University of Michigan

CENTER FOR RESEARCH ON LEARNING AND TEACHING

CRLT NORTH

Report for College of Engineering
2008-2009

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CRLT North
Report for College of Engineering
July 1, 2008–June 30, 2009

Overview

The Center for Research on Learning and Teaching (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 during the 2008-2009 academic year follow.

Research and Scholarship in Engineering Education

- CRLT North provided support for engineering faculty and GSIs interested in research in engineering education by:
  - establishing the U-M Rackham Certificate for Research in Engineering Education for engineering doctoral students;
  - convening meetings for the engineering Investing Student Learning grant winners to build community and discuss progress; and
  - offering programs on scholarship in engineering education that were attended by more than 150* engineering faculty and graduate students.
- CRLT grants provided a total of $54,500 (with additional matching funds of $16,000 provided by CoE) to engineering faculty pursuing scholarship in engineering education.
- CRLT North staff engaged in eight active research projects that resulted in three refereed journal publications, seven presentations for refereed conference proceedings, 14 other publications or presentations, and four submitted grant proposals.

Consultations and Classroom Interventions

- CRLT North provided 95 midterm student feedback sessions or other classroom interventions for 79 unique faculty or GSIs. These sessions allowed more than 3,000 U-M undergraduate and graduate students to provide constructive feedback to their instructors.
- Staff from CRLT North conducted 1616 separate consultations with faculty, administrators, or graduates students in engineering.
- 24 of the 29 (83%) new engineering faculty had face-to-face interactions with CRLT North. This included consultations regarding National Science Foundation CAREER proposals, classroom interventions, or workshops on pedagogy.
- CRLT North staff consulted with 24 individuals at 20 organizations and institutions outside U-M.

College-Wide Programs

- There were 929* engineering registrants at the following CRLT North orientations programs and workshops:
  - 430 at orientation sessions for faculty or GSIs; and
  - 499 at seminars about teaching and learning.
- For the first time, CRLT North held the mandatory Engineering GSI Teacher Training program prior to the start of classes. Almost half of the engineering GSI population attended the orientation.
- 267* engineering faculty and GSIs attended other programs offered by the main CRLT office, and CRLT North staff co-authored a new CRLT Occasional Paper on teaching for retention in science, engineering, and math.
- The CRLT Players Theatre Troupe conducted five performances for 263* engineering registrants.

* These are not necessarily unique individuals, since some persons had more than one consultation or attended multiple programs.

College-Wide Programs

CRLT North provides several college-wide programs to promote a culture of teaching and learning in engineering. These include a seminar series for engineering, service on college committees, university-wide programs planned by the main CRLT office, performances by the CRLT Players Theatre Troupe, and publicity for teaching and learning initiatives.

CRLT North Seminar Series

CRLT North offers a series of programs for instructors to develop and improve their teaching skills, strategize about ways to lead a more productive work-life, hear about their colleagues' research and scholarship in engineering education, and share ideas across disciplines. During 2008-2009, CRLT North offered 10 engineering-focused seminars and programs, and faculty and GSIs from every department participated in the seminars. There were 290 participants (not necessarily representing unique individuals) at the following ten sessions:

- *Active Learning in Engineering*, presented by Dr. Michael Prince, Professor of Chemical Engineering, Bucknell University.
- *Advanced Active Learning*, informal lunch conversation with Dr. Michael Prince.
- *Seven (Simple) Strategies to Improve Your Teaching* (for graduate students), presented by Engineering GSI Mentors.
- *Classroom Assessment Techniques* (for graduate students), presented by Engineering GSI Mentors.
- *Quick and Easy Ways to Know Your Students Are Learning* (for graduate students), presented by Engineering GSI Mentors.
- *Using Groups: A Sketch by the CRLT Players* (for graduate students).
- *Using Student Teams in Engineering Classes* (for faculty), presented by Cynthia Finelli.
- *Third Annual Research and Scholarship in Engineering Education: Poster Session* featuring 19 posters and attended by more than 100 individuals.
- *What Is It Like to Be an Engineering Faculty Member?* A panel (for graduate students) featuring Jennifer Linderman, Jamie Phillips, and Shuichi Takayama and facilitated by Tershia Pinder-Grover.
- *Work-Life Balance* (for graduate students), presented by Engineering GSI Mentors.

The average overall rating of the seminars was 4.1/5.0, and the following quotes illustrate their impact:

> *"The seminar provided an effective forum to discuss issues of balance. I found the suggestions to find mentors and to locate sources of accountability particularly helpful."*
> excerpt from graduate student seminar evaluation
>
> *"I gave the class a review [material he learned from the workshop] a couple weeks back before I met one on one with project groups. People really liked the review process. I was surprised by how positive the reaction was."*
> unsolicited email feedback from faculty participant

Committee and Other Engineering Service

- *Diversity and Outreach Council*. CRLT North participated in biweekly meetings of the full council to advise the college on diversity initiatives to pursue.
- *Engineering Teaching Academy*. With the Associate Dean for Undergraduate Education, CRLT North planned and participated in a series of brown-bag lunch sessions – open to all faculty – to talk about teaching. There were more than 50 faculty attendees (not necessarily unique individuals) at these six sessions.

- *Lecturer Major Review Guidelines.* CRLT North staff worked with a committee of administrators and lecturers to develop a proposal to better address teaching initiatives in the guidelines for the lecturer major review process.

CRLT Programs

- There were 161 engineering participants at the following activities offered by the main CRLT office:
  - 16 faculty participants and 64 student participants at 16 separate *CRLT Seminar Series* events (representing 11 and 40 unique faculty and students, respectively);
  - 35 unique individuals from engineering at the *Enriching Scholarship* program in Spring 2009;
  - 16 engineering faculty (of 109 attendees) at the *International Faculty Dinner*;
  - Six engineering faculty and three GSIs at the *Investigating Student Learning Symposium* (out of 17 total participants);
  - 14 engineering faculty (out of 79 participants) at the Fall 2008 Provost's Seminar on Teaching titled "*Teaching the Millennial Generation*"; and
  - Seven engineering faculty (out of 68) at the winter Provost's Seminar on Teaching titled "*Mentoring for Graduate Student and Postdoctoral Scholar Success*."
- *CRLT Occasional Papers.* **CRLT North staff coauthored and published a CRLT Occasional Paper titled *Teaching for Retention in Science, Engineering, and Math Disciplines: A Guide for Faculty*.** Two other Occasional Papers – *Student Teams in the Classroom: Setting up Students for Success* and *Principles for Teaching the Millennial Generation: Innovative Practices of U-M Faculty* – are underway.

CRLT Players Theatre Troupe

The CRLT Players Theatre Troupe is comprised of local professionals and student actors who perform sketches that engage faculty and graduate students in discussion of diversity, effective pedagogy, and institutional climate. The CRLT Players performed five times for engineering in 2008-2009, and there were 263 attendees at the following performances:

- *Climate in the Classroom*, a variation on *Gender in the Classroom* designed to represent the engineering context and the GSI experience related to diverse student perspectives and international experiences: one performance for 69 new engineering GSIs;
- *Faculty Advising Faculty,* showing the junior faculty/ senior faculty mentoring process and examining the many factors (both individual and institutional) that can foster or hinder effective mentoring: one performance for 15 senior faculty;
- *Gender in the Classroom*, exemplifying the "chilly" climate that women students may encounter in science and engineering classrooms: one performance for 141 new engineering GSIs;
- *The Fence,* illustrating the subtle ways that gender can affect an executive committee's interpretation of the tenure candidate's scholarship and productivity: one performance (with ADVANCE) for engineering department chairs and members of executive committees with 33 in attendance; and
- *Using Groups*, a sketch depicting the complexities that often accompany assigned group work in the classroom: one performance for GSIs as part of the CRLT North Seminar Series with five participants.

Publicity for Teaching and Learning Initiatives

The website for CRLT North, www.engin.umich.edu/crltnorth, includes information about CRLT North programs, the Engineering GSI Mentors, Engineering GSI Teacher Training, and scholarship and research in engineering education at U-M, as well as several links to pages at the main CRLT website. In 2008-2009, the website had 3,165 visits and 7,510 page views (i.e., hits). (Note: Because the traffic-tracking software for CoE changed in 2008, these statistics cannot be compared to previous data.).

Services for Engineering Faculty, Administrators, and Staff

CRLT North provides a comprehensive range of services for engineering faculty at all levels of their career, as well as for administrators and staff. These include programs for new faculty, classroom interventions, and consultations on proposal preparation or teaching and learning issues. The main CRLT office also coordinates several education-related grants.

Activities for New Faculty

- *Faculty Fellows Program*. 29 engineering faculty started their career at U-M between Winter 2008 and Winter 2009, and all of them were invited to participate in the yearlong "Faculty Fellows" program. There were 59 registrants at the following five Faculty Fellows programs coordinated by CRLT North:
  - *Active Learning in Engineering*, presented by Tershia Pinder-Grover.
  - *Meet Members of the Engineering Teaching Academy*, an informal luncheon discussion with senior faculty.
  - *Preparing an NSF CAREER Proposal*, featuring a panel of three recent CAREER winners and comments from an NSF program officer.
  - *Resources and Services Available at CRLT North*, presented by Cynthia Finelli.
  - *Strategies for New Faculty Success*, presented by Cynthia Finelli.

  The interactions CRLT North has with new faculty form the basis for long-term relationships that affect the teaching and learning climate across campus. During the year, CRLT North staff had 17 individual consultations with 14 of the 29 Faculty Fellows (these consultations are documented throughout this report), and there were 38 participants (representing 21 unique individuals) at CRLT North programs specifically offered for new faculty. Altogether, **24 of the 29 Faculty Fellows (83%) interacted with CRLT North in some way**.
- *University-Wide New Faculty Orientation*. In conjunction with the Provost and Executive Vice President for Academic Affairs, the main CRLT office organized and facilitated the university-wide New Faculty Orientation. Twelve engineering faculty were among the 147 participants in the program. Two of the six concurrent sessions were co-facilitated by staff from CRLT North.

Classroom Interventions

- *Midterm Student Feedback (MSF) sessions*. CRLT North collects student feedback for instructors who wish to assess and improve their teaching during the term. A CRLT North consultant observes the instructor in action during a regular class and then confers with the students about what is going well and what changes would improve their learning. The consultant later meets with the instructor to report findings and discuss strategies for improvement.
  - During 2008-2009, **CRLT North conducted 23 MSFs for 19 unique faculty** (some courses were taught by teams of instructors, and four faculty requested MSFs for multiple courses). More than 930 students provided constructive feedback through these sessions.
  - Two new faculty members who participated in the MSF process had this to say:

> *"The process is … very valuable in terms of improving teaching quality. The increased participation and the tailored questions make it a great supplement to the standard midterm evaluations."*
> Assistant Professor who started at U-M in Fall 2008
>
> *"The service is treated as a mechanism to improve... not to correct some problems. In all of my previous years teaching at Purdue and Berkeley, I never had access to such a professional and effective service. I applaud Michigan for supporting this and making it an integral part of their program. Thanks very much!"*
> Full Professor who started at U-M in Fall 2008

- *Other Classroom Interventions*. CRLT North also offers consultations based on classroom observation. During 2008-2009, the office offered two such consultations for one faculty member that together allowed 53 students to provide feedback.

Consultations for Faculty

During 2008-2009, CRLT North staff consulted served individuals from various departments, programs, and committees, including the following units:

  - Every academic department in engineering (Aerospace Engineering; Atmospheric, Oceanic and Space Sciences; Biomedical Engineering; Chemical Engineering; Civil and Environmental Engineering; Electrical Engineering and Computer Science; Industrial and Operations Engineering; Materials Science Engineering; Mechanical Engineering; Naval Architecture and Marine Engineering; Nuclear Engineering and Radiological Sciences; and Technical Communications);
  - Other units in engineering (Academic Advising; Academic Affairs; CAEN; the Center For Entrepreneurship; Corporate and Government Relations; the course ENG 580: Teaching Engineering; department chairs; the Design Science Program; First Year Programs; Graduate Chairs; GSI Coordinators; Multicultural Engineering Programs Office; the Office of Engineering Outreach and Engagement; the Office of International Programs; Research and Graduate Education; the Society of Minority Engineers and Scientists; the Student Chapter of the American Society of Engineering Education; Undergraduate Education; and Women in Science and Engineering); and
  - Units outside engineering (Astronomy; Chemistry; English Language and Literature; the Institute for Social Research; the Office of the Vice President for Research; Physics; Psychology; Rackham School of Graduate Studies; the School of Art and Design; the School of Education; the School of Medicine; the School of Natural Resources; the School of Social Work; and Spanish).

- *Consultations on NSF CAREER Proposals*. CRLT North provides assistance and expertise to help faculty formulate the educational plan for the NSF CAREER proposal, integrate it with their research plan, and develop the broader impacts component. This is an important way to build long-term relationships with new faculty, and the following list includes some highlights:
  - CRLT North staff consulted with seven of the 11 U-M engineering faculty (64%) who were awarded an NSF CAREER grant based on their 2008 submission;
  - CRLT North staff consulted with 14 of the 15 U-M engineering faculty (93%) who submitted NSF CAREER proposals in July 2009; and
  - These unsolicited faculty E-mails illustrate the impact of the consultations:

> *"Last year I submitted a CAREER proposal … Today, I got the official notice about the award. 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 received the NSF CAREER award in 2009
>
> *"Indeed, I managed to get the CAREER on the first try. Thanks for holding the seminars on preparing CAREER proposals last Spring, they were certainly helpful."* assistant professor who received the NSF CAREER award in 2009
>
> *"I would like to thank you, again, for all your help with my CAREER proposal! I really appreciate it!!! Your helpful and insightful comments played the pivotal role in shaping the proposal into its current form."* assistant professor who submitted the NSF CAREER proposal in 2008

- *Consultations on Preparation of Other Proposals*. CRLT North also provides assistance to faculty as they plan, implement, analyze, and disseminate evaluation research. During this academic year, CRLT North conducted five consultations regarding other (non-CAREER and/or non-NSF) research proposals. These include proposals submitted to the Hewlett-Packard Innovation Program, NSF Emerging Frontiers in Research and Innovation Program, NSF Research on Gender in Science and Engineering Program, NSF Science and Technology Centers Program, and an NSF technical research proposal.
- *Consultations on Issues Related to Teaching and Learning*. CRLT North provides consultations with individuals or groups on topics that include curricular and instructional matters such as designing courses, integrating innovative approaches to teaching and learning, interpreting student ratings, and improving teaching and learning in a class.
    - During 2008-2009, CRLT North conducted 26 individual consultations with 22 unique faculty about issues related to teaching and learning.

Services for Administrators

- *Chair and Associate Dean Leadership Program.* The main CRLT office worked with the Provost's Office to organize the new Chair and Associate Dean Leadership Program, with an orientation for new chairs and associate deans and monthly sessions for both new and experienced ones. During the year, there were 18 engineering participants (representing seven unique chairs or associate deans) at seven separate sessions in the program.

- *Individual and Group Consultations*. During 2008-2009, CRLT North conducted:
    - 19 consultations with 18 unique administrators.
    - Four customized presentations with about 75 total attendees at meetings of the engineering GSI coordinators, the Graduate Chapter of the Society of Minority Engineers and Scientists, the Professional Mentoring of Women in Science and Technology Program, and the Undergraduate Student Advisory Board.
- *Ongoing Consultations with Administrators*. CRLT North met regularly with the Associate Dean for Undergraduate Education to consult about faculty development, teaching-related issues, and GSI training. During 2008-2009, CRLT North also met as needed with the Dean of Engineering, the Associate Dean for Research and Graduate Education, the Coordinator for Graduate Education, the Coordinator for First Year Programs, staff of the office of the Associate Dean for Undergraduate Engineering, and the Managing Director of the Office of Academic Affairs.

CRLT Grants

In 2008-2009, the main CRLT office administered eight grants competitions for faculty to improve teaching and learning, and engineering faculty were very competitive for these grants. **A total of nine engineering proposals (including 11 faculty and five postdoctoral fellows or graduate students) were funded for a total of $54,500 (with additional matching funds totaling $16,000 provided by CoE)**.

- *Investigating Student Learning Competition*. Awardees attended a one-day spring symposium on research about teaching and learning. During 2009-2010, CRLT North will work with the awardees to guide them in conducting educational research on student learning, and the awardees will share their insights with colleagues at brown-bag sessions at CRLT North and at a CRLT-sponsored forum in the spring. CoE provided $16,000 in matching funding for engineering faculty who were awarded grants, and the following five engineering research projects (out of 11 funded proposals) were funded:
    - Amy Cohn and Marcial Lapp (graduate student), Industrial and Operations Engineering. “Self-Teaching Materials for Large Lecture Courses,” $4,000.
    - Alexander Ganago, Inger Bergom (graduate student), and Britton Wolfe (graduate student), Electrical Engineering and Computer Science. “Investigating the Impact of a Wiki Site on TAs' Teaching Experiences,” $4,000.

  - Brian Gilchrist, Shanna Daly (postdoctoral fellow), and Rafael Ramos (graduate student), Electrical Engineering and Computer Science. “Investigating the Development of Engineering Students into Design Practitioners as a Result of Interdisciplinary Design Team Experiences,” $4,000.
  - Perry Samson, Atmospheric, Oceanic, and Space Sciences. “Impact of Streaming Lecture on Class Dynamics and Learning,” $3,000.
  - Peter D. Washabaugh and Rafael Ramos (graduate student), Atmospheric, Oceanic and Space Sciences. “Impact of First-Year Design-Build-Test Courses in Engineering,” $4,000.

- *Other Competitions*. Engineering faculty were also awarded one grant through the Faculty Development Fund, one Stage I grant and one Stage II grant through the Gilbert Whitaker Fund for the Improvement of Teaching, and one grant through the Teaching with Technology Institute. The following faculty received these funds:
  - Barry Barkel and Johannes Schwank, Chemical Engineering. “Development of Distance Mentoring for Chemical Engineering Design Classes,” $10,000 from Faculty Development Fund Grant.
  - Panos Papalambros and Richard Gonzalez, Design Science (Mechanical Engineering and Psychology/Design Science). “Interdisciplinary Design Education Strategies,” $8,000 from Whitaker I Grant.
  - Jeff Ringenberg, Electrical Engineering and Computer Science. “Using a Tactile Programming Language to Assist Teaching Introductory Computer Science,” $2,500 from Teaching with Technology Institute Grant.
  - Perry Samson, Atmospheric, Oceanic and Space Sciences. “Developing and Implementing a Web-Based Whiteboard for Classroom Use: Phase II,” $15,000 from Whitaker II Grant.

Services for Engineering Graduate Student Instructors

CRLT North provides an array of programs for engineering GSIs. These include the mandatory teacher training program for new engineering GSIs, the Engineering GSI Mentor program, several preparing future faculty events, support for the Student Chapter of the American Society of Engineering Education, and the U-M Graduate Teacher Certificate program (administered by the main CRLT office).

Activities for New Graduate Student Instructors

- *Engineering GSI Teacher Training*. Each term, CRLT North organizes and facilitates teaching orientation programs for new GSIs in CoE. Orientation participants receive training in the fundamentals of effective teaching, as well as handling office hours, using active learning in the classroom, and developing skills to reach all students. The program also features two required practice teaching sessions for every GSI and a special "office hours" practice teaching session.
    - **This year, for the first time, the program was held prior to the start of classes (rather than on the first Saturday after classes began)**. Almost half of all the engineering GSIs attended the orientation – 141 GSIs and Instructional Assistants attended in fall, and 69 attended in winter.
    - To accommodate departments making late GSI assignments, as well as GSIs with schedule conflicts, CRLT North provided a formal make-up program during the first week of classes that featured one workshop on pedagogy and two required practice teaching sessions. There were 14 participants in the make-up program in Fall 2008 and 18 in Winter 2009.
    - Evaluations of orientations were consistently high (96% of fall participants and 98% of winter participants replied *yes* to the statement, "I would recommend this program to other new GSIs.").
    - These excerpts from the session evaluations further illustrate the value of the program:

> *"I'm sure this program would help any new teacher improve their teaching."*
> participant in Fall 2008 engineering GSI teacher training program
>
> *"I thought [EGSITT] was very well organized, helpful, and informative. I thoroughly enjoyed the orientation program & I would definitely recommend it."*
> participant in Winter 2009 engineering GSI teacher training program

- *Other GSI Orientation Programs*. Representatives from CRLT North (i.e., Engineering GSI Mentors) were present at orientations held by the following departments:
    - Aerospace Engineering;
    - Chemical Engineering;
    - Electrical Engineering & Computer Science;
    - Industrial and Operations Engineering; and
    - Mechanical Engineering.

  Approximately 185 students attended these events. Also, the main CRLT office holds a university-wide GSI Teaching Orientation Program each term, and one engineering student attended this program in Fall 2008 and three attended in Winter 2009.

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 population by each mentoring 20-30 GSIs**. Ten EGSMs served 256 GSIs in fall 2008, and ten EGSMs served 237 GSIs in winter 2009. In all, EGSMs provided 1379 separate services for those GSIs**, as shown in the following table.

Type of service	Term (Total services provided)		
	Fall 2008 (787)	Winter 2009 (622)	Total (1409)
Classroom interventions	38	32	**70**
Individual consultations	735	574	**1309**
Group consultations and activities	14	16	**30**

During 2008-2009, EGSMs conducted the following activities

- *Classroom Interventions*
  - 52 midterm student feedback sessions for 48 unique GSIs (1538 undergraduate and graduate students were served by these sessions).
  - 18 classroom observations with follow up consultations for 18 unique GSIs (557 students were served by these classroom interventions).
- *Individual Consultations*
  - 115 scheduled consultations on teaching.
  - 551 other face-to-face (or informal) consultations.
  - 492 E-mail consultations.
  - 147 resource E-mails sent to GSIs.
  - 4 practice teaching sessions.
- *Group Consultations and Activities.* EGSMs held 30 group activities that served 146 participants (not necessarily unique individuals:
  - 22 group consultations attended by 64 GSIs using the “Take Your GSI to Lunch” program; and
  - Eight GSI roundtable sessions with 82 GSIs in attendance.
- *Professional Development*. CRLT North provided the following opportunities:
  - Two informational sessions that were attended by 15 potential EGSMs – 13 who attended the informational sessions were interviewed for EGSM positions, and four who attended were subsequently hired as EGSMs;
  - 14 biweekly training sessions for EGSMs on topics that included academic integrity, active learning in engineering, inclusive teaching, the impact of GSIs on undergraduate retention, instructor identity, learning styles, and use of online midterm student ratings in the consulting process; and
  - Training sessions each term on conducting classroom observations and midterm student feedback sessions and on facilitating practice teaching sessions.

Preparing Future Faculty Events

- *Month-Long Seminar*. In May, CRLT North staff co-directed the *Tenth Annual Rackham-CRLT Seminar on College Teaching: Preparing Future Faculty*. Nine of the 50 participants in the seminar were engineering graduate students.
- *One-day Conference*. The main CRLT office also offered a one-day *Getting Ready for an Academic Career* conference in October 2008 to help graduate students and postdoctoral fellows prepare for the transition to faculty jobs. Fifty-six engineering graduate students were among the 246 participants who attended.
- *Mentoring Program*. The Rackham-CRLT 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. There were three engineering mentees out of 34 total.

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. It offers programs designed to prepare interested graduate students for careers in academia, provide undergraduate students with a better understanding of graduate education, and support the increased involvement of under-represented minority groups in higher education. During 2008-2009, CRLT North worked with 22 students by:

- offering feedback for graduate students about presentation style at two sessions of the 2008 ASEE Summer Seminar Series;
- meeting with the society's president; and
- providing assistance in selecting the ASEE Outstanding GSI for 2009.

U-M Graduate Teacher Certificate Program

With the Rackham School of Graduate Studies, the main CRLT office coordinates a program for students to earn a *Graduate Teacher Certificate*. This program serves all graduate students, including those in engineering. Four of the 51 students who completed certificates in 2008-2009 were engineering students. Approximately 18 engineering students are enrolled in the program.

Other GSI Activities

- CRLT North staff also consults with GSIs about teaching and learning, as well as about career-related issues. In 2008-2009, CRLT North conducted 13 consultations with 10 unique graduate students.
- CRLT North staff attended the class Engineering 580: Teaching Engineering to serve on a panel about obtaining an academic position. About 20 students were present.

National Leadership

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

National Workshops and Conferences

During 2008-2009, CRLT North staff participated in the following national workshops and conferences to establish connections with engineering education researchers, present research findings, lead meetings of the Educational Research and Methods Division of ASEE, and attend relevant workshops and concurrent sessions:

- *Creating Engineering Education Opportunities: Why and How?* NSF workshop. Arlington, VA. 03/06/09 (invited participant).
- *2008 IEEE/ASEE Frontiers in Education Conference*. Saratoga Springs, NY. 10/22/08–10/25/08.
- *2009 Annual ASEE Conference and Exposition.* Austin, TX. 06/14/09–06/17/09.
- *2008 Research in Engineering Education Symposium*. Davos, Switzerland. 07/07/08–07/10/08.

National Service

- CRLT North provided national service during 2008-2009 by assuming the following roles:
  - Campus liaison for the National Academy of Engineering's Center for the Advancement of Scholarship in Engineering Education.
  - Chair of the Educational Research and Methods Division of ASEE.
  - Guest co-editor for Special Issue *of International Journal of Engineering Education* on applications of engineering education research.
  - Member of the International Planning Committee for *2009 Research in Engineering Education Symposium.*
  - Member of the following proposal review panels for the Engineering Directorate of NSF:
    - CAREER proposals for Engineering Education and Centers Division.
    - Course, Curriculum, and Laboratory Improvement Program.
  - Reviewer for *2008 IEEE/ASEE Frontiers in Education Conference*.
  - Reviewer for *International Journal of Engineering Education.*
  - Reviewer for *Journal of Engineering Education*.
  - Session chair at *2008 IEEE/ASEE Frontiers in Education Conference*.
- CRLT North co-presented a workshop at the *2009 Annual ASEE Conference and Exposition* titled "Engineering Education Centers and Academic Units as Drivers of Change" with individuals from the Center for the Advancement of Scholarship in Engineering Education at the National Academies of Engineering, Pennsylvania State University, Virginia Polytechnic Institute and State University, Purdue University, and the University of Washington.

Consultations with Individuals Outside U-M

- Staff from CRLT North consulted with 24 individuals outside U-M on issues related to teaching and learning. The individuals were from the following 20 organizations and institutions:

  - Albion College
  - American Society of Engineering Education
  - Bucknell University
  - California Polytechnic State University
  - Clemson University
  - Georgia Tech
  - Heidelberger Druckmaschinen AG
  - Illinois State University
  - Kettering University
  - King Farhad University of Petroleum & Minerals
  - Purdue University
  - Rice University
  - University of Colorado at Boulder
  - University of San Diego
  - University of Washington
  - University of Western Australia
  - University of Wisconsin at Platteville
  - Utah State University
  - Virginia Tech
  - Women in Engineering Program Advocates Network

Research and Scholarship in Engineering Education: Support for Others

CRLT North recognizes the importance of its role in reforming engineering education and furthering the mission of CoE to promote excellence in engineering education. In support of these activities, CRLT North works closely with engineering faculty funded through the Investigating Student Learning competitions, has developed a brand new *Rackham Certificate for Research in Engineering Education*, assists in assessing classes in the M-STEM Academy, and offers other programs and activities to support others in pursuit of scholarly projects.

Support for Investigating Student Learning (ISL) Program

- For the 2008-2009 ISL Program, seven of the 12 awardees are from engineering. CRLT North convened a series of four meetings for these CoE awardees to build community and discuss progress. Six of the seven awardees presented posters at the *CRLT North Research and Scholarship in Engineering Education Poster Fair* and again at the year-end ISL poster session.
- CRLT North staff supported provided feedback on proposals for four engineering faculty who submitted proposals for the 2009-2010 ISL Program. Seven engineering proposals were submitted to the competition (of 19 total), and five of 11 awardees are from engineering.
- In 2009, CRLT North co-facilitated both the all-day ISL Symposium and a make-up session for engineering faculty unable to attend.

Rackham Certificate for Research in Engineering Education

- CRLT North Staff met with several faculty and administrators from engineering, LSA, the School of Education, and the Rackham School of Graduate Studies, as well as with several engineering graduate students to **develop a certificate program for engineering doctoral students desiring to learn more about research in engineering education**. The final proposal was endorsed by the CoE Curriculum Committee and approved by the Rackham Executive Committee.
- CRLT North is the main contact for the certificate. Staff created a website to describe the program (http://www.engin.umich.edu/teaching/crltnorth/rackhamcert.html) and is accepting applications.

M-STEM Class "Crossing the Boundary"

- Staff from CRLT North led an initiative to evaluate the success of the "Crossing the Boundary" class in meeting its goals. Together with individuals involved in designing and teaching the course, CRLT North developed a survey to administer at the beginning and end of the six-week summer class.

Assistance for Other Initiatives

- *Dissertation Committees*. CRLT North served on the following dissertation committee:
  - Bill Phillips, Design Science Program.
- *Programs*. Staff from CRLT North coordinated the following programs:
  - Networking event for faculty in both CoE and the School of Education to explore possible research partnerships;
  - NSF Webinar for faculty planning to submit proposals to the NSF Course, Curriculum, and Laboratory Improvement Program; and
  - Seminar for U-M Student Chapter of ASEE on *Engineering Education Research*.
- *Other activities*. Staff from CRLT North also provided the following activities:
  - Hosted a visit by faculty from Purdue University's School of Engineering Education;
  - Provided feedback to research team studying identity integration in engineering;
  - Reviewed internal U-M proposals for the Howard Hughes Medical Institute grant; and
  - Worked with faculty from Penn State who are conducting research about the Engineer of 2020 to prepare for the team's visit to U-M and participated in two separate one-on-one interviews.

Research and Scholarship in Engineering Education: Ongoing Projects

Besides supporting others as they pursue scholarship in engineering education, CRLT North pursues its own research. Currently, staff from CRLT North is engaged in the following eight research projects:

- A multi-institution study to identify college experiences that promote ethical development;
- An engineering study on the effects of different kinds of consultations on teaching;
- An evaluation of a modified midterm student feedback process for engineering;
- Research assessing the impact of a student teamwork sketch in Engineering 100;
- A study of the effects of the applied honors math course;
- Research on the use of screencasts in engineering;
- A project about classroom practices to support a diverse student body; and
- Research about who persists in STEM majors.

College Experiences that Promote Ethical Development

- *Project team*. Cynthia Finelli with Don Carpenter (Lawrence Technological University), Trevor Harding (California Polytechnic University – San Lois Obispo), Matt Holsapple (U-M graduate student, School of Education), Janel Sutkus (Carnegie Mellon University), and Kelley Walczak (U-M graduate student, School of Education).
- *Project description*. This four-year NSF project is designed to address 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 project involves visiting 20 institutions to interview students, faculty, and administrators, and then designing and administering a survey to assess the impact of various activities on students' ethical development. The project will conclude with a series of workshops to inform the national community about experiences that have the most positive impact on ethical development and to aid educators in adapting those experiences for their own institutions.
- *Project highlights*.
  - Year 2 of the four-year, NSF-funded project is complete.
  - The team visited four partner institutions in 2008-2009, conducting one-on-one interviews with two key college administrators, faculty focus groups, and student focus groups at each visit. Combined with the ten visits from last year, the team has interacted with 28 college administrators, 87 faculty, and 90 students.
  - Concurrently, the team has been working to develop the survey instruments for subsequent phases of the project. The survey was pilot tested at two institutions (including U-M), and will be administered to 4,000 undergraduate students at 20 partner institutions beginning in Winter 2010.
  - One 50% GSRA (a second year doctoral student in the School of Education) was part of the research team for the entire 2008-2009 academic year.
- *Project dissemination*.
  - The project resulted in ten papers and presentations (listed in detail later in this report), including a manuscript about the work in the journal *Review of Higher Education* and presentations about the research at the *2008 IEEE/ASEE Frontiers in Education Conference*, the *2008 Research in Engineering Education Symposium*, the *2009 Annual ASEE Conference and Exposition*, the *2009 NSF Engineering Education Awardees Conference,* the *2009 U-M Student Affairs Research Symposium*, and Carnegie Mellon University.
  - The cover story of the March 2009 *ASEE Prism,* "*The Pull of Integrity: Sure, you can catch cheaters, but why not inspire students to stay honest?"* almost exclusively featured this research.
  - One NSF proposal was submitted to further the research.

Effects of Different Kinds of Consultations on Teaching

- *Project team*. Cynthia Finelli with Amy Gottfried (Chemistry Department), Chad Hershock (Assistant Director, CRLT), Matt Kaplan (Managing Director, CRLT), Chris O'Neal (Assistant Director, CRLT), and Molly Ott (U-M graduate student, School of Education).
- *Project description*. This study addresses the question: *What is the impact of consultations informed by different kinds of data on the teaching performance of engineering faculty*? Specifically, trained instructional consultants used student ratings data, student feedback collected during an MSF, or a videotaped class session to guide midterm consultations. Three modes of assessment were used to evaluate the impact of the consultations: gains in student ratings, faculty perceptions of the consultation, and reported changes in teaching practice. Forty-nine engineering faculty teaching 55 separate courses participated in the study.
- *Project highlights*.
    - Results illuminate two key aspects of instructional consultations: (1) their efficacy varies depending on the kind of data used to guide them, with student feedback from an MSF having the largest positive impact, and (2) the instructional consultant plays a key role in helping both to interpret the available data and to identify strategies for improvement. These findings suggest three implications for practice:
        - First, whenever possible, MSF-based consultations should be offered systematically and proactively for engineering faculty;
        - Second, data for other kinds of consultations should be tailored to the needs of the individual instructor; and
        - Third, instructional consultants should be available to collaborate with faculty to enhance their teaching, thereby building an engineering culture that actively supports teaching and learning.
- *Project dissemination*.
    - A full manuscript about the project appeared in the *Journal of Engineering Education*, and a condensed, one-page overview appeared in *ASEE Prism* (listed later in this report).
    - Reprints of the full *Journal of Engineering Education* manuscript were distributed to engineering faculty involved in the original project, and copies of the *ASEE Prism* article were sent to all CoE faculty.
    - Two posters about the project were presented at U-M – one at the *Third Annual Research and Scholarship in Engineering Education: Poster Session* and one at the Medical School Poster Fair and Walking Dinner.

Modified Midterm Student Feedback (MSF) for Engineering

- *Project team*. Cynthia Finelli and Tershia Pinder-Grover with Mary Wright (Assistant Director, CRLT).
- *Project description*. This work is to develop and evaluate a modified midterm student feedback (MSF) process that will build upon the online midterm ratings system already in place in engineering. In particular, the faculty member and the consultant work together to design a survey based on data from the online midterm ratings. The consultant then administers the survey in class to get more rich feedback. The process requires much less in-class time than a typical MSF.
- *Project highlights.*
    - The project was piloted in one class during fall and was conducted in five classes in winter.
- *Project dissemination.*
    - A manuscript is underway, to be submitted to the *Journal of Faculty Development*.

Impact of Student Teamwork Sketch in Engineering 100

- *Project team*. Cynthia Finelli with Marie Kendall-Brown (CRLT postdoctoral fellow).
- *Project description*. The *Off-Course* theater sketch was created to expose students to common team dilemmas and to provide students with strategies to deal with those dilemmas. The project is designed to assess the sketch by addressing the question: *What is the impact of a student-focused teamwork sketch on students' perceptions of teamwork in an introductory engineering course?*
- *Project highlights*.
  - Students who saw the sketch reported being more prepared (and statistically significantly so) to address issues related to teamwork (specifically around lack of communication, lack of plan of action, and lack of unity) than those who did not.
  - The sketch continues to be presented. It was performed at engineering transfer student orientation in August 2008, in five of nine ENG 100 sections in Fall 2008, and in four of eight sections in Winter 2009.
- *Project dissemination*.
  - A presentation about the project was made at the *2009 Annual ASEE Conference and Exposition*, and an overview was presented at a meeting of the Diversity and Outreach Council.

Effects of the Applied Honors Math Course

- *Project team*. Cynthia Finelli with Ozan Jaquette (U-M graduate student, School of Education) and Vilma Mesa (School of Education).
- *Project description*. Many engineering students who qualify to enroll in the applied honors math course (based on Advanced Placement Test scores) do not enroll in the course. This project addresses the question: *Does enrollment in an applied honors Calculus II course (Math 156) have a positive causal impact on later educational achievement for College of Engineering students at U-M?*
- *Project dissemination*.
  - A poster about the project was presented at the *Third Annual Research and Scholarship in Engineering Education: Poster Session.*
  - A manuscript about the project was accepted by the *Journal of Engineering Education* and will appear soon.

Use of Screencasts in Engineering

- *Project team*. Tershia Pinder-Grover with Crisca Bierwert (Associate Director, CRLT) and Joanna Mirecki-Millunchick (Material Science and Engineering).
- *Project description*. This project involves a study of the value of screencasts (i.e., digital screen captures with real-time audio commentary) and their impact in the large-lecture environment. Specifically, documented screencast usage, student performance on homework and exams, and data from student surveys about attitudes and perceptions of the screencasts are being analyzed to answer the following questions: *How do students use varying kinds of screencasts? Can screencasts be used strategically to clarify topics that students identify as being difficult or unclear? Does student use of screencasts affect learning, in terms of self-report and/or exam performance?*
- *Project highlights*.
  - Data was collected from 400 students in two classes during the academic year. Data analysis is underway.

- *Project dissemination.*
    - Three presentations about the project were made (described in detail later in this report). They include one at the *2008 IEEE/ASEE Frontiers in Education Conference* and two at the *2009 Annual ASEE Conference and Exposition*.
    - A poster about the project was presented at the *Third Annual Research and Scholarship in Engineering Education: Poster Session*.

Classroom Practices to Support a Diverse Student Body

- *Project team*. Cynthia Finelli with Shanna Daly (postdoctoral fellow) and James Holloway (Associate Dean for Undergraduate Education).
- *Project description*. This project is intended to promote substantive and sustained changes in teaching practices to improve student success and support a diverse student body in engineering. The premise of the work is that the greatest impact will be seen if efforts are (1) grounded in research about successful faculty teaching practices, (2) integrated with local evidence about institutional context, student perspectives, and faculty perspectives, and (3) informed by literature on institutional change models, faculty development research, and learning theory.
- *Project highlights*.
    - The team held several meetings to plan the project and related proposals. One proposal to the U-M National Center for Institutional Diversity was not funded, and one to the NSF Course, Curriculum, and Laboratory Improvement Program is pending.

Research about Who Persists in STEM Majors

- *Project team*. Cynthia Finelli with Deborah Carter (School of Education), Cinda-Sue Davis (Women in Engineering), Pamela Davis-Kean (Institute for Social Research), and Oksana Malanchuk (Institute for Social Research).
- *Project description*. The goal of the project is to understand factors what influence students' decisions to persist in STEM majors/careers. Research questions include *Do the effects of self-efficacy, motivation, and college experiences on interest in STEM majors and STEM careers differ by gender or race/ethnicity?* and *Do the relationships differ over time?*
- *Project highlights*.
    - The team held several meetings to plan the project and submitted a proposal to the NSF Research and Evaluation on Education in Science and Engineering Program. The proposal was not funded.

Grants and Key Publications (listed in reverse chronological order)

Research Grants Submitted

1. Finelli, C. J., & Holloway, J. P. Motivating change in faculty teaching practices to support a diverse student body in engineering, *NSF Course, Curriculum, and Laboratory Improvement Program.* Proposal #0941924 for $199,999 submitted 05/21/09. Pending.
2. Finelli, C. J., & Holloway, J. P. *U-M National Center for Institutional Diversity Fellow Nomination* for Shanna Daly. $15,000. 03/31/09. Not funded.
3. Finelli, C. J. Collaborative Research: A framework for measuring the development of ethical expertise in graduate engineering research. *NSF Ethics in Engineering and Science Education Program*. Proposal #0932603 for $257,424 submitted on 03/02/09. Not funded.
4. Carter, D. F., Davis-Kean, P., & Finelli, C. J., Who persists in STEM majors and why: A mixed method approach, *NSF Research and Evaluation on Education in Science and Engineering Program*. Proposal # 0909740 for submitted $999,138. 11/21/08. Not funded.

Refereed Journal Publications (or the equivalent) Accepted for Publication or Appearing in Print

1. Mesa, V., Jaquette, O., & Finelli, C. J. (2009). In search of the Holy Grail: Measuring the impact of an individual course on students' success. Manuscript accepted for publication in *Journal of Engineering Education*.
2. Mayhew, M. J., Hubbard, S. M., Finelli, C. J., Harding, T. S., & Carpenter, D. D. (2009, Summer). Using structural equation modeling to validate the theory of planned behavior as a model for predicting student cheating. *Review of Higher Education, 32*(4): 441–468.
3. Brown, M. K., Hershock, C., Finelli, C. J., & O'Neal, C. (2009, May). Teaching for retention in science, engineering, and math disciplines: A guide for faculty. *Occasional Paper No. 25*. Ann Arbor, MI: Center for Research on Learning and Teaching, University of Michigan.
4. Finelli, C. J., Ott, M., Gottfried, A. C., Hershock, C., O'Neal, C., & Kaplan, M. (2008, Oct.). Utilizing instructional consultations to enhance the teaching performance of engineering faculty. *Journal of Engineering Education, 97*(4): 397–411.

Refereed Conference Proceedings

1. Harding, T. S., Carpenter, D. D., & Finelli, C. J. (2009, July). *Engineering culture and the ethical development of undergraduate students*. Paper accepted for presentation at 2009 Research in Engineering Education Symposium, Palm Cove, Queensland, Australia.
2. Finelli, C. J., & Kendall-Brown, M. (2009, June). Using an interactive theater sketch to improve students' teamwork skills. *Proceedings of the 2009 ASEE Annual Conference & Exposition*, Austin, TX. (Available on CD-ROM).
3. Pinder-Grover, T., Mirecki-Millunchick, J., Bierwert, C., & Shuller, L. (2009, June). The efficacy of screencasts on diverse students in a large lecture course. *Proceedings of the 2009 ASEE Annual Conference & Exposition*, Austin, TX. (Available on CD-ROM).
4. Pinder-Grover, T., Mirecki-Millunchick, J., Bierwert, C., & Shuller, L. (2009, June). Leveraging screencasts to strategically clarify unclear material science concepts. *Proceedings of the 2009 ASEE Annual Conference & Exposition*, Austin, TX. (Available on CD-ROM).
5. Sutkus, J. A., Finelli, C. J., Carpenter, D. D., & 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. (Available on CD-ROM).
6. Pinder-Grover, T., Mirecki-Millunchick, J., & Bierwert, C. (2008, Oct.). Work-in-progress: Using screencasts to enhance student learning in a large lecture material Science and engineering course. *Proceedings of the 38th Frontiers in Education Conference*, Saratoga, NY.

7. Sutkus, J. A., Carpenter, D. D., Finelli, C. J., & Harding, T. S. (2008, Oct.). Work-in-progress: Building the Survey of Engineering Ethical Development (SEED) instrument. *Proceedings of the 38th Frontiers in Education Conference*, Saratoga, NY.

Invited External Presentations and Workshops Made this Year

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 the 2009 ASEE Annual Conference & Exposition, Austin, TX.
2. Finelli, C. J. (2009) *Educating ethical engineers.* The University Lecture Series – invited presentation given at Carnegie Mellon University, Pittsburgh, PA. 04/01/09.

Other Publications and Presentations

1. Holsapple, M. A., Finelli, C. J., Carpenter, D. D., & Harding, T. S. (2009, Oct.). *Work-in-progress: A mixed methods approach to developing an instrument measuring engineering students' positive ethical behavioral outcomes*. Paper accepted for presentation at the 39th Frontiers in Education conference, San Antonio, TX.
2. Holsapple, M. A., & Finelli, C. J. (2009, May). *Culture of professional ethics education in schools of engineering: Implications for all students*. Presented at the 2009 U-M Student Affairs Research Symposium, Ann Arbor, MI.
3. Carpenter, D. D., Finelli, C. J., Harding, T. S., Sutkus, J. A., & Holsapple, M. A. (2009, Feb.). *A holistic assessment of the ethical development of engineering undergraduates.* Poster presented at the NSF Engineering Education and Centers Awardees Conference, Reston, VA.
4. Harding, T. S., Carpenter, D. D., & Finelli, C. J. (2009, Feb.). *Ethics education or ethical development?* Invited workshop presented for the NSF Engineering Education and Centers Awardees Conference, Reston, VA.
5. Finelli, C. J. (2008, Nov.). JEE Selects: A way to enhance teaching. *ASEE Prism Magazine*. Page 61.
6. Finelli, C. J., Ott, M., Gottfried, A., Hershock, C., O'Neal, C., & Kaplan, M. (2008, Oct.). *Consultations on teaching – Benefits for engineering faculty*. Poster presented at the U-M Third Annual Research and Scholarship in Engineering Education: Poster Session, Ann Arbor, MI.
7. Kieffer, J., Aldridge, M., Bickel, J., Feldman, A., Katz, M., Warren, M., Zhen, C., & Pinder-Grover, T. (2008, Oct.). *Enhancing materials science and engineering curricula through computation.* Poster presented at the U-M Third Annual Research and Scholarship in Engineering Education: Poster Session. Ann Arbor, MI
8. Mesa, V., Finelli, C. J., & Jaquette, O. (2008, Oct.). *Measuring the impact of an individual course on students' success*. Poster presented at the U-M Third Annual Research and Scholarship in Engineering Education: Poster Session. Ann Arbor, MI.
9. Mirecki-Millunchick, J., Pinder-Grover, T., & Bierwert, C. (2008, Oct.). *Using screencasts to enhance student learning in a large lecture material science and engineering course*. Poster presented at the U-M Third Annual Research and Scholarship in Engineering Education: Poster Session. Ann Arbor, MI.
10. Yalisove, S., Pinder-Grover, T., Bierwert, C., & Tebo, K. (2008, Oct.). *Teaching where students learn: A fresh approach to deploying GSIs.* Poster presented at the U-M Third Annual Research and Scholarship in Engineering Education: Poster Session. Ann Arbor, MI.
11. Finelli, C. J., Ott, M., Gottfried, A. C., Hershock, C., O'Neal, C., & Kaplan, M. (2008, Sept.). *Consultations informed by different kinds of data: The impact on engineering faculty's teaching*. Poster presented at the U-M Medical School Poster Fair and Walking Dinner, Ann Arbor, MI.
12. Finelli, C. J., Sutkus, J. A., Carpenter, D. D., & Harding, T. S. (2008, July). *A longitudinal study of the ethical development of engineering and non-engineering students at a national research university.* Paper presented at Research in Engineering Education Symposium, Davos, Switzerland.

13. Carpenter, D. D., Finelli, C. J., & Harding, T. S. (2008, July). *Investigating the linkages between unethical professional behaviors and engineering undergraduate cheating.* Paper presented at 2008 Research in Engineering Education Symposium, Davos, Switzerland.

CRLT North Staff

During 2008-2009, 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, Chad Hershock, Matthew Kaplan, Chris O'Neal, Mary Wright, and Erping Zhu. Program support was provided by James Freeland and Jeri Hollister.

Cynthia Finelli, Director of CRLT North

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. She is a strong advocate of active, team-based learning in the classroom and is engaged in several engineering education research projects. She is chair of the Educational Research and Methods Division of ASEE, and she holds an appointment as associate research scientist in engineering education at U-M.

Tershia 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 plans teacher training for new engineering GSIs, oversees the Engineering GSI Mentor Program, co-directs the Rackham-CRLT Preparing Future Faculty Seminar, directs the CRLT GSI team, and develops pedagogical workshops. Tershia also consults with faculty and GSIs on a variety of teaching and learning issues and participates in engineering education research initiatives.