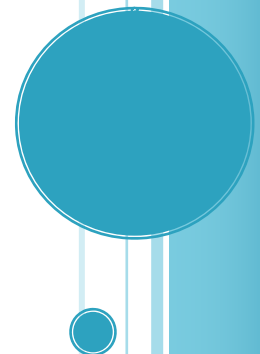
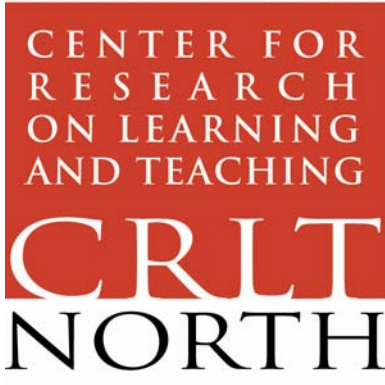


THE CENTER FOR RESEARCH ON LEARNING AND TEACHING NORTH (CRLT NORTH)

2009-2010 Report for College of Engineering

University of Michigan



CRLT NORTH: REPORT FOR COLLEGE OF ENGINEERING

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OVERVIEW

The Center for Research on Learning and Teaching North (CRLT North) represents a partnership between the College of Engineering (CoE) and the main CRLT office on central campus. Some highlights of the engineering services provided by CRLT North and the main CRLT during the 2009-2010 academic year follow.

COLLEGE-WIDE PROGRAMS

- CRLT North offered twelve sessions for the CRLT North Seminar Series which were had an overall attendance of 456 (357 unique individuals). Of note: the program *A Conversation on the Future of Engineering Education*, featuring James Duderstadt and Sheri Sheppard, was attended by more than 150 individuals.
- There were 326 new instructors (306 unique individuals) at CRLT North programs for new engineering faculty, GSIs, and undergraduate instructional aides, and CRLT North staff had face-to-face interactions 20 (80%) of the 25 new faculty hired in 2009-2010.
- Other programs coordinated by CRLT North had an attendance of 254 (140 unique individuals). These included an engineering faculty curriculum retreat in which more than 80 engineering faculty participated and a workshop on engineering education research that 33 people attended.
- The CRLT Players Theater Troupe conducted twelve performances that were attended by engineers. Altogether there were 323 engineering registrants (representing 310 unique individuals).
- The main CRLT office offered other programs that were attended by 301 individuals from engineering (representing 175 unique individuals).

CONSULTATIONS AND CLASSROOM INTERVENTIONS

- CRLT North provided 91 Midterm Student Feedback sessions or other classroom interventions for 27 unique faculty and 58 unique GSIs, allowing more than 2300 students to provide feedback to their instructors.
- All of the 18 faculty who submitted NSF CAREER proposals in July 2010 attended CRLTN's *Preparing an NSF CAREER workshop*, and 15 (83%) had individual consultations with CRLT North.
- Staff from CRLT North (including Engineering GSI Mentors) conducted 119 consultations with faculty or administrators and 1449 with students or postdoctoral fellows in engineering.
- CRLT North staff consulted with 22 individuals at 18 organizations and institutions outside U-M.

RESEARCH AND SCHOLARSHIP IN ENGINEERING EDUCATION

- CRLT North supported engineering faculty and GSIs interested in research in engineering education by:
 - Convening meetings for the engineering Investing Student Learning grant winners to build community and discuss progress,
 - Offering seminars on scholarship in engineering education, including a half-day workshop on research design and methodology with feedback on participants' own projects, and
 - Managing the Rackham Certificate in engineering education research for graduate students.
- CRLT grants provided a total of \$41,722 (with additional matching funds of \$6,000 provided by CoE) to engineering faculty pursuing scholarship in engineering education.
- Staff from CRLT North engaged in nine research projects, submitted three NSF grant proposals, published 15 refereed journal or conference publications, and made six other publications or presentations.

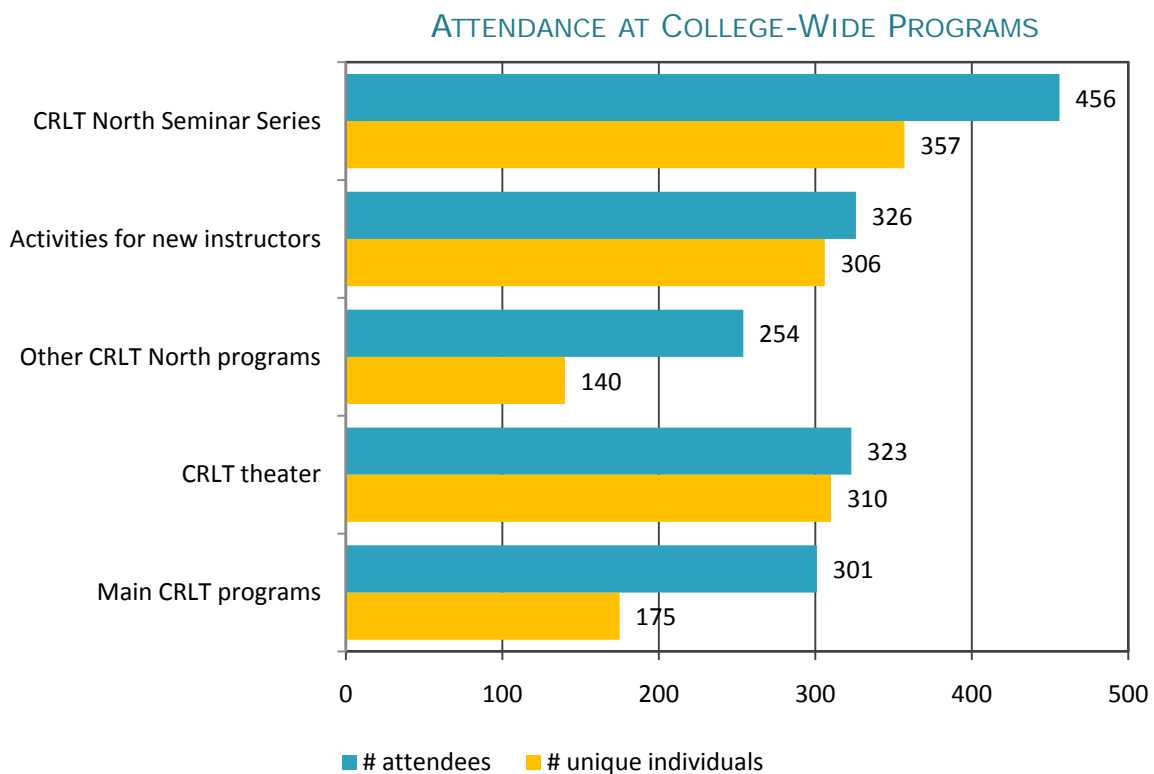
CRLT NORTH ADVISORY BOARD

The CRLT North Advisory Board, established in January 2010, is a group of seven faculty which provides guidance and insight about CRLT North programs and serves as advocates for CRLT North within the engineering community. The board also reviews proposals for the Curricular Innovations in Undergraduate Engineering Education program. Members of the board include:

- Krzysztof Fidkowski – Assistant Professor, Aerospace Engineering
- John Foster – Associate Professor, Nuclear Engineering and Radiologic Sciences
- Jessy Grizzle – Professor, Electrical Engineering and Computer Science
- Jerome Lynch – Associate Professor, Civil and Environmental Engineering
- Joanna Millunchick – Associate Professor, Materials Science and Engineering
- Mark Moldwin – Professor, Atmospheric, Oceanic, and Space Sciences
- Margaret Wooldridge – Professor, Mechanical Engineering

COLLEGE-WIDE PROGRAMS

CRLT North provides several college-wide programs to promote a culture of teaching and learning in engineering. These include the CRLT North Seminar Series, activities for new engineering instructors, other programs for the engineering community, performances by the CRLT Players Theater Troupe, and university-wide programs planned by the main CRLT office. Altogether, **these programs had an attendance of 1660 (794 unique individuals)**.



CRLT NORTH SEMINAR SERIES

There were 456 attendees (representing 357 unique individuals) at the following 12 programs in the CRLT North Seminar Series:

1. *Actively Engaging Students in Engineering Sections and Labs* (for graduate students & postdoctoral fellows), 09/14/09.
2. *Handling Sticky Situations With Students* (for graduate students & postdoctoral fellows), 10/01/09.
3. *Developing a Productive Relationship With Your Research Advisor* (for graduate students & postdoctoral fellows), 10/15/09.
4. *Fourth Annual Research and Scholarship in Engineering Education Poster Session*, with 17 posters on display, 10/22/09.
5. *Teaching with Variety: Helping Students “Get it”* (for faculty), 11/03/09.
6. *Creative Problem Solving* (for faculty), presented by H. Scott Fogler, 11/16/09.
7. *Best Teaching Practices: Perspectives From Experienced Engineering GSIs* (for graduate students & postdoctoral fellows), 01/14/10.
8. *Helping Students Learn in a Laboratory Course* (for graduate students & postdoctoral fellows), 01/26/10.
9. *A Conversation on the Future of Engineering Education*, featuring James Duderstadt and Sheri Sheppard and attended by more than 150 members of the community, 02/05/10.
10. *Teaching for Student Retention in Engineering* (for faculty), 02/18/10.
11. *Writing a Teaching Philosophy Statement for Engineering* (for graduate students & postdoctoral fellows), 03/17/10.
12. *First Days: (dis)Ability in the Classroom*, a CRLT Players performance (for faculty), 03/31/10.



PHOTOS TAKEN DURING THE PROGRAM *A CONVERSTION ON TEACHING*

ACTIVITIES FOR NEW INSTRUCTORS

CRLT North offers activities to support new instructors as they prepare for teaching. These include both new faculty workshops and orientation programs for GSIs and undergraduate instructional aides (IAs), and they had an attendance of 351 (331 unique instructors).

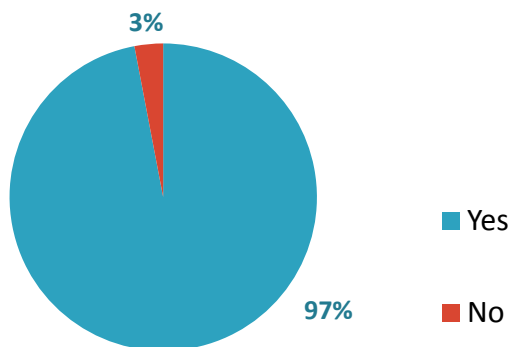
WORKSHOPS FOR NEW ENGINEERING FACULTY

- **CRLT North offered five workshops for new engineering faculty. Eighty were in attendance (representing 61 unique individuals);** postdoctoral fellows were invited to attend the NSF CAREER Proposal workshop:
 1. *Overview of CRLT North* at the Keys to the College session, 09/23/09.
 2. *Strategies for New Faculty Success*, 10/01/09.
 3. *Actively Engaging Students in Engineering Courses*, 02/24/10.
 4. *Networking with Members of the Engineering Teaching Academy*, 03/23/10.
 5. *Preparing an NSF CAREER Proposal*, 04/27/10.

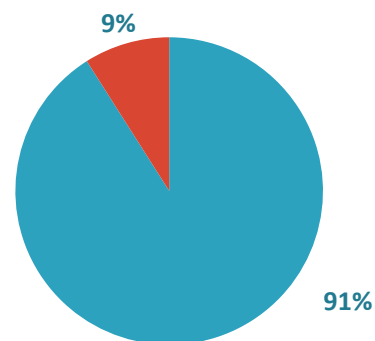
ENGINEERING GSI/IA TEACHER TRAINING

- Each term, CRLT North coordinates the mandatory teacher orientation program for new GSIs and IAs. It includes an all day training program and two practice teaching sessions, and there is a make-up program to accommodate late GSI/IA assignments. **Altogether, 271 unique students attended the orientation programs,** and ratings of the program continue to be high.

Would you recommend the program?



Do you feel well prepared to teach?



“This program exceeded my expectations as I did not anticipate being given tangible tools that I can use. I am leaving the program with many new ideas which is great!”

GSI who participated in teacher training in Winter 2010

OTHER CRLT NORTH PROGRAMS

CRLT North coordinates several other programs for engineering. **There were 254 attendees (representing 140 unique individuals) at the following programs:**

1. *College of Engineering Faculty Retreat* to discuss the undergraduate curriculum, attended by more than 80 members of the CoE community, 09/18/09.
2. *First Year Issues Program*, a series of brown bag lunch sessions for engineering faculty teaching first year courses that addressed the following topics:
 - Supporting students in distress, 10/02/09.
 - Managing student teams, 12/15/09.
 - Working with faculty-undergraduate teaching teams, 02/19/10.
3. *College of Engineering Diversity Summit* (undergraduate breakout session of the event), 10/13/09.
4. *Faculty Brown-Bag Lunches on Teaching* covering the following topics:
 - Oral examinations for classroom assessment, 10/29/09.
 - International students, 12/18/09.
 - Diversity in the classroom, 01/22/10.
5. *What Have We Learned About Educating Engineers? A Field Report from the Carnegie Study*, presented by Sheri Sheppard, 02/05/10.
6. *NSF Web-Based Webinar on Proposal Writing*, 03/30/10.
7. *NSF Web-Based Webinar on Project Evaluation and Broader Impacts*, 04/15/10.
8. *Introduction to Education Research*, 05/26/10.



FACULTY ARE ENGAGED DURING A CRLT NORTH PROGRAM ON EDUCATING ENGINEERS

CRLT THEATER

The CRLT Players Theater Troupe performs sketches that engage faculty and graduate students in discussions of diversity, effective pedagogy, and institutional climate. In 2009-2010, the **CRLT Players had the following 12 performances that included 323 engineers (representing 310 unique individuals) in the audience:**

- *The First Class*, showing student viewpoints on a variety of classroom practices and approaches, 09/02/09 and 03/24/10.
- *Climate in the Classroom*, addressing diverse student perspectives and international experiences in the engineering classroom, 09/03/09 and 01/05/10.
- *Staff Vignettes*, focusing on the interactions of support staff and their key administrators and addressing difficulties of managing staff dynamics, 09/23/09.
- *First Days – (dis)Ability in the Classroom*, highlighting the many issues, stereotypes, and dynamics surrounding disabilities, 10/26/09 and 03/31/10.
- *The Kiss*, a one-act play on the topic of sexual harassment, 01/13/10 and 01/27/10.
- *Graduate Student Mentoring*, exploring common dynamics and dilemmas in the faculty / graduate student mentoring relationship, 04/05/10.
- *Faculty Advising Faculty*, showing the junior faculty / senior faculty mentoring process and examining factors that can foster or hinder effective mentoring, 05/13/10.
- *Student Conflict in the Classroom*, focusing on students' perspectives and instructor responsibility in a classroom conversation that suddenly turns contentious, 05/18/10.

MAIN CRLT PROGRAMS

There were 301 engineering participants (representing 175 unique individuals) at the following activities offered by the main CRLT office:

- 19 new engineering faculty at the university-wide *New Faculty Orientation* program and four engineering students at the *GSI Teaching Orientation* program.
- 156 faculty and GSIs at 20 separate *CRLT Seminar Series* events (representing 78 unique individuals).
- 31 participants (19 unique individuals) at the *Enriching Scholarship* program in Spring 2010.
- 23 engineering faculty at the *International Faculty Dinner*.
- Two engineering faculty and three GSIs at the *Investigating Student Learning Symposium*.
- 14 engineering faculty at the Fall 2009 Provost's Seminar on Teaching titled *Teaching the Millennial Generation*.
- 32 engineering faculty at the Winter 2010 Provost's Seminar on Teaching titled *Mentoring for Graduate Student and Postdoctoral Scholar Success*.
- 18 participants at other programs.

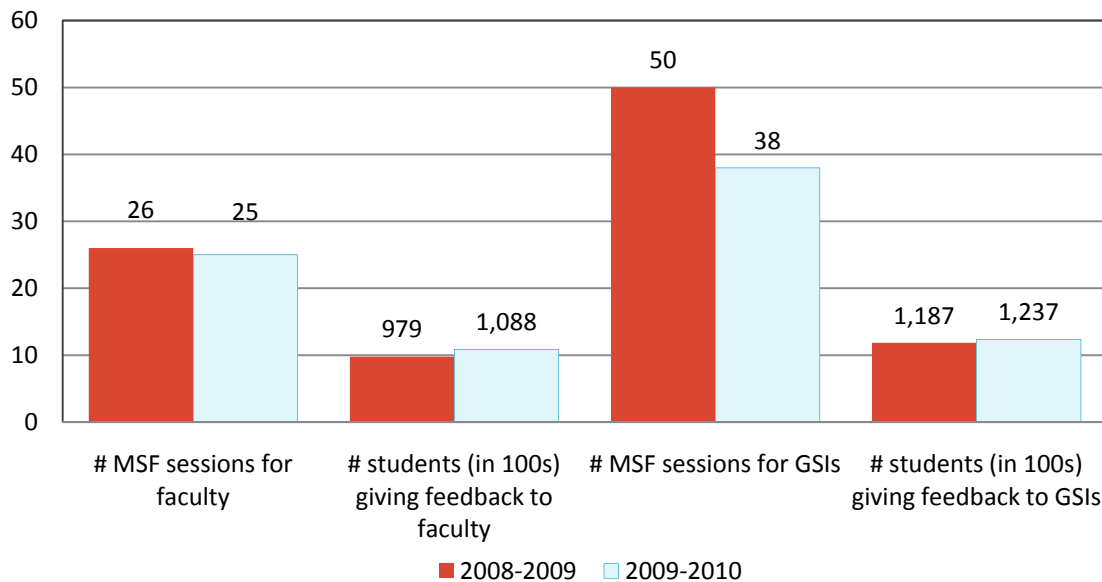
SERVICES FOR INSTRUCTORS AND ADMINISTRATORS

CRLT North provides a comprehensive range of services for instructors and administrators which includes classroom interventions and consultations on proposal preparation and other issues. CRLT North also publicizes ongoing teaching and learning initiatives through its website, and the main CRLT office coordinates the Provost’s Campus Leadership Programs and several education-related grants. Finally, CRLT North staff serve on various committees and make classroom presentations.

CLASSROOM INTERVENTIONS

- Staff from CRLT North conducted:
 - **25 Midterm Student Feedback sessions for 26 engineering faculty, allowing more than 1000 students to provide feedback on faculty teaching** (interventions for GSIs are documented elsewhere in this report).
 - 5 consultations based on a videotaped class session or a class observation for five unique faculty.

MIDTERM STUDENT FEEDBACK SESSIONS BY CRLT NORTH STAFF



“The service is invaluable and appreciated. It should be part of all new faculty promotion dossiers, if not already.”
Full Professor during first term at U-M, Fall 2009

“The feedback that I received was much more detailed and useful than what can be obtained from end-of-term student evaluations. Plus, it allowed me to address problem areas mid-semester, which probably led to the significant increase in ratings at end of term.”
Assistant Professor during first term at U-M, Fall 2009

CONSULTATIONS WITH INSTRUCTORS AND ADMINISTRATORS

CONSULTATIONS FOR THE NSF CAREER PROPOSAL

- Staff from CRLT North conducted:
 - **Consultations with 15 (83%) of the 18 engineering faculty who submitted NSF CAREER proposals in July 2010.**
 - A workshop on *Preparing an NSF CAREER Proposal* that was **attended by all 18 of the engineering faculty who submitted proposals in July 2010.**
 - **Interactions with 36 assistant professors eligible to write NSF CAREER proposals for July 2010** (some of the consultations happened after the end of the academic year).

“Today, I got the official notice [that I was awarded the CAREER grant]. I would like to thank you for your inspiration and enormous assistance in developing the educational plan for this proposal. Without your help and input, this would not have been possible. Thanks a lot!”

Assistant Professor who was awarded the CAREER grant in 2009

CONSULTATIONS FOR OTHER NSF PROPOSALS

- Staff from CRLT North and the main CRLT conducted **13 consultations with 10 unique faculty preparing NSF proposals (other than the CAREER)** for the following programs:
 - Climate Change Education
 - Course, Curriculum, and Laboratory Improvement
 - Fostering interdisciplinary Research in Engineering
 - Graduate Stem Fellows in K-12 Education
 - Science Masters Program
 - Research Experience for Undergraduates
 - Transforming Undergraduate Education in STEM

CONSULTATIONS FOR INSTRUCTORS

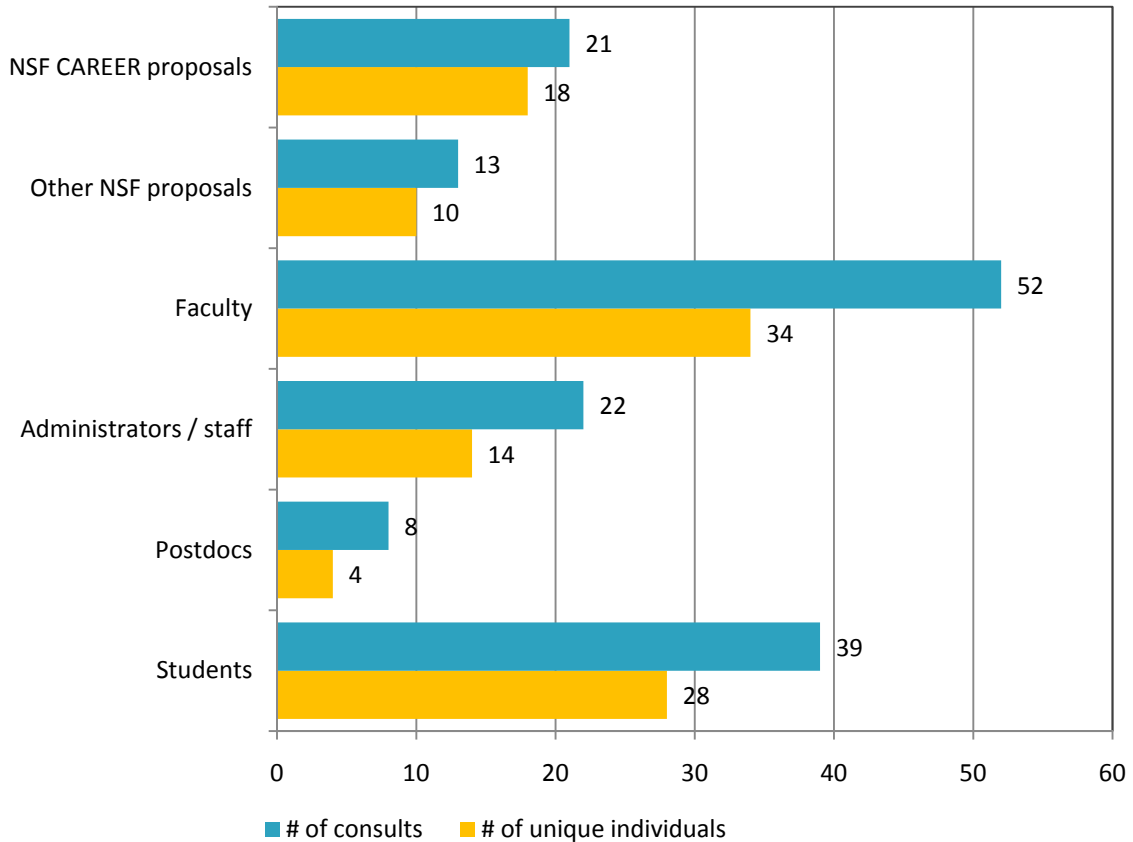
- Staff from CRLT North and the main CRLT conducted:
 - 52 consultations for 34 unique faculty.
 - 8 consultations for 4 postdoctoral fellows.
 - 39 consultations for 28 students.

CONSULTATIONS FOR ADMINISTRATORS AND STAFF

- Staff from CRLT North and the main CRLT conducted **22 consultations for 14 unique individuals and 11 group meetings** on topics that included:
 - Assessing student perceptions of the electrical engineering program by coordinating a series of EECS student focus groups, preparing a final report on the feedback, and discussing findings at ECE Undergraduate Curriculum Committee meeting.
 - Implementing college-wide assessment with the ABET planning group.
 - Revising the Lecturer Major Review Guidelines to better support teaching.

- Planning department-based efforts to promote good teaching.
- Discussing ways to promote diversity and to address diverse student voices in the college.
- Designing effective training modules with the Responsible Conduct of Research Task Force.
- Incorporating ethics education into the curriculum with the engineering ethics / sustainability group.
- Discussing teaching support available for engineering instructors at the U-M reaccreditation meeting with the Higher Learning Commission.
- Evaluating the Off-Course theater sketch performed in ENG 100 and preparing a videotaped overview with members of the Educational Theater Company.
- Planning the Alliance for Graduate Education and the Professoriate (AGEP) mentoring initiative and presenting at the AGEP Research Symposium.
- Developing a program for faculty on distance learning and technology.
- Restructuring the Engineering GSI Mentor program.
- Developing a Rackham grant-writing workshop.
- Mentoring engineering graduate students.
- Sharing GSI coordination efforts across departments.
- CRLT North met as needed to consult about faculty development, teaching-related issues, and GSI training with the following individuals:
 - Dean of Engineering.
 - Associate Dean for Undergraduate Education.
 - Associate Dean for Academic Affairs.
 - Director of Academic Programs.
 - Managing Director of the Office of Academic Affairs.
 - Coordinator of GSI programs.

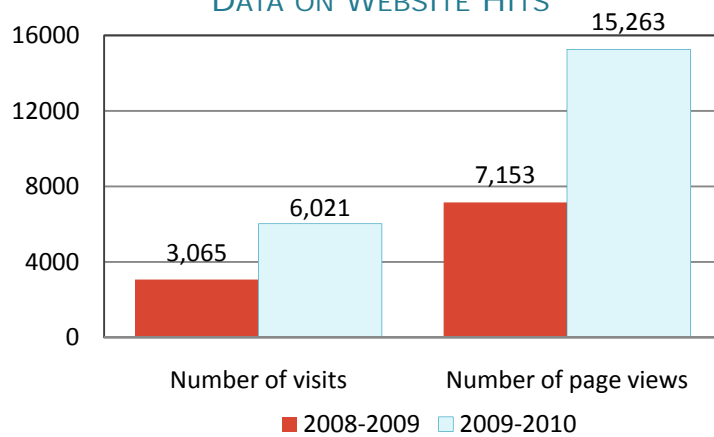
CONSULTATIONS BY CRLT NORTH STAFF



CRLT NORTH WEBSITE

- The website had **6,021 visits** and **15,263 page views**, an almost two-fold increase from the previous year.

DATA ON WEBSITE HITS



PROVOST'S CAMPUS LEADERSHIP PROGRAM

- The main CRLT office worked with the Provost's Office to organize the 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 15 engineering attendees (5 unique deans or chairs) at 10 separate sessions.

CRLT GRANTS

In 2009-2010, the main CRLT office administered eight grants competitions for faculty to improve teaching and learning, and engineering faculty were very competitive for these grants. **Six engineering proposals were funded for a total of \$41,722 (with additional matching funds totaling \$6,000 provided by CoE).**

- *Investigating Student Learning Competition.* Awardees attended a one-day spring symposium on research about teaching and learning and will work with CRLT North during the coming year to conduct educational research on student learning. CoE provided \$6,000 in matching funding for engineering faculty for the following two research projects:
 - Krzysztof Fidkowski – Assistant Professor, Aerospace Engineering
A Systematic Assessment of the Benefits of Active Learning in Undergraduate Aerodynamics, \$3,000.
 - Denise Sekaquaptewa – Associate Professor, Psychology & Lorelle Meadows – Director of Academic Programs, Engineering
The Effect of Group Gender Composition on Student Learning in Undergraduate Engineering Project Teams, \$3,000.
- *Other Competitions.* Engineering faculty were also awarded the following four grants through the Faculty Development Fund and the Stage I Gilbert Whitaker Fund for the Improvement of Teaching:
 - Amy Cohn – Associate Professor, Industrial and Operations Engineering
Optimization Processes for Power Systems: A New Inter-Disciplinary Course Focusing on Renewable Energy, \$5,995 from Faculty Development Fund.
 - Joanna Millunchick – Associate Professor, Materials Science and Engineering
Investigating the Efficacy of Screencasts as Learning Tools in College of Engineering Courses, \$10,000 from Whitaker Stage I grant.
 - Jeffrey Ringenberg – Lecturer, Computer Science Engineering
Engineering Online Gateway System, \$9,727 from Whitaker I grant.
 - Steve Yalisove – Professor, Materials Science and Engineering & Franc Nunoo-Quarcoo – Professor, Art and Design
Engineering Lectures in the Vocabulary of Graphic Design: Improving Student Comprehension and Retention in Engineering Lectures, \$10,000 from Whitaker Stage I grant.

COMMITTEE SERVICE

- Staff from CRLT North and the main CRLT regularly participated on the following committees:
 - Diversity and Outreach Council.
 - Learning Technology Committee.
 - All-Hands group of the Associate Dean for Undergraduate Education.

CLASSROOM PRESENTATIONS

- Staff from CRLT North made presentations in the following classes:
 - *ENG 580: Teaching Engineering* to discuss evaluation of teaching and Rackham Certificate in Engineering Education Research.
 - *ENG 580: Teaching Engineering* to discuss ethics.
 - *ME 495: Laboratory II* to discuss ethics.

SERVICES FOR POSTDOCTORAL FELLOWS AND STUDENTS

CRLT North provides an array of programs for postdoctoral fellows, graduate students, and undergraduate instructional aides (IAs) in engineering. These include consultations, a course on college teaching for postdocs, the Engineering GSI Mentor program, several preparing future faculty events, support for the Student Chapter of the American Society of Engineering Education, and the Graduate Teacher Certificate (administered by the main CRLT).

ACTIVITIES FOR POSTDOCTORAL FELLOWS

- Eleven of 32 participants in the seven week *CRLT / Rackham Postdoctoral Short Course on College Teaching in Science and Engineering* were engineering postdocs.

ENGINEERING GSI MENTOR PROGRAM

- CRLT North hires, trains, and manages the Engineering GSI Mentors (EGSMs), a group of experienced GSIs who serve the entire engineering GSI/IA population by each mentoring 20-30 individuals. **EGSMs served 289 and 263 GSIs/IAs in fall and winter, respectively. In all, EGSMs provided 1463 separate services.**

THE ENGINEERING GSI MENTORS



Fall 2009



Winter 2010

SERVICES PROVIDED BY ENGINEERING GSI MENTORS

Type of service	Fall 2009	Winter 2010	Total
Midterm Student Feedback sessions	21	17	38
Other classroom interventions	12	11	23
Scheduled consultations on teaching	44	64	108
Informal consultations (in person or email)	550	582	1132
Attendance at group consultations or activities	86	76	162
Total	713	750	1463

PROFESSIONAL DEVELOPMENT FOR EGSMs

- CRLT North held an informational session about the EGSM program that was attended by 7 potential EGSMs. Three who attended were subsequently hired as EGSMs.
- EGSMs participated in training sessions on conducting Midterm Student Feedback sessions and classroom observations and on facilitating practice teaching sessions.
- EGSMs attended biweekly professional development programs on topics that included:
 - Program overview and using surveys to know your GSIs.
 - Discussion with the Associate Dean for Undergraduate Education.
 - Consultation issues.
 - Midterm Student Feedback reports.
 - Identifying and working with students in distress.
 - Inclusive teaching: disability in the classroom.
 - Teaching the Millennial Generation.
 - Gender biases in speech.
 - Inquiry learning and “Top ten worst teaching mistakes.”
 - EGSM program restructuring.
 - Consulting in laboratory classes.
 - Inductive learning using the “jigsaw” format.
 - Working with GSI-faculty teams.

“Not only have the experiences of working with the EGSM program been extremely enriching and rewarding, but my experiences came up in almost every job interview. Thank you so much for everything you’ve done!”

former Engineering GSI Mentor

DEPARTMENT GSI ORIENTATIONS

- EGSMs were present at several department orientations. Approximately 180 students attended the programs held by the following departments:
 - Aerospace Engineering
 - Chemical Engineering
 - Electrical Engineering & Computer Science
 - Industrial and Operations Engineering
 - Mechanical Engineering

PREPARING FUTURE FACULTY (PFF) EVENTS

- *Month-Long PFF Seminar.* In May, CRLT North staff co-directed the *Eleventh Annual CRLT / Rackham Seminar on College Teaching*, and eight engineering students participated (out of 49 total).
- *One-day PFF Conference.* The main CRLT office offered a one-day conference *Getting Ready for an Academic Career*. 33 engineering graduate students and postdocs participated (out of 245 total).
- *Mentoring Program.* The CRLT / Rackham Graduate Student 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 28 total) involved two unique engineering graduate students.

SUPPORT FOR STUDENT CHAPTER OF THE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

- The U-M Student Chapter of the American Society for Engineering Education (ASEE) is an organization committed to furthering education in engineering. In 2009-2010, CRLT North worked with nine students by providing feedback for graduate students at two sessions of the *ASEE Summer Seminar Series*.

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 *Graduate Teacher Certificate*.
 - Six of the 48 students who completed certificates in 2009-2010 were engineering students.

NATIONAL LEADERSHIP

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

SERVICE AT THE NATIONAL LEVEL

During 2009-2010, staff at CRLT North served in the following national leadership roles:

- Guest co-editor for special issue of *International Journal of Engineering Education* on applications of engineering education research.
- Member of *Frontiers in Education Conference Steering Committee*.
- Campus liaison for National Academy of Engineering's *Center for the Advancement of Scholarship in Engineering Education*.
- Reviewer for:
 - *Advances in Engineering Education*.
 - *International Journal of Engineering Education*.
 - *Journal of Engineering Education*.
- Co-leader for national effort to network Engineering Education Centers and Programs.

PARTICIPATION IN WORKSHOPS AND CONFERENCES

- CRLT North staff attended the following conferences:
 - *2009 Annual ASEE Conference & Exposition*, Austin, TX. 06/14/09–06/17/09.
 - *2009 Research in Engineering Education Symposium*, Queensland, Australia. 07/20/09–07/23/09.
 - *39th IEEE/ASEE Frontiers in Education Conference*, San Antonio, TX. 10/18/09–10/21/09.
 - *NSF Engineering Education and Centers Division Awardees Conference*, Reston, VA. 01/30/10–02/02/10.

CONSULTATIONS OUTSIDE OF U-M

● CRLT North staff conducted 29 consultations for 22 individuals at these 18 organizations outside of U-M:

- California Polytechnic State University
- Clemson University
- General Electric Aviation
- Lakeland College
- Lawrence Technological University
- Massachusetts Institute of Technology
- Middle East Technical University
- North Carolina State University
- Pennsylvania State University
- Shanghai Jiao Tung University
- South Dakota School of Mines
- Stanford University
- University of Arkansas
- University of California, Irving
- University of South Florida
- University of Washington
- Virginia Tech
- Wiley Publishing

ASSISTANCE FOR SCHOLARSHIP IN ENGINEERING EDUCATION

CRLT North recognizes the importance of its role in reforming engineering education and furthering the mission of the college to promote excellence in engineering education. In support of these activities, CRLT North manages the *Rackham Certificate for Research in Engineering Education*, works closely with engineering faculty funded through the Investigating Student Learning competitions, and offers programs to support scholarly work of others.

RACKHAM CERTIFICATE IN ENGINEERING EDUCATION RESEARCH

- CRLT North coordinated the certificate program and advertised it by email and poster distribution.
- The first applicant was approved for the program in December.

INVESTIGATING STUDENT LEARNING (ISL) COMPETITION

2009-2010 COMPETITION

- CRLT North convened a series of three meetings for the five engineering ISL awardees to build community and discuss progress.
- Engineering ISL awardees presented posters at the *CRLT North Research and Scholarship in Engineering Education Poster Fair* and at the year-end ISL poster session.

2010-2011 COMPETITION

- Staff from CRLT North provided feedback on proposals for engineering faculty submitting to the competition.
- The all-day ISL Symposium, co-facilitated by staff from CRLT North, was attended by 10 ISL awardees (including 2 from engineering).

OTHER NETWORKING INITIATIVES

- Staff from CRLT North coordinated the following meetings to promote networking:
 - Discussion of a possible Center for Engineering Education Research.
 - Lunch program for School of Education faculty candidate and several engineering faculty.
- CRLT North staff served as faculty co-advisor for a graduate student in the Design Science Program.

ONGOING RESEARCH IN ENGINEERING EDUCATION RESEARCH

Besides supporting others as they pursue scholarship in engineering education, CRLT North conducts its own research. Staff from CRLT North:

- Pursued nine research projects.
- Submitted three grant proposals, had 13 refereed journal or conference publications, and made six other publications or presentations.
- Completed Year 3 of four-year, \$850,000 NSF project on ethical development of engineering undergraduates.

RESEARCH ACTIVITIES BY CRLT NORTH STAFF

Title and Project Team	Project Description and Dissemination
<p>ACTIVITIES THAT PROMOTE ETHICAL DEVELOPMENT OF ENGINEERING UNDERGRADUATES</p> <p>Project team: Cynthia Finelli, three U-M graduate students, and individuals from California Polytechnic State University, Carnegie Mellon University, and Lawrence Technological University</p>	<ul style="list-style-type: none"> ▪ The project, 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? The team visited 18 institutions to interview students, faculty, and administrators and used the results to design the SEED Survey. 3,943 undergraduate engineering students at 19 institutions completed the survey. The project will conclude with national workshops about experiences that are most influential on ethical development and about how to adapt them for other contexts. ▪ Two NSF proposals were submitted and nine manuscripts and presentations were completed.
<p>INTEGRATED MATH / SCIENCE COURSE OF THE M-STEM ACADEMY</p> <p>Project team: Cynthia Finelli, Cinda-Sue Davis, Guy Meadows, Lorelle Meadows, and one U-M graduate student</p>	<ul style="list-style-type: none"> ▪ The M-STEM Academy is a program for at-risk, already-admitted engineering students in CoE. It includes a pre-freshman, six-week, summer transition program with three academic classes. This project involves evaluating one of those courses, "Crossing the Boundary." ▪ A paper will be presented at the <i>2010 ASEE Annual Conference & Exposition</i>.
<p>ALTERNATIVE METHODS FOR GATHERING STUDENT FEEDBACK</p> <p>Project team: Cynthia Finelli, Tershia Pinder-Grover, and Mary Wright (Assistant Director, CRLT)</p>	<ul style="list-style-type: none"> ▪ This work is to develop and evaluate a modified midterm student feedback process which builds upon the online midterm ratings system already in place in engineering. Specifically, the instructor and consultant design a survey based upon online ratings, and the survey is then administered in class to get more focused student feedback. ▪ A manuscript describing the research has been accepted for publication in the <i>Journal of Faculty Development</i>.
<p>APPLIED HONORS MATH COURSE</p> <p>Project team: Cynthia Finelli, Vilma Mesa (Assistant Professor, Education), and one U-M graduate student</p>	<ul style="list-style-type: none"> ▪ This project is designed to answer the question: Does enrollment in an applied honors math course have a positive causal impact on later educational achievement for U-M engineering students? ▪ A manuscript describing the project was published in the <i>Journal of Engineering Education</i>.

RESEARCH ACTIVITIES BY CRLT NORTH STAFF

Title and Project Team	Project Description and Dissemination
<p>STUDENT TEAMWORK SKETCH IN ENG 100</p> <p>Project team: Cynthia Finelli and Callie McKee (Director of the U-M Educational Theater Troupe)</p>	<ul style="list-style-type: none"> ▪ CRLT North worked with the Educational Theater Troupe to develop a student-focused teamwork sketch for performance in ENG 100. This project studies the impact of it on students' perceptions of teamwork. ▪ The team developed a promotional video about the sketch (http://onsp.umich.edu/faculty_staff/offcourse.html) and presented one paper and one poster about this project.
<p>NATIONAL PROGRAM FOR TEACHING IN ENGINEERING</p> <p>Project team: Cynthia Finelli and individuals from ASEE, Bucknell University, Center for the Advancement of Scholarship in Engineering Education, Georgia Institute of Technology, Tennessee Technological University, and University of Louisville</p>	<ul style="list-style-type: none"> ▪ Strengthening the Performance of Engineering and Engineering Technology Educators across the Disciplines (SPEED) is a concept for a nationally-recognized professional development program for engineering and technology educators. The SPEED program is being developed with ASEE, and it will enable educators across the nation to voluntarily and continuously improve their teaching and their students' learning. ▪ The team submitted an NSF proposal and will present a paper at <i>2010 ASEE Annual Conference & Exposition</i>.
<p>INSTRUMENT TO ASSESS TEAM MEMBER EFFECTIVENESS</p> <p>Project team: Cynthia Finelli and individuals from, Georgia Southern University, North Carolina State University, Purdue University, and Rose-Hulman Institute of Technology.</p>	<ul style="list-style-type: none"> ▪ The team received the <i>2009 Premier Award for Engineering Education Courseware</i>.
<p>SCREENCASTS TO INCREASE STUDENT LEARNING</p> <p>Project team: Tershia Pinder-Grover, Joanna Millunchick, and a graduate student from Michigan State University</p>	<ul style="list-style-type: none"> ▪ 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. Specifically, screencast usage, student performance on homework and exams, and student surveys about attitudes and perceptions are being analyzed to determine how students use the screencasts, how the screencasts can be most effectively designed, and how the screencasts impact student learning. ▪ The team submitted an NSF proposal.
<p>PERCEPTIONS ABOUT THE MILLENNIAL GENERATION</p> <p>Project team: Tershia Pinder-Grover and Chris Groscurth (Assistant Director, CRLT)</p>	<ul style="list-style-type: none"> ▪ This project is designed to answer the question: How do future faculty perceive teaching and learning for Millennial students, and how do their perceptions map onto principles valued by the engineering education community? ▪ A <i>CRLT Occasional Paper</i> about the project was published, and a paper will be presented at the <i>2010 ASEE Annual Conference & Exposition</i>.

PROPOSALS, PUBLICATIONS, AND PRESENTATIONS

Staff at CRLT North submitted three NSF grant proposals, co-authored 15 referred journal or conference publications, and made six other publications or presentations.

RESEARCH GRANTS SUBMITTED

1. Finelli, C. J. Collaborative research: ASEE SPEED Program. *National Science Foundation—Course, Curriculum, and Laboratory Improvement Phase 2: Expansion Program*. Proposal #1021983, \$41,546, submitted 01/13/10.
2. Finelli, C. J. Collaborative research: Longitudinal measurement of ethical development in engineering students and professionals. *National Science Foundation—Engineering Education Centers Unsolicited Program*. Proposal #0952635, \$378,292, submitted 07/20/09.
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 Type 1 Program*. Proposal #1043811, \$81,812, submitted 05/26/10.

REFEREED JOURNAL PUBLICATIONS IN PRINT OR ACCEPTED

1. Carpenter, D. D., Harding, T. S., & Finelli, C. J. (2010). Using research to identify academic dishonesty deterrents among engineering undergraduates. *International Journal of Engineering Education*, 26(5). In press.
2. Finelli, C. J., Wright, M. C., & Pinder-Grover, T. (2010). Consulting the Delphi: A new idea for collecting student feedback through the Two-Survey Method. *Journal of Faculty Development*, 24(2). 25-33.
3. Meizlish, D. M., Pinder-Grover, T., & Wright, M. C. (2010). 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.
4. Mesa, V., Jaquette, O., & Finelli, C. J. (2009). Measuring the impact of an individual course on students' success. *Journal of Engineering Education*, 98(4), 349-359.
5. Pinder-Grover, T., Milkova, S., & Hershock, C. (2010). 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. Finelli, C. J., & Kendall-Brown, M. (2009, June). Using an interactive theater sketch to improve students' perceptions about and ability to function on diverse teams. *Proceedings of the 2009 ASEE Annual Conference & Exposition*, Austin, TX.
2. Finelli, C. J., Meadows, L. A., Lorch, D., Davis, C.-S., & Meadows, G. (2010, June). *Are we really "Crossing the Boundary"?* Assessing a novel integrated math/science course. Paper accepted for presentation at 2010 ASEE Annual Conference & Exposition, Louisville, KY.
3. Harding, T. S., Sutkus, J. A., Finelli, C. J., & Carpenter, D. D. (2009, July). Engineering culture and the ethical development of undergraduate students. *Proceedings of the 2009 International Research in Engineering Education Symposium*, Palm Cove, Queensland, Australia.
4. Holsapple, M. A. Carpenter, D. D., Sutkus, J. A., Finelli, C. J., Walczak, K., & Harding, T. S. (2010, June). *Understanding the differences between faculty and administrator goals and students' experiences with ethics education*. Paper accepted for presentation at 2010 ASEE Annual Conference & Exposition, Louisville, KY.

5. Holsapple, M. A., Finelli, C. J., Carpenter, D. D., Harding, T. S., & Sutkus, J. A. (2009, Oct.). Work-in-progress: A mixed-methods approach to developing an instrument measuring engineering students' positive ethical behavioral outcomes. *Proceedings of the 39th IEEE/ASEE Frontiers in Education Conference*, San Antonio, TX.
6. 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. (2010, Aug.). *The Comprehensive Assessment of Team Member Effectiveness: Development of a behaviorally anchored rating scale for self and peer evaluation*. Paper accepted for presentation at the 2010 Academy of Management Annual Meeting, Montreal, Canada.
7. Pinder-Grover, T. & Groscurth, C. (2010, June). *Perceptions of Millennial student learning: The future faculty perspective*. Paper accepted for presentation at 2010 ASEE Annual Conference & Exposition, Louisville, KY.
8. Sutkus, J. A., Carpenter, D. D., Finelli, C. J., & Harding, T. S. (2009, June). An examination of student experiences related to engineering ethics: Initial findings. *Proceedings of the 2009 ASEE Annual Conference & Exposition*, Austin, TX.
9. Visco, D., Schaefer, D., Utschig, T., Mohsen, J. P., Fortenberry, N., Prince, M., & Finelli, C. J. (2010, June). *Preparing for participation in SPEED: An ASEE initiative for a nationally recognized development program for engineering educators*. Paper accepted for presentation at 2010 ASEE Annual Conference & Exposition, Louisville, KY.
10. Walczak, K., Finelli, C. J., Holsapple, M. A., Sutkus, J. A., Harding, T. S., & Carpenter, D. D. (2010, June). *Institutional obstacles to integrating ethics into the curriculum and strategies for overcoming them*. Paper accepted for presentation at 2010 ASEE Annual Conference & Exposition, Louisville, KY.

INVITED WORKSHOPS

1. Litzinger, T. A., Finelli, C. J., Atman, C., Fortenberry, N. L., & Griffith, H. (2009, June). *Engineering Education Centers and Academic Units*. Workshop presented at 2009 ASEE Annual Conference & Exposition, Austin, TX.
2. Pawley, A. L., Riley, D., Harding, T. S., Lord, S., & Finelli, C. J. (2009, Oct.). *From active learning to liberative pedagogies: Alternative teaching philosophies in CSET education*. Special session at 39th IEEE/ASEE Frontiers in Education Conference, San Antonio, TX.

OTHER PRESENTATIONS

1. Finelli, C. J., Holsapple, M. A., Sutkus, J. A., Carpenter, D. D., Harding, T. S., & Walczak, K. (2010, Feb.). *The Survey of Engineering Ethical Decision-Making: Developing measures of engineering students' positive ethical behavior*. Poster presented at the NSF Engineering Education Awardees Conference, Reston, VA.
2. Finelli, C. J., & Kendall-Brown, M. (2009, Oct.). *Using an interactive theater sketch to improve students' ability to function on diverse teams*. Presented at the U-M CRLT North 4th Annual Research and Scholarship in Engineering Education Poster Session, Ann Arbor, MI.
3. Holsapple, M. A., Sutkus, J. A., Finelli, C. J., Carpenter, D. D., Harding, T. S., & Walczak, K. (2009, Oct.). *Development and testing of a survey to measure ethics education experiences and outcomes*. Presented at the U-M CRLT North 4th Annual Research and Scholarship in Engineering Education Poster Session, Ann Arbor, MI.
4. Walczak, K., Finelli, C. J., Holsapple, M. A., Harding, T. S., Carpenter, D. D., & Sutkus, J. A., (2009, Oct.) *Institutional barriers to integrating ethics education into the undergraduate engineering curriculum*. Presented at the U-M CRLT North 4th Annual Research and Scholarship in Engineering Education Poster Session, Ann Arbor, MI.

CRLT NORTH STAFF

During 2009-2010, Cynthia Finelli and Tershia Pinder-Grover served as primary professional staff of CRLT North. Their biographies are listed here. Additional programming and consultations were provided by staff from the main CRLT office including Crisca Bierwert, Constance Cook, Charles Dershimer, Chad Hershock, Matthew Kaplan, Mary Wright, and Erping Zhu. Program support was provided by Danielle Dorsette, James Freeland, and Jeri Hollister.

CYNTHIA FINELLI, DIRECTOR OF CRLT NORTH AND ASSOCIATE RESEARCH SCIENTIST



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 is 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 associate research scientist in engineering education at U-M.

TERSZIA PINDER-GROVER, ASSISTANT DIRECTOR OF CRLT NORTH



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, 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 assessing the impact of peer mentoring programs for GSIs.

