2020 concepts by working on projects, listening to speakers, and engaging in group discussions. More information about the course is available in the Findings of this report.
- A scholar/parent introductory meeting about the E2020 program was scheduled during each summer orientation session. Topics included:
  - Social networking during summer to develop relationships between cohort members and faculty/staff involved with program
  - Programmatic goals of program and what to expect
  - Student input for educational and social programming
  - Introduction to E2020 peer mentors, who will be providing peer support for cohort members and assisting with program development and implementation

- A social/professional networking site for scholars and the project team was set up, <https://e2020scholars.groupsite.com>. The site was used to build community among the scholars, including calendar, photos, student postings, news articles, etc. Documents were uploaded to assist scholars in their transition from high school (or community college) to college and in their planning for academic success. Links to videos, lectures and programs related to E2020 concepts were posted and discussion was encouraged. An E2020 student group was formed to maintain site content and relevancy. More information about the use of the groupsite is available in the Findings of this report.
- Fall meeting topics included: kick-off/welcome and orientation to the E2020 Scholars Program; weekly reflections on student experiences; career fair preparation; introduction to the field of engineering including NAE Grand Challenges; entrepreneurship in engineering and other special topics; time management, study skills, and personal well-being; Map-Works feedback (assessment tool focused college transition issues); and scholar feedback on the program. Scholars also participated in several outreach events throughout the year for prospective engineering students.
- Several E2020 students participated in a tour of Rockwell Collins in Cedar Rapids, Iowa, on January 28, 2010. This was a collaborative activity with the Engineering Leadership Program. A total of 34 students visited Rockwell Collins headquarters. Throughout the day, students attended presentations about diversity, business ethics, and the leadership structure of Rockwell Collins. Greg Churchill, Rockwell's executive vice president and chief operating officer, also presented to the students. The scholars were guided on a tour of the plant.
- Various organizational tasks to develop and support programming for the cohorts and community were accomplished.

## **Curriculum and Assessment**

- Courses and learning communities will incorporate introductory learning modules emphasizing selected outcomes from the NAE's vision for the engineer of 2020. Planning and implementation are underway to provide student learning experiences in the four E2020 pillars:
  - Leadership development, including teamwork, communication, and service
  - Global awareness and understanding, including cultural adaptability
  - Systems-thinking, including interdisciplinary engineering design
  - Innovation, including creativity and entrepreneurship
- Project team members met with the faculty leaders of each pillar. The leaders and group members are listed in the table in the Project Management section of this report. The group structure ensures key linkages that will benefit the project and related college activities. Group members bring expertise needed to define, integrate, and assess the pillar outcomes and learning experiences. Every group member has a defined role.
- During spring 2010, the scholars attended a seminar course that introduced them to knowledge, skills and abilities in each of the four pillars. More information about the course is available in the Findings of this report.

- The seminar course instructor, faculty pillar group leaders, and project team members have begun to explore, collect, and develop materials to support curriculum and assessment of the four developmental areas of the program. The Sharepoint intranet site is used as a workspace.
- The pillar groups will work on the following possible activities:
  - Develop student learning outcome(s) corresponding to a pillar.
  - Map pillar outcome(s) to key competencies, using COE ABET core competencies and new ones as needed.
  - Develop introductory learning module(s) that can be used by E2020 students in ENGR 110X and that can also be used in all COE learning communities (e.g., ENGR 101).
  - Design the curriculum for a semester or half-semester class focused on a pillar.
  - Brainstorm and create a list of key experiences for the E2020 students that will help them meet the student learning outcome(s) associated with the pillar. Engage co-curricular groups in the college (provide information, etc.).
  - Research and collect key citations related to the pillar (online database creation).
  - Brainstorm and list key team building activities and social activities for students in conjunction/coordination with LCTT.
  - Brainstorm and list ideas for a capstone experience for the E2020 student for their final year.
- Each pillar group covered the following agenda topics in the spring semester:
  - E2020 Overview
  - Pillar Group Overview
  - ENGR 110X Update
  - Timeline
  - Faculty Leader Retreat
  - Pillar Group Next Steps
  - ELP Example
- During summer 2010, there will be a faculty leader retreat in preparation for pillar and course development for 2010-11.

## Evaluation

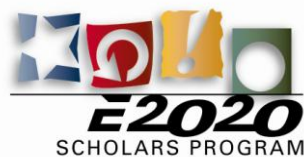
- Evaluation during year two consisted primarily of continued collaboration with other team members to establish criteria and implement initial data collection for more detailed subsequent data-driven evaluation efforts. The emphasis in year two continued to be on the criteria and mechanisms for attracting, recruiting, and enrolling students supported by the E2020 project. Data to assess longer-term student outcomes are in the process of being collected. As for year one, a process evaluation was based on participation by the evaluators in E2020 meetings and in related meetings, including Iowa State University's NSF-funded SEEC (STEM Student Enrollment and Engagement through Connections) project.
- Interactions during year two with the PI and co-PIs for E2020 make it clear that planning for future project implementation continues to proceed well. Members of the E2020 groups continued to cooperate well, and valuable linkages have been established with other E2020 groups through meetings among the project's leaders.

# Annual Report for Year 2

## E2020 Scholars

### NSF S-STEM Program

#### Award #0807051



## Findings, Products, and Contributions

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The activities of the project led to several results and outputs during year two. These are highlighted below.

### E2020 Scholars Program Visual Identity

During year one, a logo for the E2020 Scholars Program was created by a graphic designer from Engineering Communications and Marketing. Each of the E2020 outcome areas is depicted by a graphical icon.



The logo continues to be used in program communications, giving the program and scholars a distinctive visual identity.

### E2020 Scholars

The first scholarships were awarded for cohorts beginning fall 2009, i.e., 2009-10. The second round of scholarships is to cohorts beginning fall 2010, i.e., 2010-11. The table below lists the number of scholarships anticipated in the grant proposal and the actual number of scholarships awarded. Due to a small transfer applicant pool for the 2009 cohort, the number of transfer scholarships awarded is less than proposed. However, we awarded more transfer scholarships this year.

Cohort	Number of Scholarships - Proposed			Number of Scholarships - Awarded		
	First Year	Transfer	Total	First Year	Transfer	Total
<b>2009-10</b>	12	13	25	16	7	23
<b>2010-11</b>	11	12	23	12	14	26
<b>Total</b>	23	25	48	28	21	49

The table below summarizes the number of applicants and scholars for the 2009-10 and 2010-11 cohorts.

	<b>Total</b>	<b>First Year Students</b>			<b>Transfer Students</b>		
		<b>All</b>	<b>Women</b>	<b>Minority</b>	<b>All</b>	<b>Women</b>	<b>Minority</b>
<b>2009-10</b>							
<b>Applicants</b>	208	189	52	28	19	1	1
<b>Scholars</b>	23	16	5	5	7	0	0
<b>2010-11</b>							
<b>Applicants</b>	195	173	35	15	22	5	0
<b>Scholars</b>	26	12	7	4	14	5	0
<b>Total</b>							
<b>Scholars</b>	49	28	12	9	21	5	0

A majority of ISU transfer students come from Iowa community colleges. Minority student enrollment in STEM at community colleges in Iowa is a challenge due to the demographics of the state. However, there are opportunities and needs that two-year and four-year institutions in the state should address.

The first cohort of E2020 scholars, which entered during fall 2009, is listed in the table below.

<b>Last Name</b>	<b>First Name</b>	<b>Home State</b>	<b>Major</b>	<b>Learning Community / Transfer Institution</b>	<b>Status</b>
Bomett	Moses	IA	ENGR	LEAD LC (multicultural)	Changed major
Carr	Alexander	CO	Aer E	Major LC	
DeLoatch	Sterling	IL	Cpr E	LEAD LC (multicultural)	
Escher	Anthony	IA	ME	Major LC	
Fleege	Alicia	WI	ENGR	Honors LC	
Jimenez	Lizette	IL	Ch E	Major LC	
Klutzke	Brenda	MN	M E	Honors LC	
Kruger	Samuel	IA	C E	Major LC	
Lyon	Todd	IA	Cpr E	Major LC	
Magstadt	Benjamin	NE	E E	Major LC	
Morgan	Donathan	MO	E E	LEAD LC (multicultural)	
Morrow	Kristen	IA	BSE (ELP)	Major LC	
Page	Ryan	IA	I E	Major LC	
Rager	Karly	SD	CE	Major LC	
Rondon	Andrew	KS	C E	Major LC	
Wenger	Justin	IA	Con E	Major LC	
Flaherty	Patrick	IA	ME	LC / Iowa Central CC	
Jolley	Christopher	IA	CE	LC / Hawkeye CC/Salt Lake CC	
King	John	IA	Ch E	Kirkwood CC, Iowa Western CC	
McGuire	Ethan	IA	Ch E	Southwestern CC	
Schulte	Eric	IA	C E	LC / Hawkeye CC	
Smith	Jeffrey	NE	Aer E	Univ. of Nebraska	
Titus	Mathew	IA	M E	LC / DMACC	

Two of the twenty-three scholars are no longer in the program.

The table below shows the results of the application and selection process conducted this year for the second cohort of E2020 scholars, who will start fall 2010. See their demographics in the table above.

<b>Last Name</b>	<b>First Name</b>	<b>Home State</b>	<b>Major</b>	<b>Learning Community / Transfer Institution</b>
Anderson	Christina	NE	MatE	Major LC
Demmon	Carrie	IA	ChE	WISE LC
Fox	Tyler	IL	ENGR	Undeclared LC
Gilsdorf	Ryan	MO	CprE	Major LC
Jones	Tyler	MN	ME	Major LC
Nelson	Lauren	MN	ChE	WISE LC
Olivares	Alexandra	IA	AerE	Major LC
O'Loughlin	Caitlin	IA	CE/Env	WISE LC
Rosenthal	Michael	IA	CE/Env	Major LC
Sanocki	Mark	WI	CE/Env	Major LC
Sauerbrei	Samantha	IA	ChE	Honors LC
Stovall	Jasmine	NE	CE/Env	Major LC
Anderson	Taylor	IA	SE	Iowa Central CC
Beougher	Andrew	IA	EE	Des Moines Area CC
Briesmoore	Rebecca	IA	CE	Univ. of Iowa
Dobbie	Paul	IA	ME	DMACC
Freebolin	Jake	IA	ME	Kirkwood CC (spring entry)
Geerdes	Edwin	IA	ME	Iowa Lakes CC
Judkins	Andrew	IA	ENGR	LC / Marshalltown CC
Lundeen	Kurt	IA	ME	Scott CC
Mally	Elizabeth	IA	CE	Kirkwood CC
McCuddin	Hannah	IA	AerE	LC / Western Iowa Tech CC
Mishler	Margaret	IA	IE	Kirkwood CC
Pavel	Brittney	IA	ChE	LC / Iowa Central CC
Sprecher	Jeremy	IA	BSE	Oregon St. Univ./DMACC
Swenson	Benjamin	IA	ConE	LC / Kirkwood

Each scholar must participate in a first year learning community (LC). The LC is shown in the tables above in the specified column. "Major LC" refers to the learning community offered by the academic department. All academic departments in the College of Engineering offer learning communities. There are currently fewer learning community options for transfer students. However, through the NSF STEP project, there is a new learning community for all undeclared engineering transfer students that will be available to all incoming transfer students. New departmental transfer learning communities are being created in the electrical and computer engineering department and the industrial engineering department. New transfer orientation classes are being implemented for electrical, computer, software, and undeclared engineering students, and these will be opened to all transfer students. These initiatives have increased the percentage of transfer students participating in a learning community from 22% in fall 2008 to 38% in fall 2009.

As part of the scholar application review process, an application database was developed and merged with the ISU financial aid database for demonstrated financial need. This database was used for review of applicants throughout the selection process. The database is maintained by support staff for the E2020 program.

## Project Website

Over the past year, the college's recruiting materials have been redesigned to incorporate new messaging. This was done through ISU's NSF STEP project as part of its objective to enhance communications and recruiting. The theme – that engineers create a better world and that students can (*Be Creative*)<sup>2</sup> – was developed with ZLRIGNITION, a communications marketing firm that has experience with Iowa State and youth marketing. The E2020 Program website, <http://www.engineering.iastate.edu/e2020>, was redesigned to match the new design. A screenshot is shown below.



The recruiting brochure and prospective student website are available at:

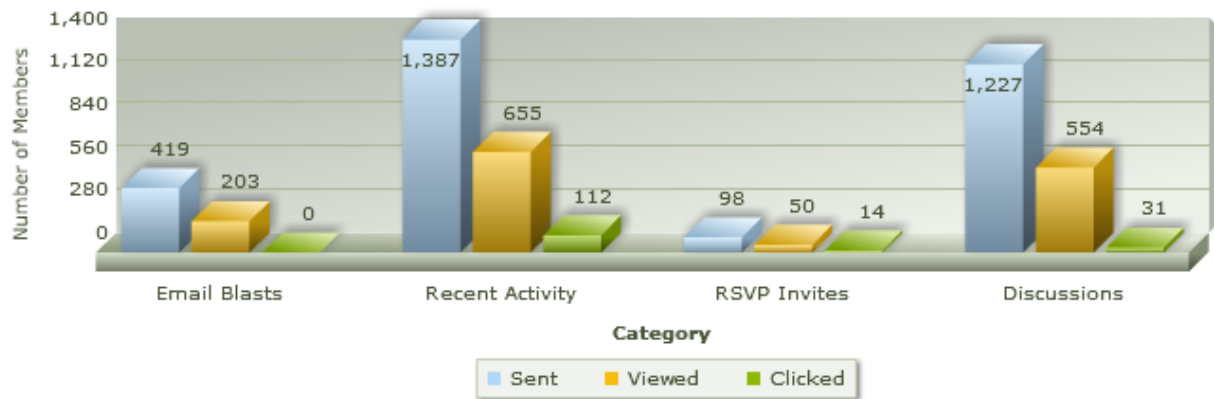
- <http://www.eng.iastate.edu/seec/COERecruitmentBrochure.pdf>
- <http://www.eng.iastate.edu/prospective/>.



## Scholars Groupsite

A social/professional networking site, <http://e2020scholars.groupsite.com>, is being used to enhance networking and communication among the scholars and the program faculty, staff and peer mentors. The Activities report summarizes the use of the groupsite. The website keeps track of the demographics and statistics of members and activity. Several usage statistics for the groupsite are shown graphically below. Thus, data show that the site is being used; further analysis of the data and student feedback will guide and customize the use of the site.

### Member Email Statistics



### Group Emails Sent

[Previous](#) View by:

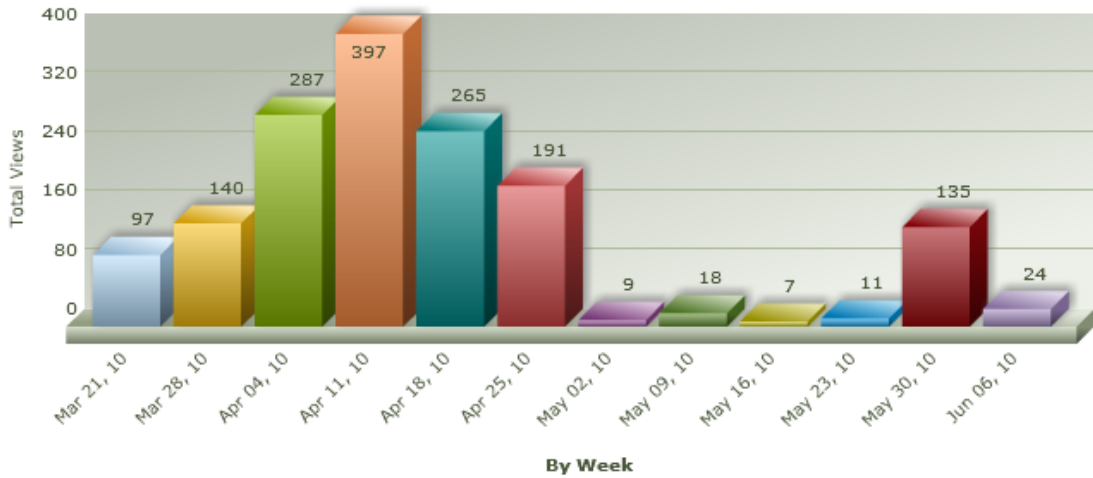
Click on any of the bars in the chart for more details.



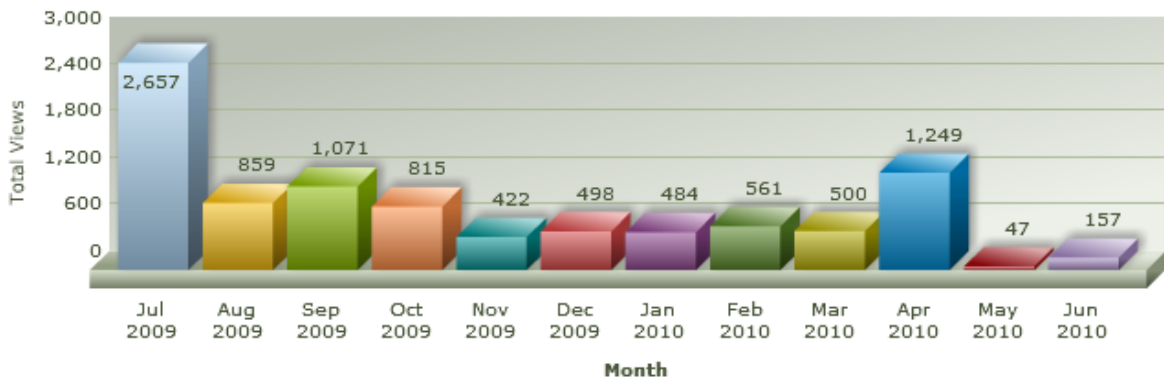
### Total Page Views

[Previous](#) View by:

Click on any of the bars in the chart for more details.



### Total Page Views



### Seminar Course (ENGR 110X)

The course, ENGR 110X, E2020 Scholars Program Seminar, met weekly during spring 2010 for one credit hour. Mark Laingen served as the instructor with guest lectures by project team members and faculty pillar leaders. All scholars in the 2009 cohort participated. The class schedule is shown below.

The pillar faculty leaders and groups will begin to develop subsequent courses, 210X, 310X, and 410X, to provide deeper learning into each of the pillars as well as project-based learning experiences.

ENGR 110X - E2020 SCHOLARS SEMINAR						
Week	Date	Topic	Assignment	Readings	Speaker	Objectives
1	13-Jan	Introduction	Nametag,			
2	20-Jan	Peer Mentor program			Dr. Bruning/M. Darrow	
3	27-Jan	Leadership	Guest speaker		Dr. K. Athreya	
4	3-Feb		Group Project			
5	10-Feb		Presentations			
6	17-Feb	Innovation	Guest speaker		Dr. D. Jacobsen	
7	24-Feb		Group Project			
8	3-Mar		Presentations			
9	10-Mar	Systems Thinking	Guest speaker		Dr. C. Rehmann	
10	17-Mar	SPRING BREAK	NO CLASS			
11	24-Mar		Group Project			
12	31-Mar		Presentations			
13	7-Apr	Global Awareness	Guest speaker		Dr. A. Kaleita-Forbes	
14	14-Apr		Group Project			
15	21-Apr		Presentations			
16	28-Apr	Final Week	Turn in Assignments *			
		*	portfolios, reflections, resume			

In 110X, each pillar was assigned three lecture periods, and the material was designed to develop students' knowledge, skills, and abilities. Feedback from one of the students in response to Dr. Rehmann's class experience on systems thinking is shown below.

Before these 3 weeks on Systems Thinking, I did not fully understand what the topic was about. These past 3 weeks I have learned so much. The 3 diagrams that were used to describe systems thinking were a very good tool to learn this concept. I learned that systems thinking is something - that you must always think about when considering a project. I learned how many things influence each other in a large scale project. These 3 weeks have taught me to look more at the big picture and how one engineering projects influence everything.

## E2020 Program Communications

The E2020 scholars were announced through the electronic newsletter distributed by the NSF STEP project: <http://www.eng.iastate.edu/seec/newsletter.shtml>.

# CONNECTIONS

The newsletter for SEEC project advocates

Spring 2009 — [View Online](#)

### E2020 Scholars Announced

This fall, Iowa State's College of Engineering will welcome its first [E2020 Scholars](#). These 19 young men and women represent seven states and were chosen from over 200 applicants. E2020 Scholars will take part in the E2020 Learning Community, which will emphasize student professional development in the areas of leadership, interdisciplinary and systems thinking, innovation and entrepreneurship, and global awareness. These attributes are expected to characterize the engineer of 2020. Additionally, each scholar receives a \$2,500 E2020 scholarship which is funded by the NSF S-STEM program and renewable up to four years.

The E2020 scholarship was marketed through the electronic newsletter distributed by the College of Engineering to alumni, faculty, and staff: [http://www.eng.iastate.edu/e-news\\_alumni/2010/2-Feb.html](http://www.eng.iastate.edu/e-news_alumni/2010/2-Feb.html).

### College seeks engineering leaders of tomorrow for E2020 Scholars Program

If you know a high school senior or transfer student who might possess the qualities and characteristics of an up-and-coming engineering leader, one who is becoming globally aware, is a critical thinker, and is highly creative, please encourage him or her to apply for the College of Engineering [E2020 Scholars Program](#). Scholarships of up to \$10,000 given over a four-year period are awarded through the program. Applications are due March 10. [\(Criteria and application information\)](#)

Video clips were produced documenting the scholars' understanding of E2020 concepts (leadership, global awareness, etc.), the educational value of the program, and commentary on the students' educational experience. The videos serve as promotion and awareness tools for the public and prospective students. A video is available at the project website (see the screenshot above) and on YouTube, [http://www.youtube.com/watch?v=eL0IRE-idbc&feature=player\\_embedded](http://www.youtube.com/watch?v=eL0IRE-idbc&feature=player_embedded).

An excerpt of the YouTube webpage is shown below.

YouTube

Search Browse Upload

**E2020 Scholars Program**

ISUEngineering 92 videos Subscribe

what is an  
E2020  
scholar?

0:13 / 3:05 360p CC

ISUEngineering January 22, 2010 3:05 342 views

Learn more about the E2020 Scholars program at Iowa State University's Colleg...

Like Save to Share <Embed>

Respond to this video...

A press release is available for E2020 scholars to provide to their local newspapers.

## E2020 Scholar Press Release

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FOR IMMEDIATE RELEASE

### [Student's first and last name] Awarded E2020 Scholarship

*City, State (Month, Day 2010)* [Student's first and last name] will be attending Iowa State University's College of Engineering this fall as a member of the E2020 Scholars Program. In addition to receiving a \$2,500 scholarship award, renewable up to four years, [student's last name] will join incoming E2020 Scholars in the E2020 Learning Community. "This program builds off of ISU's nationally ranked Learning Community program," describes Dr. Steven K. Mickelson, Director, Center for Excellence in Learning and Teaching, Co-Director, ISU Learning Communities, and Associate Chair, Agricultural and Biosystems Engineering Department. "The E2020 Learning Community will focus on understanding and

developing attributes in the areas of leadership development, global awareness and understanding, orientation to systems thinking, and innovative and entrepreneurial aptitudes. These attributes are expected to characterize the engineer of 2020.”

This exemplary group of students will work on real engineering challenges facing our world today – and those that will be faced in the future – as they build their skills. For example, an E2020 Scholar may become an undergraduate research assistant and work on a bioengineering project seeking polymers suitable for self-regulating systems for drug delivery. He/she may choose a leadership role with the ISU PRISUm solar car team to develop innovative solutions for renewable energy. Or, he/she may find that an internship abroad provides opportunity to help develop sustainable agriculture systems. Many of the problems posed by the College of Engineering’s 2050 Challenge, such as providing modern healthcare, renewable, nonpolluting energy, and abundant clean water to all parts of the world, will be tackled by E2020 Scholars.

The E2020 Scholars Program and corresponding E2020 Scholarships are made possible by a grant from the National Science Foundation (NSF). The NSF is investing in the future workforce needs of America in science, technology, engineering, and mathematics (STEM). “Scholarships are vital to bringing students into STEM fields of study and broadening participation in engineering,” explains Dr. Diane Rover, Associate Dean for Academic and Student Affairs and Professor, Electrical and Computer Engineering. “The E2020 Scholarship recognizes not only the academic accomplishments of the scholars, but also the vision these scholars have for creating a better world and meeting the 2050 Challenge set forth by the College of Engineering. Each scholar brings unique experiences and talents, and collectively, they represent the promise of engineering to society.”

#### CONTACT INFO

Monica Bruning

Talent Expansion Director  
Engineering, Academic and Student Services  
Iowa State University  
Phone: 515.294.9963  
Email: [mbruning@iastate.edu](mailto:mbruning@iastate.edu)

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## Evaluation Findings

Four S-STEM program goals were articulated for E2020:

1. Improved educational opportunities for students:
  - a. What is the effect of ELP related programming and enhancements for the E2020 Scholarship Program? To what extent do students demonstrate progress on E2020 learning outcomes?
2. Increased retention of students to degree achievement:
  - a. Does scholarship support, E2020 relevance to students, and learning community engagement increase retention?
3. Improved student support programs at institutions of higher education:
  - a. What is the benefit of extending ELP to greater numbers of students and of complementary NSF STEP grant activities?
4. Increased numbers of well-educated and skilled employees in technical areas of national need:
  - a. What is the result of the E2020 focus and the concurrent goal of the NSF STEP grant to increase the number of engineering graduates?

In pursuit of data to evaluate student perceptions of progress made toward achieving these four goals, an electronic survey (see below) has been distributed to students participating in E2020.

**E2020 Scholars Evaluation Survey**

1=Strongly Agree, 2=Agree Somewhat, 3=Neutral, 4=Disagree Somewhat, 5=Strongly Disagree

1. My involvement in E2020 has been a positive experience. 1 2 3 4 5

Please comment here on your response to question 1.

2. The format of the first semester meetings (met with other first year students every 2-3 weeks and with my LC more frequently) was satisfactory.

1 2 3 4 5

Please comment here on your response to question 2.

3. The content of the meetings first semester help me understand what the concept E2020 Scholars Program meant.

1 2 3 4 5

Please comment here on your response to question 3.

4. The format for the second semester class (first year and transfer students meeting every week in a class setting) was satisfactory.

1 2 3 4 5

Please comment here on your response to question 4.



5. I understand that the leadership pillar involves leadership development, teamwork, communication and service. 1 2 3 4 5

Please comment here on your response to question 5.

6. I have an understanding about the global awareness, understanding, and cultural adaptability pillar. 1 2 3 4 5

Please comment here on your response to question 6.

7. I have an understanding about the systems thinking, including interdisciplinary engineering design pillar. 1 2 3 4 5

Please comment here on your response to question 7.

8. I have an understanding about the innovation, creativity and entrepreneurship pillar. 1 2 3 4 5

Please comment here on your response to question 8.

9. My involvement in the E2020 Scholars Program has enhanced my educational experience this year. 1 2 3 4 5

Please comment here on your response to question 9.

10. I have found the E2020 Scholars program to be a source of support for my educational aspirations.  
1 2 3 4 5

Please comment here on your response to question 10.

11. My interactions with the peer mentor (Ana) was helpful.  
1 2 3 4 5

Please comment here on your response to question 11.

12. My interactions with the program coordinators (Dr. Bruning and Mark) were helpful.  
1 2 3 4 5

Please comment here on your response to question 12.

13. My interactions with the faculty (Drs. Athreya, Jacobson, Rehmann, and Kaleita) were helpful.  
1 2 3 4 5

Please comment here on your response to question 13.

14. Using the Groupsite website as a communication tool was helpful and should be employed next year.  
1 2 3 4 5

Please comment here on your response to question 14.

15. The E2020 Scholars program fits in well with my courses. 1 2 3 4 5

Please comment here on your response to question 15.

16. The E2020 Scholars Program complemented my involvement with my learning community. 1 2 3 4 5

Please comment here on your response to question 16.

17. The E2020 Scholars program is a good fit with my career interests. 1 2 3 4 5

Please comment here on your response to question 17.

18. I feel like I have grown as a person through my E2020 experiences. 1 2 3 4 5

Please comment here on your response to question 18.

19. The diversity of topics, disciplines, and people (students and staff) was satisfactory. 1 2 3 4 5

Please comment here on your response to question 19.

20. I feel better prepared to succeed in college because of E2020 Scholars.

1 2 3 4 5

Please comment here on your response to question 20.

21. What do you think are the best aspects of the current E2020 Scholars program?

22. What do you think should be changed in the current E2020 Scholars program?

Thank you very much for participating in this survey. Your responses will help improve the E2020 Scholars program.

Process evaluation at this stage can continue to address some key questions regarding project effectiveness.

a) Regarding accountability:

- Did the project team do what it said it was going to do?
  - Yes. Members of the E2020 leadership team have continued to meet regularly and have conducted productive meetings. Positive and productive channels of communication have been established and expanded among academic, administrative, and student affairs professionals.
- Were the activities related to the goals and objectives of the project actually completed?
  - Although little hard data yet exist at the end of Year 2 relevant to the four program goals, activities have been undertaken directed toward meeting these goals.

b) Regarding effectiveness:

- How well did the activities meet the objectives of the project?
  - It is still too early to have hard measures of student outcomes, but the organization of E2020 staff into functional teams has led to concrete activities and has established the basis for data collection based on relevant measures of student success.
- Were the objectives accomplished, in light of the attitudes, opinions, and knowledge of the participants?
  - Continued group and individual discussions with E2020 leaders make it clear that they believe progress is being made toward accomplishing the objectives of E2020. This perception is shared by the evaluators

c) Regarding impact:

- What changes have occurred as a result of the project?
  - The functional teams that were established during Year 1 have continued to function, and activities undertaken by these groups designed to contribute to larger numbers of student recruited into engineering have continued and expanded, and appear to have borne fruit as measured by data reported during team meetings.
  - Information regarding funding opportunities has been disseminated more widely to high school students, and efforts among College of Engineering student recruitment and student affairs staff appear to have become better coordinated.
  - The E2020 Website (<http://www.eng.iastate.edu/e2020/index.asp>) has been established, and is being updated and maintained. The following data from 1/1/10 to 5/23/10 summarize the Webstats for this site:
    - 1,636 unique visitors made 3,123 total visits to the E2020 website. They viewed an average of 3 pages and spent an average of 3 minutes on the site per visit. Of these visitors, 48.90% were one-time visitors, while the remaining 51.10% were repeat visitors.
    - The application page received 1,708 views from 1,227 unique visitors. Visitors to the application page spent an average of 2 minutes and 39 seconds on this page.

- 36.54% of visitors arrived at the E2020 home page directly. 45.98% came from a referring source, with the College of Engineering home page, Google, and Iowa State's financial aid home page being the top three referring sources.
    - How are these changes related to the stated expected outcomes of the project?
      - Measurable student outcomes are in progress, and structural and functional changes have been directed toward achieving those outcomes.
    - How have individual and group attitudes been changed?
      - Coordination among the SEEC, E2020, and Engineering Leadership programs remains clearly evident.
    - How have individual and group behavior been affected?
      - More regular meetings among relevant program staff have been held under the auspices of E2020, and communications external to those meetings appear to be occurring with greater frequency.
    - What forms of institutional change have occurred?
      - The most readily evident change is the frequent interactions among otherwise separate student affairs units.
- d) Regarding organizational context:
- Which structures, policies, or events affected the project?
    - Based on discussions with E2020 leadership, participation of the evaluators at E2020 team meetings, and examination of meeting minutes and related documents, the direction taken by the program has been impacted by the increasingly challenging university budget situation and responsiveness to the national and state workforce development needs to increase and diversify the number of students majoring in engineering and in STEM disciplines generally. Research conducted at Iowa State University with participation by one of the evaluators has been undertaken to relate engineering undergraduate student outcomes to risk factors and student characteristics using MAP-Works data (Making Achievement Possible—Educational Benchmarking Inc.).
  - What helped to achieve the goals and objectives of the project?
    - Positive attitudes of cooperation and shared purpose among E2020 leaders have been the primary reason for progress toward achieving the goals of the project.
  - What made it difficult to achieve project goals and objectives?
    - Achieving the project's goals and objectives has been made more difficult owing to changes in university and college budgetary priorities and consequent staffing reductions and reassignments. Achievement of goals has been as yet difficult to measure owing to the lack of hard data at this point related to the recruiting class of 2009 and the forthcoming class of 2010.
- e) Regarding unanticipated outcomes:
- What happened that was not planned for or expected?
    - Leadership changes within the College of Engineering and severe and persisting institutional budget pressures have created a challenging and uncertain climate in which to evaluate the impact of the project and consequences regarding its full implementation.