The Center for Research on Learning and Teaching in Engineering

2011-2012

Report for the College of Engineering

UNIVERSITY OF MICHIGAN

Authored by: Cynthia Finelli

University of Michigan
CENTER FOR RESEARCH ON LEARNING AND TEACHING IN ENGINEERING
CRLT ENGIN

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CRLT IN ENGINEERING

ANNUAL REPORT

June 1, 2011 – May 31, 2012

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HIGHLIGHTS

The Center for Research on Learning and Teaching in Engineering (CRLT-Engin), together with the main CRLT, provides a variety of services for the College of Engineering. Some highlights of 2011-2012 follow.

NEW INITIATIVES

CRLT-Engin designed and implemented the large course pilot initiative for Chemical Engineering and the successful **Teaching Circle for Large Engineering Courses** program. Participants' approaches to teaching changed significantly during the program.

CRLT-Engin staff merged their faculty development work with their research interests for the **NSF project on motivating faculty to adopt research-based effective teaching practices**. Data from focus groups with faculty, students, and advisors, and from a student survey have elucidated ways to enhance the culture of teaching and learning in engineering.

COLLEGE-WIDE PROGRAMS

CRLT-Engin **offered eleven college-wide seminars and seven programs for new instructors.** Overall, these had an attendance of 213 (164 unique individuals) and 607 (379 unique individuals), respectively. These programs included a new required program for first time undergraduate Instructional Aides.

Three engineering faculty were among five, university-wide recipients of the esteemed Teaching Innovation Prize offered by the main CRLT.

CONSULTATIONS AND CLASSROOM INTERVENTIONS

CRLT-Engin reached out to **department chairs** to better inform them about CRLT-Engin, connected with **new faculty**, and conducted over 360 **midterm student feedback sessions and one-on-one consultations** on teaching and learning.

NATIONAL LEADERSHIP

CRLT-Engin staff **consulted with 30 individuals at 26 organizations** outside U-M and reviewed several proposals for NSF, journal manuscripts, and conference papers.

RESEARCH IN ENGINEERING EDUCATION

CRLT-Engin provided a variety of opportunities to strengthen the **engineering education research community**. These included: (1) almost 80 consultations on proposal preparation or education research, and (2) eight other sessions that engaged 166 participants (117 unique individuals).

Engineering faculty were awarded **twelve grants totaling $58,550** (through programs administered by the main CRLT and including $6,000 of funding matched by CoE).

Staff from CRLT-Engin engaged in eleven research projects, submitted five NSF grant proposals, and published 30 refereed journal or conference publications (including **six manuscripts in the prestigious Journal of Engineering Education**).

GSIs enjoying a performance by the CRLT Players.

About CRLT in Engineering

The Center for Research on Learning and Teaching in Engineering (CRLT-Engin) represents a partnership between the College of Engineering (CoE) and the main CRLT office (www.crlt.umich.edu). Established in 2004, CRLT-Engin is located on North Campus and is staffed by experienced engineering educators who work in close collaboration with CoE faculty and administrators. The office, originally named CRLT North, was renamed in 2011 to more accurately portray the partnership between CRLT and CoE and the joint reporting structure of CRLT-Engin. Both CRLT-Engin and the main CRLT office provide services to engineering instructors. Goals for CRLT-Engin include:

- Delivering high-quality professional development programs for faculty and student instructors,
- Consulting with individuals and units wishing to promote a culture of outstanding teaching and learning,
- Supporting faculty engaged in research and scholarship in engineering education,
- Providing national leadership to enhance the visibility of U-M in engineering education, and
- Planning and conducting rigorous research in engineering education.

CRLT in Engineering Advisory Board

- The CRLT-Engin Advisory Board provides guidance and insight about programs, and it advocates for CRLT-Engin within the engineering community. In 2011–2012, the board assisted in selecting the Richard and Eleanor Towner Prize for Outstanding GSIs and met twice. Members of the board include:
  - Krzysztof Fidkowski – Aerospace Engineering,
  - John Foster – Nuclear Engineering and Radiologic Sciences,
  - Jessy Grizzle – Electrical Engineering and Computer Science,
  - Jerome Lynch – Civil and Environmental Engineering,
  - Joanna Millunchick – Materials Science and Engineering,
  - Mark Moldwin – Atmospheric, Oceanic and Space Sciences, and
  - Margaret Wooldridge – Mechanical Engineering.

2012 CRLT in Engineering Faculty Associate

- Dr. Joanna Millunchick was selected as the 2012 CRLT-Engin Faculty Associate because of her ongoing commitment and dedication to programs at CRLT-Engin. In her role, she has collaborated on developing a Teaching Circle on Large Engineering Courses. Besides planning the program and co-facilitating its multiple sessions, she consulted with and provided advice for faculty participants, is assisting with disseminating results of the project through CoE and beyond, and will help to plan the next phase of the project. She also presents and facilitates programs for CRLT-Engin as needed.

CRLT IN ENGINEERING STAFF

- During 2011–2012, Cynthia Finelli, Tershia Pinder-Grover, and Shanna Daly served as primary professional staff of CRLT-Engin. Their biographies are listed here. Additional programming and consultations were provided by staff from the main CRLT office including Constance Cook, Crisca Bierwert, Chad Hershock, Matthew Kaplan, Jeffrey Steiger, Mary Wright, and Erping Zhu. Program support was provided by Laurie Stoianowski, Kenyon Richardson, Pam Fisher, Amy Wester and Charmayne Wiley, as well as by Amy Hamermesh and Jeri Hollister.

CYNTHIA FINELLI, DIRECTOR OF CRLT-ENGIN AND RESEARCH ASSOCIATE PROFESSOR

Dr. Cynthia Finelli earned B.S.E.E., M.S.E.E., and Ph.D. degrees from U-M in 1988, 1989, and 1993, respectively. Prior to joining CRLT in April 2003, she was the Richard L. Terrell Professor of Excellence in Teaching, founding director of the Center for Excellence in Teaching and Learning, and associate professor of electrical engineering at Kettering University. Her current research interests include evaluating methods to improve teaching, studying faculty motivation to change classroom practices, and exploring ethical decision-making in engineering students. Dr. Finelli was co-editor for a special issue of the *International Journal of Engineering Education* on applications of engineering education research, is past Chair of the Educational Research and Methods Division of the American Society of Engineering Education, and holds an appointment as research associate professor in engineering education at U-M.

TERSHIA PINDER-GROVER, ASSISTANT DIRECTOR OF CRLT-ENGIN

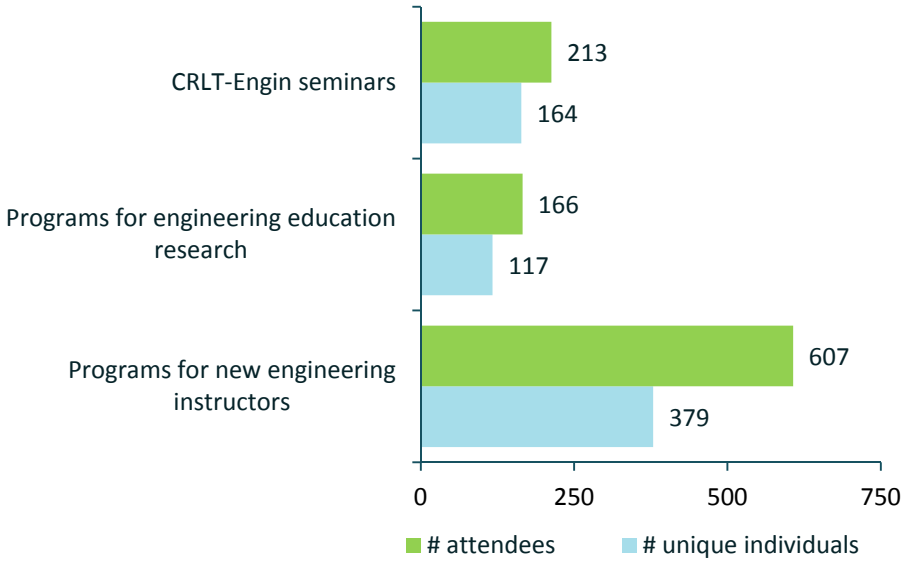
Dr. Tershia Pinder-Grover earned a B.S. degree in Fire Protection Engineering from the University of Maryland in 1999 and M.S. and Ph.D. degrees in Mechanical Engineering from U-M in 2002 and 2006, respectively. She joined CRLT in August 2005, where she coordinates initiatives for engineering GSIs (especially programs for Preparing Future Faculty), develops workshops and seminars, and consults with faculty and graduate students on a variety of pedagogical topics. Her current research interests include examining the effect of instructional technology on student learning and performance and examining GSIs' perceptions of active learning teaching methods.

SHANNA DALY, INSTRUCTIONAL CONSULTANT FOR CRLT-ENGIN AND ASSISTANT RESEARCH SCIENTIST

Dr. Shanna Daly earned a B.E. in Chemical Engineering from the University of Dayton in 2003, and an M.S. in Chemistry and a Ph.D. in Engineering Education from Purdue University, in 2006 and 2008, respectively. At CRLT-Engin, Dr. Daly consults with faculty and GSIs, and she coordinates the Engineering Teaching Consultant program. Dr. Daly holds an appointment as assistant research scientist in engineering education at U-M. Her research focuses on the investigation of design ideation, innovation practices, and creative processes as well as the translation of research to practice in the form of pedagogy, curriculum development, and faculty support. She received the Apprentice Faculty Grant Award from the Educational Research Methods Division of ASEE.

COLLEGE-WIDE PROGRAMS AND RESOURCES

CRLT-Engin provides several college-wide programs to promote a culture of teaching and learning in engineering. These include two large course programs (a new strategic initiative this year), the CRLT-Engin Seminar Series, programs to support engineering education research, and activities for new engineering instructors. Several of these included theater performances by the CRLT Players. Altogether, **these programs had an attendance of 1040 (612 unique individuals).** Additionally, CRLT-Engin coordinates the Engineering Teaching Consultant Program and the Towner Prize for Outstanding GSIs, maintains a website (with nearly 25,000 hits annually), and provides several education-related grants and university-wide programs through the main CRLT. The chart here shows attendance data for several of the college-wide programs.



LARGE COURSE INITIATIVES

CHEMICAL ENGINEERING LARGE COURSE PROGRAM

- In collaboration with the Associate Dean for Undergraduate Education in Engineering, CRLT-Engin planned and coordinated this program for three Chemical Engineering faculty in Fall 2011. The program involved a series of six meetings that featured research-based best practices and technology demonstrations. The faculty participants learned from each other and from their successful peers, and they were able to adopt effective teaching practices and instructional technology for their large-course teaching. In Winter 2012, the program expanded to two additional Chemical Engineering faculty.

Teaching Circle for Large Engineering Courses

- CRLT-Engin's Director co-facilitated this program together with Faculty Associate Joanna Millunchick. Twenty-five faculty applied, and seven were invited to participate. The program consisted of four sessions which addressed the following topics:
  - Active learning,
  - Building rapport in large classes,
  - Student motivation and screencasts, and
  - Student preconceptions and clickers.

  The sessions featured relevant research and practical implementation strategies, and they allowed faculty to interact extensively with the two program facilitators, each other, and other faculty who were invited guests. Participants had a midterm student feedback session, and they completed a survey and had classroom observations at the beginning and end of the term. Each was eligible for a $1,000 grant to support their large course teaching.
- **Faculty participants' approaches to teaching changed significantly during the program, and their self-reported enthusiasm and clarity increased statistically significantly more than it did for faculty in a control group**.

> It was a fantastic program that **far exceeded my expectations**! Not only did it provide me with great ideas and an opportunity to freely ask questions about how to improve my teaching, but I **greatly valued the networking opportunities** with other faculty of various levels of expertise facing similar challenges in engineering.
>
> The possibility of changing my classroom from one of passive learning to one that incorporates some active learning is the big take-away possibility that this program provided. Plus, I now **believe that I can undertake such a transition in an incremental fashion that allows me to avoid huge risky time investments** and to take corrective action in timely manner.
>
> The program definitely affected how I approach teaching. I am now aware of the resources and ways I can try to use in my teaching. **This is empowering to me**.
>
> *Teaching Circle participants*

CRLT IN ENGINEERING SEMINARS

	Attendance* at CRLT-Engin Seminars		
Department	**Faculty**	**Students**	**Total**
AERO	2	2	4
AOSS	10	4	14
BME	4	7	11
CEE	2	7	9
CHE	9	4	13
EECS-CSE	10	16	26
EECS-ECE	11	11	22
IOE	7	9	16
ME	6	21	27
MSE	2	9	11
NAME	2		2
NERS	4		4
Tech Comm	7	1	8
Other	24	22	46
Total	**89**	**113**	**213**

*Individuals who attended multiple events are counted multiple times

- In 2011–2012, there were 213 attendees (representing 164 unique individuals) at the following 11 programs in the CRLT-Engin Seminar Series:

1. ***Are they getting it? Low stakes ways to assess student learning*** (for graduate students and postdocs)
2. ***Research based principles for making learning work***
3. ***Education research in the College of Engineering: Who's doing what?*** A panel featuring Lorelle Meadows, Joanna Millunchick, and Cindy Finelli
4. ***Using concept questions to engage students and check their progress*** (for faculty)
5. ***Your advisor: The collaborator, the senior scientist, or the hands-off supervisor?*** (for GSIs), featuring the CRLT Players
6. ***Best teaching practices: Perspectives from experienced GSIs*** (for GSIs)
7. ***Seven strategies to improve your teaching*** (for GSIs)
8. ***Instructional technology in engineering courses,*** with faculty panel featuring Lola Eniola-Adefeso, Joanna Millunchick, and Jeff Ringenberg
9. ***Inspiring the entrepreneurial mindset in the classroom***
10. ***The key to an impressive academic job application: Your teaching philosophy statement*** (for GSIs)
11. ***Ethical development in engineering undergraduates: Research findings***

> I am writing to let you know that I believe that attending your workshops **played a big role my achieving tenure**... The reward for attendance at the programs and subsequent implementation was **consistently high teaching scores**.
>
> *Unsolicited comment from newly tenured Associate Professor*

PROGRAMS FOR ENGINEERING EDUCATION RESEARCH

	ATTENDANCE* AT PROGRAMS FOR EDUCATION RESEARCH		
Department	**Faculty**	**Students**	**Total**
AERO	1	2	3
AOSS	8	2	10
BME	2	1	3
CEE		1	1
CHE	4	2	6
EECS-CSE	7	1	8
EECS-ECE	3	5	8
IOE		5	5
ME	4	5	9
MSE	4	1	5
NAME		2	2
NERS		1	1
Tech Comm	8		8
Other	63	34	97
Total	**104**	**62**	**166**

*Individuals who attended multiple events are counted multiple times

- CRLT-Engin created multiple opportunities for faculty who are pursuing engineering education research to network and share data, refine research ideas, participate in a poster fair, and mentor graduate students. **These programs for engineering education research engaged 166 participants (117 unique individuals)** and included:
  - ***RESEARCH AND SCHOLARSHIP IN ENGINEERING EDUCATION POSTER FAIR*** with 17 posters on display,
  - Seven ***NETWORKING AND DATA-SHARING SESSIONS*** to discuss ongoing engineering education research. In all, there were 74 present, representing 34 unique individuals,
  - Six consultations with 4 faculty teams regarding Investigating Student Learning projects,
  - Email group for members of the U-M engineering education research community, with more than 60 messages sent to the group,
  - Meeting of faculty board for the Rackham Certificate in Engineering Education Research, subsequent updates to certificate requirements, and first recipient of the certificate, and
  - Support and guidance for student chapter of ASEE and their panel on engineering education research following CRLT-Engin poster fair.

PROGRAMS FOR NEW INSTRUCTORS

	ATTENDANCE* AT PROGRAMS FOR NEW INSTRUCTORS			
Department	**Faculty**	**GSIs**	**IAs**	**Total**
AERO	0	29		29
AOSS	8	9		17
BME	1	22	3	26
CEE	1	29	17	47
CHE	2	29	7	38
EECS-CSE	4	85	39	128
EECS-ECE	5	47	14	66
ENGR	0	11	19	30
IOE	11	22	4	37
ME	9	72	1	82
MSE	3	41		44
NAME	2	8		10
NERS	3	19	6	28
Other	9	16		25
Total	**58**	**439**	**110**	**607**

*Individuals who attended multiple events are counted multiple times

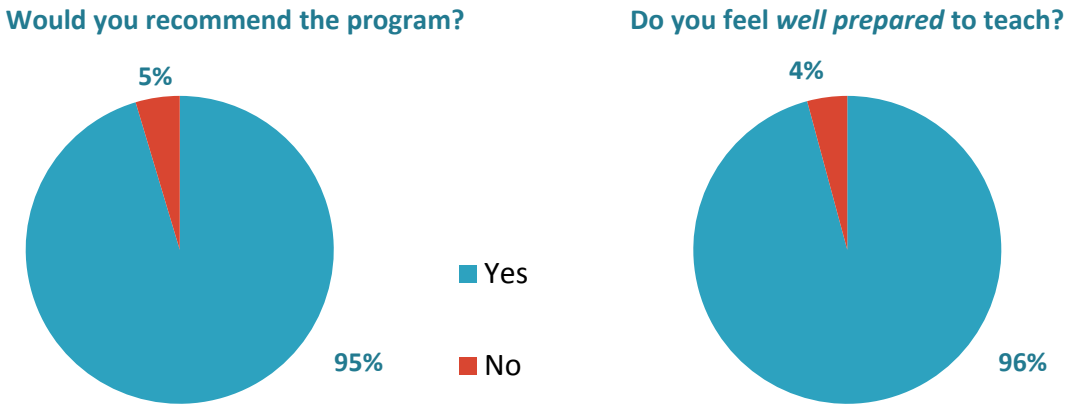
NEW FACULTY PROGRAMS

- **There were 58 new engineering faculty (representing 38 unique individuals) in attendance at four workshops**:
  - ***COLLEGE OF ENGINEERING NEW FACULTY ORIENTATION***, featuring a panel of experienced faculty discussing teaching at U-M and a session for new faculty to deliver a practice lesson and receive feedback on their teaching,
  - ***STRATEGIES FOR NEW FACULTY SUCCESS***, a program which spurred the new faculty present – the new faculty in attendance to organize a series of networking lunches,
  - ***NETWORKING FOR NEW ENGINEERING FACULTY***, and
  - ***PREPARING AN NSF CAREER PROPOSAL***, 25 present (including 15 engineering assistant professors and several postdoctoral fellows) plus seven presenters.

> I **benefitted a lot from the practice teaching session** [at new faculty orientation], very good session indeed.
>
> Great job by the organizers. **Very useful information.**
>
> *Participants in College of Engineering New Faculty Orientation*

ENGINEERING GSI & IA TEACHING ORIENTATIONS

- CRLT-Engin coordinates the mandatory teaching orientation program for new GSIs and IAs. Altogether, **607 GSIs/IAs (representing 341 unique students) attended** the three separate programs:
  - ***GSI TEACHING ORIENTATION***, a day-long program featuring two separate concurrent sessions on teaching, a performance by the CRLT Players, and a practice teaching session),
  - ***IA TEACHING ORIENTATION***, an evening teaching program for undergraduate IAs with two concurrent sessions and a practice teaching session, and
  - ***ADVANCED PRACTICE TEACHING*** sessions focusing on active learning.
- Ratings of the program continue to be high, as shown below.



> The orientation cleared up a lot of the questions I've had about grading, office hours, and other topics I never considered.
>
> *GSI who participated in teacher training in Fall 2011*

ENGINEERING TEACHING CONSULTANTS

- CRLT-Engin hires, trains, and manages the Engineering Teaching Consultant (ETCs). The ETCs are a group of experienced GSIs who work in teams to serve the entire engineering GSI/IA population by mentoring 70-90 GSIs/IAs per team**. In the fall and winter, respectively, ETCs served 311 and 288 GSIs/IAs**. Consultations and midterm student feedback services provided by the ETCs are documented elsewhere in this report.

> Thank you … for making the ETC program so great…it really is one of the best experiences I have had at the university.
>
> *Graduating ETC, Winter 2012*

THE ENGINEERING TEACHING CONSULTANTS

FALL 2011

WINTER 2012

GROUP CONSULTATIONS

- ETCs arranged 16 group activities (which were attended by 110 GSIs/IAs) for the following departments
  - Aerospace Engineering,
  - Atmospheric, Oceanic, and Space Sciences
  - Biomedical Engineering,
  - Civil and Environmental Engineering,
  - Chemical Engineering,
  - Electrical Engineering and Computer Science,
  - Industrial and Operations Engineering,
  - Mechanical Engineering,
  - Materials Science and Engineering,
  - Naval Architecture and Marine Engineering,
  - Nuclear Engineering and Radiologic Engineering, and
  - Undergraduate Engineering.

DEPARTMENT GSI ORIENTATIONS

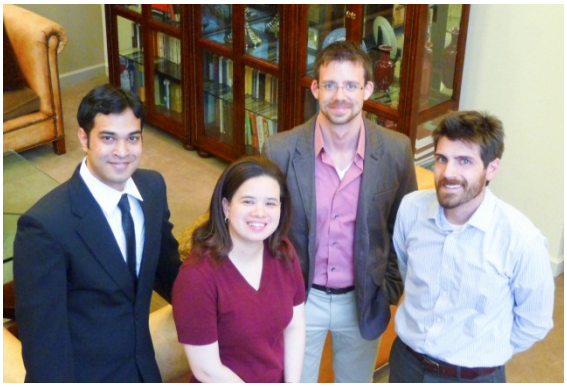
- ETCs were present at eight department orientations. Approximately 150 students attended programs held by the following departments:
  - Chemical Engineering (three sessions),
  - Electrical Engineering and Computer Science,
  - Industrial and Operations Engineering (two sessions), and
  - Mechanical Engineering (two sessions).

PROFESSIONAL DEVELOPMENT FOR ETCS

- ETCs attended biweekly professional development programs on topics that included:
  - Active learning,
  - Bloom's taxonomy,
  - Consulting with GSIs,
  - Midterm student feedbacks,
  - Multicultural teaching,
  - Peer-to-peer teaching,
  - Teaching philosophies, and
  - Team building.

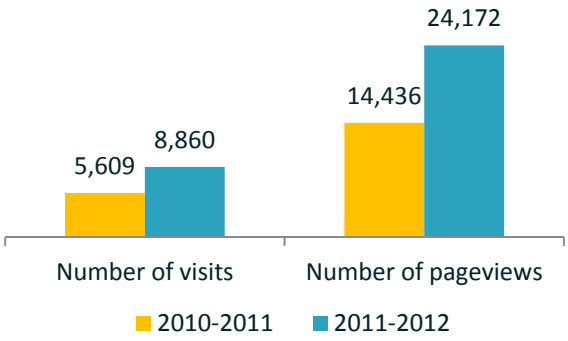
Richard and Eleanor Towner Prize for Outstanding GSIs

- CRLT-Engin coordinated the Towner Prize to recognize outstanding graduate student teaching. Members of the CRLT-Engin Advisory Board, as well as others, reviewed the 26 nominations. **$1,500 awards were made to the following four GSIs this year (and winners were announced in the Michigan Daily and the College of Engineering Facebook and Twitter pages)**:
  - Shaurjo Biswas
    Materials Science and Engineering,
  - Andrew DeOrio
    Electrical Engineering and Computer Science,
  - Marcial Lapp
    Industrial and Operations Engineering, and
  - Shani Ross
    Biomedical Engineering.



CRLT in Engineering website

- **The website had 8,860 visits (by 3,225 unique visitors) and 24,172 pageviews/hits**. The pages most frequently visited include:
  - Services for GSIs & IAs (8,949 hits),
  - Workshops & seminars (2,765 hits),
  - Towner Prize for GSIs (1,618 hits),
  - Engineering education research resources (1,105 hits), and
  - Certificate in engineering education research (700 hits).



CRLT Players theater performances for engineering

- The CRLT Players Theater Troupe performs sketches that engage faculty and graduate students in discussions of diversity, effective pedagogy, and institutional climate. In 2011-2012, the **CRLT Players had four performances that included 228 engineers (representing 211 unique individuals) in the audience**:
  - ***Climate in the classroom***, addressing diverse student perspectives and international experiences in the engineering classroom (two performances),
  - ***Graduate student vignettes*****,** focusing on developing good relationships between graduate students and their faculty research advisors, and
  - ***The faculty meeting***, depicting a faculty discussion about a faculty search and demonstrating how gender dynamics and faculty rank influence the conversation.

GRANTS ADMINISTERED THROUGH THE MAIN CRLT

- In 2011–2012, the main CRLT office administered several grants competitions for faculty to improve teaching and learning, and engineering faculty were very competitive for them. **Twelve engineering proposals were funded for a total of $52,550 (with additional matching funds totaling $6,000 provided by CoE)**.

INVESTIGATING STUDENT LEARNING (ISL) COMPETITION

- Through the ISL competition, awardees attend an all-day symposium on scholarship of teaching and learning, work with staff from CRLT-Engin to conduct education research on student learning, and present their work at the year-end ISL poster session. This year, the following engineering awards were made (and CoE provided $6,000 in matching funds)
  - Robin Fowler – Technical Communication
    The effect of electronic platform on student engineering design team success, $3,000 (matched by CoE).
  - Steve Yalisove – Materials Science and Engineering
    Improving student learning with an inverted classroom model: An action-based immersive learning experience proposal, $3,000 (matched by CoE).

TEACHING INNOVATION PRIZE

- Through the Teaching Innovation Prize competition, five faculty from across the university were recognized for developing student learning innovations. This year, **three engineering faculty received the award, the largest number of recipients from a single college to date**. Each recipient was awarded $5,000 and will disseminate their teaching innovations at a future campus-wide event.
  - Lola Eniolo-Adefeso – Chemical Engineering
    Using K-12 outreach to motivate self-directed learning in the engineering classroom.
  - Joanna Millunchick – Materials Science Engineering
    The use of screencasts in large lecture courses.
  - Kathleen Sienko – Mechanical Engineering
    Design for global health.

OTHER GRANT COMPETITIONS

- Engineering faculty were awarded the following seven grants:
  - David Chesney – Electrical Engineering and Computer Science
    Microsoft Kinect platform for game and app development for patients with autism - Gilbert Whitaker Fund: Stage 1, $10,000.
  - Amy Cohn – Industrial and Operations Engineering & Michelle Macy – Medical School
    Developing a framework for hands-on collaborations between engineering and medical students on open-ended projects - Gilbert Whitaker Fund: Stage 1, $9,700.
  - Allen Liu – Mechanical Engineering
    Teaching ME 211 using a tablet computer - Instructional Development Fund, $500.
  - Wei Lu – Mechanical Engineering
    A virtual lab for nanotechnology education - Teaching with Technology Institute, $2,500.
  - Stephanie Sheffield – Technical Communication
    Improving oral presentation, design, delivery, and feedback in large lecture courses through interactive online in-class activities - Teaching with Technology Institute, $2,500.
  - Jan Stegemann – Biomedical Engineering
    Integrating case studies into the Biomedical Engineering design - Faculty Development Fund, $5,850.
  - Dawn Tilbury – Mechanical Engineering
    Take-home control experiment - Instructional Development Fund, $500.

CRLT UNIVERSITY-WIDE PROGRAMS

- CRLT offers a variety of seminars and workshops for participants across the university. There were **214 engineering participants (representing 138 unique individuals) at activities offered by the main CRLT office**.

SEMINARS

- 73 faculty and GSIs (representing 48 unique individuals) at 18 *CRLT Seminar Series* events.
- 30 participants (18 unique individuals) at seven *Enriching Scholarship* programs in Spring 2012.

PROVOST'S CAMPUS LEADERSHIP PROGRAM

- The main CRLT office worked with the Provost's Office to organize the *Provost's Campus Leadership Program*, an orientation for new chairs and associate deans and monthly sessions for both new and experienced ones. During the year, there were 30 engineering attendees (11 unique deans or chairs) at six separate sessions.

POSTDOCTORAL SHORT COURSE

- Seven of 34 participants in the seven week *Rackham/CRLT Postdoctoral Short Course on College Teaching in Science and Engineering* were engineering postdocs.

PREPARING FUTURE FACULTY (PFF) PROGRAMS

- In May, CRLT-Engin staff co-directed the *Rackham/CRLT Seminar on Preparing Future Faculty*, and eight engineering students participated (out of 55 total).
- The main CRLT office offered a one-day conference, *Getting Ready for an Academic Career*. 60 engineering graduate students and postdocs participated (out of 321 total).
- The *Rackham/CRLT Graduate Student and Postdoc Mentorship Program* brings together U-M graduate students and faculty from nearby colleges and universities to explore faculty work-life and the academic job search. Three mentor / mentee pairs (out of 24 total) involved engineering graduate students.

GRADUATE TEACHER CERTIFICATE PROGRAM

- With the Rackham School of Graduate Studies, the main CRLT office coordinates a program for graduate students across the university to earn a U-M Graduate Teacher Certificate. One of the 47 students who completed certificates in 2011–2012 was an engineering student.

OTHER PROGRAMS

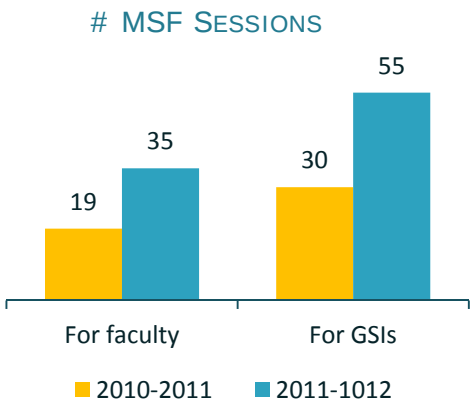
- 14 engineering faculty at the *Thurnau Professor Dinner* and 18 at the *International Faculty Dinner.*
- 41 engineering participants at the *CRLT 50th Anniversary Panel and Plenary.*
- 15 new engineering faculty at the university-wide *New Faculty Orientation.*
- Two new engineering GSIs at the university-wide *GSI Teaching Orientation.*
- Two engineering faculty at the Provost's Seminar on Teaching titled *Teaching with Collections: Engaging Students in the Archives, Museums, and Gardens of the University of Michigan.*
- Four engineering faculty participants in the *Google Faculty Learning Community.*

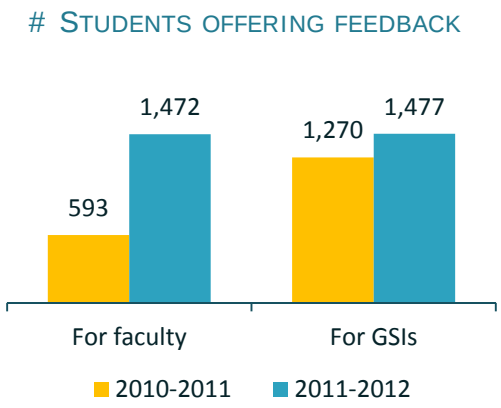
SERVICES FOR INDIVIDUAL FACULTY, GSIS, AND POST-DOCS

CRLT-Engin provides a comprehensive range of services for individual instructors that includes classroom interventions (such as midterm student feedback sessions), teaching-related consultations, consultations on proposal preparation and education research, and long-term collaborations.

MIDTERM STUDENT FEEDBACK SESSIONS AND OBSERVATIONS

- Staff from CRLT-Engin (including the Engineering Teaching Consultants) conducted:
  - 35 Midterm Student Feedback sessions for engineering faculty and 55 for engineering GSIs, allowing 2,949 students to provide feedback on faculty teaching.
  - 24 classroom observations and follow-up consultations with engineering faculty, and 28 for GSIs.





> Your comments and suggestions were very constructive, and easy to implement. I used the [MSF] service for a course that I was teaching for the sixth time. Even though I was comfortable with the way I had taught the course, the program **encouraged me to make simple but important changes** that I know had a big impact on the students. I have recommended this service to all of my colleagues, whether they are junior or senior.
>
> *Assistant Professor, Fall 2011*

> Thanks again for the midterm student feedback help! It **really changed the way that I both structured my class and interacted with my students**. I truly appreciate it!
>
> *Assistant Professor, Winter 2012*

> I had a midterm feedback session for the **first time in my long career at U-M**. It was really valuable.
>
> *Full Professor, Winter 2012*

Individual consultations

Teaching-related consultations

- Staff from CRLT-Engin (including the Engineering Teaching Consultants) and the main CRLT conducted the following consultations about issues related to teaching and learning:
  - 45 consultations for 33 unique faculty, staff, or administrators, and
  - 97 consultations for 78 unique graduate students (including GSIs).

Consultations on proposal preparation

- Staff conducted 22 consultations with 15 U-M engineering assistant professors submitting NSF CAREER proposals.
- Staff conducted 25 consultations with 15 unique faculty preparing NSF proposals other than the CAREER and internal proposals (other than the CAREER) for the following programs:
  - NSF Research Initiation Grants in Engineering Education (RIGEE) Program,
  - NSF Broadening Participation Research Initiation Grants in Engineering (BRIGE) Program,
  - NSF Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) Centers,
  - NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Program,
  - NSF Transforming Undergraduate Education in STEM (TUES) Program, and
  - Mellon Foundation.

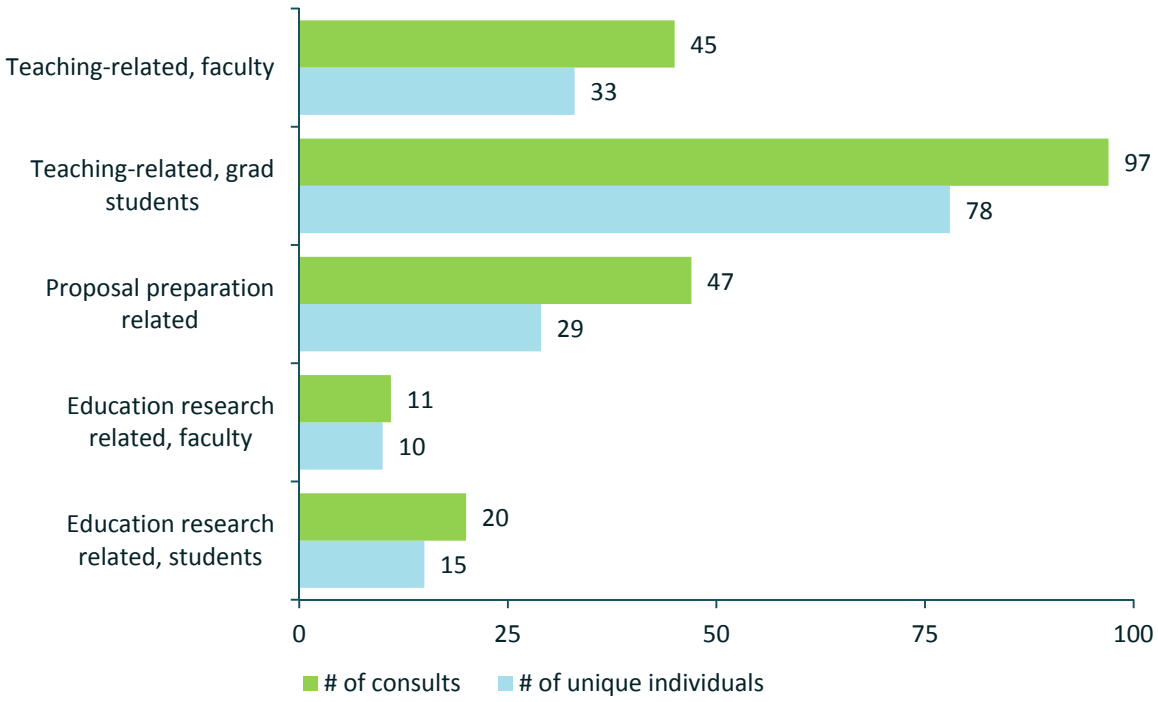
> I wanted to let you know that the CAREER proposal I submitted this summer was awarded and I think **the assistance I received from you in formulating a broader impacts plan was very helpful**.
>
> *CAREER recipient*

> I will be resubmitting my CAREER proposal this year, but I don't think I will be changing up my broader impact and educational section much, because it **got great reviews thanks to your help last year**.
>
> *CAREER recipient*

Consultations on education research

- Staff from CRLT-Engin conducted the following consultations about issues related to engineering education research:
  - 11 consultations for 10 unique faculty, staff, or administrators, and
  - 20 consultations for 15 unique graduate students (including GSIs).

DATA RELATED TO CONSULTATIONS



	CONSULTATIONS* (INCLUDING MSFS) RELATED TO				
Department	**MSFs and Observations**	**Teaching**	**Proposal Preparation**	**Education Research**	**Total**
AERO	6	7		5	18
AOSS	8		3		11
BME	7	9	2	1	19
CEE	12	9	8	5	34
CHE	16	20	1	3	40
EECS-CSE	21	17	6		44
EECS-ECE	15	25	2		42
IOE	14	6	6	2	28
ME	23	14	5	6	48
MSE	2	11	4		17
NAME	2	1			3
NERS	6	5			11
Tech Comm	8	2		3	13
Engin Admin		3	5	1	9
Total	**142**	**142**	**47**	**31**	**362**

This table includes services provided by the Engineering Teaching consultants
*Individuals who had multiple services are counted multiple times

SUSTAINED CONSULTATIONS AND COLLABORATIVE PROJECTS

- CRLT-Engin staff engaged in sustained consultations with faculty and staff on the following projects:
  - Improving teaching style,
  - Learning qualitative research skills in survey design, interview protocol design, and qualitative data analysis, and
  - Refining a course-based innovation for a research journal.
- CRLT-Engin staff engaged in long-term collaborations with faculty and staff on the following projects:
  - Designing a TA training program for the *Summer School for Integrated Computational Education*,
  - Designing and leading sessions for the *Center for Entrepreneurship Young Entrepreneurs Workshop*,
  - Designing and leading two sessions for the *Design Immersion Program*,
  - Discussing the new teaching orientation policy for undergraduate instructional aides,
  - Investigating interdisciplinary interactions in large-scale research and development projects,
  - Planning *NextProf: Diversifying the Academy*, a future faculty summit for engineers, and
  - Synthesizing a survey instrument from engineering education literature to assess the Multidisciplinary Design Minor's Design Immersion Program for 100 entering students.

SERVICES FOR ADMINISTRATORS AND THE BROADER COMMUNITY

To support administrators, staff, and the broader community, CRLT-Engin staff consults with administrators and staff and have regular meetings with administrators to ensure that programming meeta the needs of the community, assume a variety of teaching responsibilities (for full courses and as a guest lecturer), and serve on numerous committees.

CONSULTATIONS FOR ADMINISTRATORS AND STAFF

- Staff had one-on-one meetings with chairs of the following departments to discuss CRLT-Engin:
  - Aerospace Engineering,
  - Atmospheric, Oceanic, and Space Sciences,
  - Civil and Environmental Engineering,
  - Chemical Engineering,
  - Computer Science Engineering,
  - Materials Science & Engineering, and
  - Naval Architecture and Marine Engineering
- Staff made presentations about CRLT-Engin at faculty meetings for the following departments:
  - Computer Science Engineering,
  - Materials Science & Engineering, and
  - Civil and Environmental Engineering.
- Staff from CRLT-Engin and the main CRLT conducted **26 consultations for 20 staff and administrators** on topics that included:
  - A town hall meeting for the Honor Council,
  - Developing an honors program,
  - Difficult faculty members,
  - Information about NSF CAREER awards,
  - Learning styles and the Myers-Briggs Type Inventory,
  - Lecturer reappointment,
  - Programs to highlight entrepreneurship,
  - Research on creativity and art making,
  - Sustainability courses and programs,
  - Teaching large classes,
  - Theater performances for engineering, and
  - Using reflective writing in the multidisciplinary design program.
- CRLT-Engin met as needed to consult about faculty development, teaching-related issues, and GSI training with the following administrators:
  - Associate Dean for Undergraduate Education,
  - Associate Dean for Academic Affairs, and
  - Managing Director of the Office of Academic Affairs.

Teaching and guest lecturer activities

- Staff from CRLT-Engin had the following teaching responsibilities:
  - ENGR 490-08: Intro to design process (Winter 2012), and
  - ENGR 200: Product design (Spring 2012) – Tecnun University, Spain

> This is one of the best new classes in the College of Engineering. It is so unique, and it covers material that every engineer should learn. I would (and already have) encourage all my friends to take this class. For the first time, I feel like I have an idea about how to go about designing a system.
>
> *Student enrolled in ENGR 490-08, Winter 2012*

- **Staff from CRLT-Engin made 13 guest lecture presentations** in the following seven classes:
  - ENGR 580: Teaching Engineering (two times),
  - ENGR 590: Engineering in the K-12 Classroom,
  - ME 250: Design and Manufacturing I (two sections),
  - ARTDES 300/ ME 450/ DESCI 501: Analytical Product Design,
  - CHE 405: Problem Solving and Trouble Shooting in the workplace,
  - ENGR 100: Introduction to Engineering (five sections), and
  - University of Dayton, Multidisciplinary Design.

Committee service

- Staff from CRLT-Engin regularly participated on the following committees:
  - All-Hands group of the Associate Dean for Undergraduate Education,
  - College of Engineering's Undergraduate Education Team,
  - Dissertation committee for Design Science Ph.D. student, and
  - Faculty Advisory Council of the Center for Engineering Outreach and Diversity.

NATIONAL LEADERSHIP

CRLT-Engin is dedicated to providing national leadership to enhance the visibility of U-M in engineering education. As such, CRLT-Engin consults with individuals outside the U-M community, serves on national committees and review boards, and participates in national workshops and conferences.

CONSULTATIONS OUTSIDE OF U-M

- 34 consultations for 30 individuals at the following 26 organizations outside of U-M:
  - American Society of Engineering Education,
  - ASEE Prism,
  - Duke University,
  - Georgia Institute of Technology,
  - Kettering University,
  - Lonestar College,
  - Makarere University, Uganda,
  - Mathworks,
  - National Science Foundation,
  - Oakland University,
  - Olin College,
  - Purdue University,
  - Ritsumeikan University, Japan,
  - Shanghai Jiao Tong University, China,
  - University of California – Irvine,
  - University of Chicago,
  - University of Cincinnati,
  - University of Louisville,
  - University of Maryland,
  - University of Pittsburgh,
  - University of San Diego,
  - University of South Carolina,
  - University of South Florida,
  - University of Texas – Austin,
  - Virginia Tech, and
  - Western Michigan University.

NATIONAL SERVICE

- During 2011–2012, staff at CRLT-Engin served in the following national leadership roles:
  - Member of Kettering University's Center for Excellence in Teaching & Learning Advisory Board.
  - Member of Frontiers in Education Conference Steering Committee.
  - Reviewer for conference papers submitted to:
    - 2012 ASEE Conference, Educational Research and Methods Division, and
    - 2011 Research in Engineering Education Symposium.
  - Reviewer for manuscripts submitted to:
    - Design Studies,
    - Journal of Mechanical Design, and
    - Journal of Science and Technology Education.
  - Reviewer for proposals submitted to:
    - National Science Foundation Graduate Research Fellowship Program, and
    - National Science Foundation International Research Experience for Students Program.
- Co-leader of Engineering Education Centers and Programs group.

PARTICIPATION IN WORKSHOPS AND CONFERENCES

- CRLT-Engin staff attended the following conferences to share research results, participate in professional development, and increase U-M national visibility:
  - *NSF Engineering Education Centers Division – Awardees Conference*, Arlington, VA, where CRLT-Engin's Director co-facilitated two panels on "Building Value Propositions" and presented poster on ethics research,
  - Engineering Education Research Peer-mentoring Workshop, Athens, GA,
  - *2011 Annual ASEE Conference & Exposition*, Vancouver, Canada, and
  - *Research in Engineering Education Symposium*, Madrid, Spain.

RESEARCH IN ENGINEERING EDUCATION

CRLT-Engin recognizes the importance of its role in reforming engineering education and furthering the mission of the college to promote excellence in engineering education. In addition to supporting others who pursue scholarship in engineering education, CRLT-Engin conducts its own research. In particular, staff:

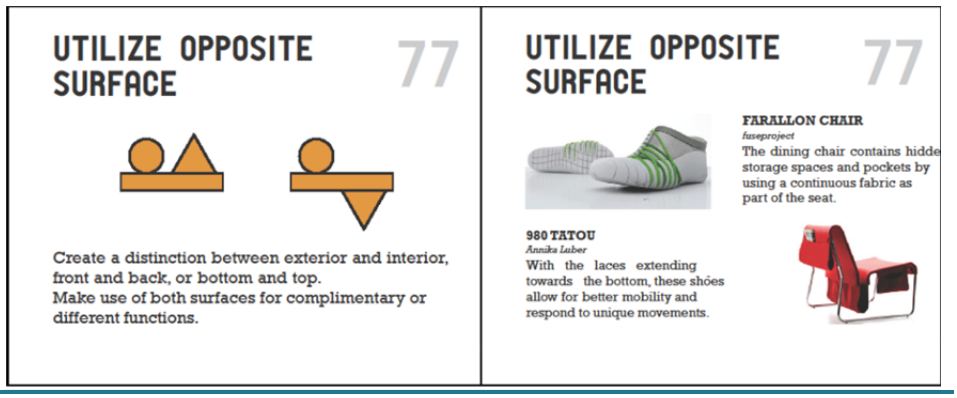
- **Actively pursued eleven major research initiatives, and**
- **Submitted five grant proposals, and**
- **Had 15 refereed journal manuscripts and 15 refereed conference proceedings accepted or published, including six manuscripts in the prestigious *Journal of Engineering Education.***

RESEARCH ACTIVITIES BY CRLT IN ENGINEERING STAFF

Title and Project Team	Project Description and Activities
FACULTY TEACHING PRACTICES TO SUPPORT STUDENT SUCCESS **Project team:** Cynthia Finelli, Shanna Daly, James Holloway, one research assistant, and two U-M students in the Undergraduate Research Opportunity Program (UROP)* * *Drs. Finelli and Daly received the UROP Faculty Recognition Award for Outstanding Mentorship as a result of their work with these two students*.	• This project, supported through an *NSF Course, Curriculum, and Laboratory Improvement* award, is intended to promote substantive and sustained changes in teaching practices to improve student success and support a diverse student body in engineering. Applying the Expectancy-Value Theory to faculty motivation to adopt research based effective teaching practices, the project aims to integrate local evidence about institutional context and faculty/student perspectives with research about successful teaching practices to develop an institutional change model. • Several aspects of the project were completed this year: ▪ Ten years of demographic and academic data were compiled for engineering students, and success metrics were compared by gender and minority status. An internal report describing the findings was used at the College of Engineering Diversity Retreat. ▪ Focus groups for academic advisors were conducted to identify faculty practices they believe support student success. ▪ A survey about teaching practices that positively impact student success was completed by 386 engineering undergraduates. Focus groups were subsequently conducted to explore interesting survey responses. ▪ Focus groups of engineering faculty were conducted to examine factors that influence faculty's motivation to adopt research-based, effective practices. • Dissemination included two conference papers and three internal presentations.

Research activities by CRLT-Engin staff

Title and Project Team	Project Description and Activities
Activities that promote ethical development of engineering undergraduates **Project team:** Cynthia Finelli, Donald Carpenter (Lawrence Technological University), Trevor Harding (California Polytechnic State University), Janel Sutkus (Carnegie Mellon University), and five U-M graduate students	• The project, funded by an *NSF Engineering Education Centers* award and involving 19 partner institutions, is designed to answer the question: What activities (in the formal and/or informal engineering curriculum) have the most positive impact on the ethical development of engineering undergraduates? Qualitative data were collected during focus groups and interviews with 123 students and 146 faculty or administrators, and quantitative data comprised survey responses from 3,914 undergraduate engineering students. • Dissemination included one national and three regional workshops, three refereed journal articles, five conference presentations, and several internal presentations. • NSF funded the next stages of this research in which a practical instrument for assessing students' ethical development will be designed for use by engineering educators nationally.
Design heuristics: Cards to prompt creative designs **Project team:** Shanna Daly, Seda Yilmaz (Iowa State University), Colleen Seifert (Psychology), Richard Gonzalez (Psychology), and two U-M undergraduate students	• The Design Heuristics comprise 77 cards developed after extensive analysis of innovative products and expert designers. Each card describes one successful design strategy and includes an abstract image depicting the application of the strategy and two examples showing evidence of the strategy in existing consumer products. The current goals of this work, funded through a newly-awarded *NSF Transforming Undergraduate Education in STEM* grant, include validating the advantages of the 77 cards and studying how they can influence students' idea generation processes and design outcomes. • Through guest lectures, the 77 cards were shared with over 500 students in 15 classes. Other dissemination includes one manuscript and two conference presentations. Commercialization of the cards is underway.



RESEARCH ACTIVITIES BY CRLT-ENGIN STAFF

Title and Project Team	Project Description and Activities
CREATIVE PROCESS PEDAGOGY **Project team:** Shanna Daly, Colleen Seifert (Psychology), five U-M undergraduate students, and one U-M graduate student	• This research seeks to examine and compare "best practices" for creative development embedded in courses across the university. In-depth data from 20 courses, including instructor and student interviews and student surveys, has been analyzed. Data from a university-wide survey of instructors for 73 courses has also been collected. • Three grant proposals were submitted, and two manuscripts are underway.
EFFECTS OF ETHNOGRAPHIC INVESTIGATIONS ON STUDENT DESIGN DECISIONS **Project team**: Shanna Daly, Kathleen Sienko (Mechanical Engineering), and one U-M graduate student	• The goal of this project is to study the impact of a design primer workshop series on students' design decisions in a global health project in Ghana. The workshops focus on ethnography, synthesizing the voice of the customer, and developing design requirements. • A proposal to the *NSF Research Initiation Grant in Engineering Education* program was submitted to support the research, and a pilot investigation was completed.
SCREENCASTS TO INCREASE STUDENT LEARNING **Project team:** Tershia Pinder-Grover, Joanna Millunchick (Materials Science and Engineering), and one Michigan State University graduate student	• This project involves studying the value and impact of screencasts (i.e., digital screen captures with real-time audio commentary) in the large-lecture environment. Through the lens of the Expectancy-Value Theory, the research involves a combination of quantitative and case study analyses to examine how and why students use these resources, explore students' perceptions of the helpfulness of screencasts, and study the relationship between screencast use and performance on particular exam questions. • Dissemination included one manuscript and one presentation.
THE CHALLENGE OF TRANSITIONING FROM AN ENGINEERING CAREER TO GRADUATE SCHOOL **Project team:** Shanna Daly, Steve Skerlos (Mechanical Engineering), Diane Peters (U-M alum), and two U-M graduate students	• This project, funded by an *NSF Engineering Education Research* grant, explores the experiences of returning STEM graduate students (i.e., those who have worked after their undergraduate degree for at least five years). In particular, it seeks to investigate returners' decision-making processes, the guidance they seek when considering graduate education, academic, personal, and social issues they face in returning, and success strategies that enable them to persist and succeed in graduate school. • Analysis of the pilot interview data is complete, and a survey instrument for both returners and traditional students is under development. Next steps include identifying ways to leverage returning students' role in developing innovations.

Other research projects

NSF Workshop on engineering education research taxonomy

- At the invitation of NSF and following conversations with NSF program officers and the executive Director of ASEE, the Director of CRLT-Engin submitted a workshop proposal to NSF. The purposes of the workshops are: (1) to engage the broad, national community in creating a taxonomy for the field of engineering education research, and (2) to prioritize areas of research within the framework of the taxonomy.

Opportunities for creative design in ENGR 100

- This research focuses on engineering students' conceptions of creativity and their perceptions of creative opportunities in their ENGR 100 design projects as they progress through the semester. Four student surveys were developed, administered, and analyzed, and findings were presented internally.

ePortfolios for the academic job market

- CRLT-Engin assisted faculty from Virginia Tech in implementing a pilot program for engineering GSIs. Through the program, ten participants created professional ePortfolios for the academic job market.

Approaches to Design

- This project focuses on ways people approach design tasks from different disciplinary perspectives. Two manuscripts about the work were published.

Proposals, publications, and presentations

Ongoing, awarded, or pending research grants

1. **Daly, S. R.,** & Skerlos, S. Characterizing engineers who return from industry to earn a Ph.D. and their impact on innovation. *National Science Foundation–Research in Engineering Education (REE) Program*. Proposal #1159345, $425,999. 04/01/12- 3/31/14. [awarded]
2. **Daly, S. R**., Gonzalez, R., & Seifert, C. M. Integrating design heuristics into engineering education as a pedagogy for ideation. *National Science Foundation–Transforming Undergraduate Education in STEM (TUES) Program*. Proposal #1140256, $199,859, 04/15/12-03/14/13. [awarded]
3. **Finelli, C. J.** Collaborative Research: The SEED-PA. A practical instrument for assessing individual ethics initiatives. *National Science Foundation–Transforming Undergraduate Education in STEM (TUES) Program*. Proposal #1140175, $86,656. 04/15/12–03/31/14. [awarded]
4. **Finelli, C. J.** Workshops to create a taxonomy for engineering education research and prioritize areas of research. *National Science Foundation–Engineering Education Program*. Proposal #1240797, $233,178. Submitted 04/09/12. [pending]
5. **Finelli, C. J.**, & Holloway, J. P. Motivating change in faculty teaching practices to support a diverse student body in engineering. N*ational Science Foundation–Course, Curriculum, and Laboratory Improvement (CCLI) Program*. Proposal #0941924, $199,999. 09/15/10–08/31/13 (one-year, no-cost extension). [ongoing]
6. **Finelli, C. J.,** King, P. M., & Dey, E. L. Collaborative research: A holistic assessment of the ethical development of engineering undergraduates. *National Science Foundation–Engineering Education Program*. Proposal #0647532, $548,181. 03/01/07–02/28/13 (two one-year, no-cost extensions). [ongoing]
7. Sienko, K. & **Daly, S. R**. The Effects of Ethnographic Investigations on Students' Design Decisions. *National Science Foundation–Research Initiation Grants in Engineering Education (RIGEE) Program*. Proposal # 1240295, $149,993. Submitted 03/29/12. [pending]

Refereed journal publications (or equivalent) in print or accepted

1. Adams, R. S., **Daly, S. R.**, Mann, L., & Dall'Allba, G. (2011, Nov.). Being a professional: Three lenses on design thinking, acting, and being. *Design Studies, 32*(6), 588-607.
2. Bryan, L., Sederberg, D., **Daly, S. R.**, Sears, D., & Giordano, N. (2012). Facilitating teachers' development of nanoscale science, engineering, and technology content knowledge. *Nanotechnology Review, 1*, 85-95.
3. **Daly, S.**, Yilmaz, S., Christian, J., Seifert, C. M., & Gonzalez, R. (2012). Design heuristics in engineering concept generation. *Journal of Engineering Education*. In press.
4. **Daly, S. R.**, Adams, R. S., & Bodner, G. M. (2012, April). What does it mean to design? A qualitative investigation of design professionals' experiences. *Journal of Engineering Education, 101*(2), 187-219.
5. **Daly, S. R.**, Christian, J., Yilmaz, S., Seifert, C. M., & Gonzalez, R. (2012). Assessing design heuristics in idea generation within an introductory engineering design course. *International Journal of Engineering Education*, *28*(2), 463-473.
6. **Finelli, C. J.**, Holsapple, M. A., Ra, E., Bielby, R. M., Burt, B. A., Carpenter, D. D., Harding, T. S., & Sutkus, J. A. (2012, July). An assessment of engineering students' curricular and co-curricular experiences and their ethical development. *Journal of Engineering Education, 101*(3), 469-494.
7. **Finelli, C. J.**, **Pinder-Grover, T.**, & Wright, M. C. (2011). Consultations on teaching. Using student feedback for instructional improvement. In C. E. Cook & M. L. Kaplan (Eds.), *Advancing the culture of teaching at a research university: How a teaching center can make a difference* (65-79). Sterling VA: Stylus Publishing.
8. Green K**., Pinder-Grover, T.** & Millunchick, J. (2012). Impact of screencast technology: Connecting the perception of usefulness and the reality of performance. *Journal of Engineering Education.* In press.
9. Harding, T. S., Carpenter, D. D., & **Finelli, C. J.** (2012, April). An exploratory investigation of the ethical behavior of engineering undergraduates. *Journal of Engineering Education, 101*(2). 346-374.
10. Holsapple, M. A., Carpenter, D. D., Sutkus, J. A., **Finelli, C. J.**, & Harding, T. S. (2012, April). Framing faculty and student discrepancies in engineering ethics education delivery. *Journal of Engineering Education, 101(*2*).* 169-186.
11. Kalish, A., Robinson, S., Border, L. L. B, Chandler, E. O., Connolly, M., Eaton, L. J., Gilmore, J., Griffith, L., Hanson, S., **Pinder-Grover, T.**, & von Hoene, L. (2012). Steps toward a framework for an intended curriculum for graduate and professional students: How we talk about what we do. In A. Kalish & S. Robinson, (Eds.), *Studies in Graduate and Professional Student Development* (163-174). In press.
12. Meizlish, D. M., **Pinder-Grover, T.**, & Wright, M. C. (2012). Effective use of graduate peer teaching consultants: Recruitment, training, supervision, and evaluation. In K. Brinko (Ed.), *Practically Speaking*. Stillwater, OK: New Forums Press. In press.
13. Ohland, M. W., Loughry, M. L., Woehr, D. J., **Finelli, C. J.**, Bullard, L. G., Felder, R. M., Layton, R. A., Pomeranz, H. R., & Schmucker, D. G. (2012). The Comprehensive Assessment of Team Member Effectiveness: Development of a behaviorally anchored rating scale for self and peer evaluation. *Academy of Management Learning & Education*. In press.
14. **Pinder-Grover, T.** Meizlish, D. M., & Wright, M. (2011). Graduate Peer Teaching Consultants: Expanding the Center's Reach. In C. Cook (Eds.) *Advancing the Culture of Teaching on Campus: How a Teaching Center Can Make a Difference* (80-96). Stylus Publishing: Sterling, VA.
15. **Pinder-Grover, T.**, Milkova, S., & Hershock, C. (2012). Training TAs as consultants at the University of Michigan: Workshop series for peer mentors. In K. Brinko (Ed.), *Practically speaking*. Stillwater, OK: New Forums Press. In press.

REFEREED CONFERENCE PROCEEDINGS

1. Bielby, R. M., Harding, T. S., Carpenter, D. D., **Finelli, C. J.**, Sutkus, J. A., Burt, B. A., Ra, E., & Holsapple, M. A. (2011, June). Impact of different curricular approaches to ethics instruction on ethical reasoning ability. *Proceedings of the 2011 ASEE Annual Conference & Exposition*, Vancouver, Canada.
2. Burt, B., Carpenter, D. D., **Finelli, C. J.**, Harding, T. S., Sutkus, J. A., Holsapple, M. A., Bielby, R. M., & Ra, E. (2011, June). Outcomes of engaging engineering undergraduates in co-curricular experiences. *Proceedings of the 2011 ASEE Annual Conference & Exposition*, Vancouver, Canada.
3. Carpenter, D. D., **Finelli, C. J.**, Holsapple, M. A., Bielby, R. M., Burt, B. A., Sutkus, J. A., & Harding, T. S. (2011, Oct.). Assessing the ethical development of engineering undergraduates in the United States. *Proceedings of the 2011 International Research in Engineering Education Symposium*, Madrid, Spain.
4. Christian, J., **Daly, S. R.**, Yilmaz, S., Seifert, C., & Gonzalez, R. (2012). *Design heuristics support two modes of idea generation: Initiating ideas and transitioning among concepts*. Accepted for presentation at the 2012 ASEE Annual Conference & Exposition, San Antonio, TX.
5. **Daly, S. R.**, Bell, A., Gilchrist, B., Hohner, G., & Holloway, J. (2011, June). Making a college-level multidisciplinary design program effective and understanding the outcomes. *Proceedings of the 2011 ASEE Annual Conference & Exposition*, Vancouver, Canada.
6. **Daly, S. R.**, Christian, J., Yilmaz, S., Seifert, C. M., & Gonzalez, R. (2011, June). Teaching design ideation. *Proceedings of the 2011 ASEE Annual Conference & Exposition*, Vancouver, Canada.
7. **Daly, S. R.**, **Finelli, C. J.**, Al-Khafaji, A. B., & Neubauer, M. J. (2012). *Student perspectives of faculty classroom practices*. Accepted for presentation at the 2012 ASEE Annual Conference & Exposition, San Antonio, TX.
8. **Finelli, C. J.**, & **Daly, S. R.** (2011, Oct). Teaching practices of engineering faculty: Self-reported behavior and actual practice. *Proceedings of the 2011 International Research in Engineering Education Symposium*, Madrid, Spain.
9. Hohner, G, **Daly, S. R.**, Wegner, J., Lee, M., & Goldstein, A. (2012). *Becoming an engineer: Assessing the impact of a short workshop on incoming engineering students' understanding of engineering design*. Accepted for presentation at the 2012 ASEE Annual Conference & Exposition, San Antonio, TX.
10. Holsapple, M. A., Sutkus, J., **Finelli, C. J.**, Carpenter, D. D., Burt, B. A., Ra, E., Harding, T. S., & Bielby, R. M. (2011, June). We can't get no satisfaction!: The relationship between students' ethical reasoning and their satisfaction with engineering ethics education. *Proceedings of the 2011 ASEE Annual Conference & Exposition*, Vancouver, Canada.
11. Holsapple, M.A., Sutkus, J. A., **Finelli, C. J.**, Carpenter, D. D., Burt, B. A., Ra, E., Harding, T. S., & Bielby, R. M. (2011, Nov.). Exploring the relationship between satisfaction, pedagogical approaches, and student outcomes. *Proceedings of the 26th Annual Conference of the Association for the Study of Higher Education Conference*, Charlotte, NC.
12. Peters, D. & **Daly, S. R.** (2012). *Why do professionals return to school for graduate degrees*? Accepted for presentation at the 2012 ASEE Annual Conference & Exposition, San Antonio, TX.
13. Peters, D., & **Daly, S. R.** (2011, June). The challenge of returning: Transitioning from an engineering career to graduate school. *Proceedings of the 2011 ASEE Annual Conference & Exposition*, Vancouver, Canada.
14. Yilmaz, S., Christian, J. L., **Daly, S. R.**, Seifert, C. M., & Gonzalez, R. (2012). How do design heuristics affect outcomes? *International Design Conference*, Dubrovnik, Croatia.
15. Yilmaz, S., Christian, J. L., **Daly, S. R.**, Seifert, C. M., & Gonzalez, R. (2011). Collaborative idea generation using design heuristics. *Proceedings of the 18th International Conference on Engineering Design, ICED '11*, Kopenhagen, Denmark.

OTHER PRESENTATIONS

1. Al-Khafaji, A. B., Neubauer, M. J., **Daly, S. R.**, & **Finelli, C. J.** (2012, Feb). *Cultivating the classroom: Student perspectives of faculty classroom practices*. Poster presented at the CRLT-Engin Research and Scholarship in Engineering Education Poster Fair, Ann Arbor, MI.
2. Bielby, R. M., Carpenter, D. D., **Finelli, C. J.**, Harding, T. S., Sutkus, J. A., Burt, B. A., & Holsapple, M. A. (2012, Feb). *Impact of different curricular approaches to ethics on positive ethical behavior*. Poster presented at the CRLT-Engin Research and Scholarship in Engineering Education Poster Fair, Ann Arbor, MI.
3. Burt, B. A., Carpenter, D. D., Holsapple, M. A., **Finelli, C. J.**, Bielby, R. M., Sutkus, J. A., & Harding, T. S. (2012, Feb). *Co-curricular experiences: Bridging the disconnect between the classroom and ethics instruction*. Poster presented at the CRLT-Engin Research and Scholarship in Engineering Education Poster Fair, Ann Arbor, MI.
4. Carpenter, D. D., Sutkus, J. A., **Finelli, C. J.**, & Harding, T. S. (2011, Oct.). *An exploration of the ethical development of engineering undergraduates*. Mini workshop at 41st IEEE/ASEE Frontiers in Education Conference, Rapid City, SD.
5. **Finelli, C. J.**, & Harding, T. S. (2011, Oct.). *SEED Project Regional Workshop*, Ann Arbor, MI.
6. **Finelli, C. J.**, Carpenter, D. D., & Harding, T. S. (2012, March). *Collaborative research: A holistic assessment of the ethical development of engineering undergraduates*. Poster presented at the NSF Engineering Education Awardees Conference, Arlington, VA.
7. Green, K., **Pinder-Grover, T.,** and Millunchick, J. (2012, Feb.) *Impact of screencast technology: Connecting perceptions and performance*. Poster presented at the CRLT-Engin Research and Scholarship in Engineering Education Poster Fair, Ann Arbor, MI.
8. Holsapple, M. A., **Finelli, C. J.**, Bielby, R. M., Burt, B. A., Carpenter, D. D., Harding, T. S., & Sutkus, J. A. (2012, Feb). *Student engagement in ethics education: Quantity and quality*. Poster presented at the CRLT-Engin Research and Scholarship in Engineering Education Poster Fair, Ann Arbor, MI.
9. Tolbert, D. & **Daly, S. R.** (2012, Feb.). *Student perceptions of creative opportunities in engineering design: Preliminary findings*. Poster presented at the CRLT-Engin Research and Scholarship in Engineering Education Poster Fair, Ann Arbor, MI.