

University of Michigan



CRLT NORTH

Report for College of Engineering 2007-2008

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**CRLT North
Report for College of Engineering
July 1, 2007–June 30, 2008**

During the 2007-2008 academic year, CRLT North (in conjunction with the main CRLT office) provided a number of services for the College of Engineering. This report provides a summary of those services.

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Overview

The Center for Research on Learning and Teaching (CRLT) North represents a partnership between the College of Engineering and the main CRLT office on central campus. Established in January 2004, CRLT North is located on North Campus and is staffed by experienced engineering educators who work in close collaboration with College of Engineering faculty and administrators. Engineering services provided by CRLT North and the main CRLT include:

- College-wide programs to promote a culture of teaching and learning in engineering;
- A comprehensive range of services (including orientation programs, classroom interventions, and consultations) for engineering faculty and GSIs at all levels of their careers;
- National leadership to enhance the visibility of U-M in engineering education; and
- Research and scholarship to explore issues related to teaching and learning in engineering.

Summary of CRLT North Services

- CRLT North has had 2,645 contacts from clients in the College of Engineering. These include:
 - Approximately 1,405 College of Engineering participants* in attendance at programs, including:
 - 402 at orientation sessions for faculty or GSIs and 18 at programs for chairs and associate deans;
 - 615 at seminars or workshops about teaching and learning;
 - 291 at engineering performances by the CRLT Players Theatre Troupe;
 - 67 at Preparing Future Faculty events; and
 - 12 participating in the U-M Graduate Teacher Certificate Program.
 - Approximately 1,240 engineering client services via individual or small group consultations* including:
 - 20 midterm student feedback sessions or other classroom interventions for faculty;
 - 68 midterm student feedback sessions or other classroom interventions for GSIs;
 - 150 faculty, administrators, or staff served by other consultations or services; and
 - More than 1,000 graduate students served by other consultations or services (some brief, some intensive).
- CRLT North and the main CRLT office have provided several other services to engineering, including:
 - More than 2,750 total U-M undergraduate and graduate students served by midterm student feedback sessions or other classroom interventions; and
 - 10 active research projects that have resulted in three refereed journal publications and 12 other publications or presentations;
 - Consultations with 42 individuals outside of U-M at 35 organizations and institutions;
 - \$66,995 in grants administered by CRLT; and
 - 26,494 page views at the CRLT North Web site.

* Note that these are not unique individuals since some persons may have had more than one consultation.

College-Wide Programs

CRLT North provides several college-wide programs to promote a culture of teaching and learning in engineering. During 2007-2008, these included: a seminar series; facilitation for the *NSF-ADVANCE Science and Technology Excellence Program*; participation on the *Academic Practices for a Positive Learning Environment Planning Committee*; university-wide programs planned by the main CRLT office; performances by the CRLT Players; 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 2007-2008, CRLT North offered 11 engineering-focused seminars and programs, and faculty and GSIs in every department participated in the workshops. There were 268 participants at the sessions. The seminars included:

- *Active Learning in Engineering*, presented by Tershia Pinder-Grover;
- *Best Teaching Practices: Perspectives from Experienced Engineering GSIs* (for GSIs), presented by Engineering GSI Mentors;
- *Developing a Productive Relationship with Your Research Advisor* (for GSIs), presented by Engineering GSI Mentors;
- *Effective Lecturing* (for GSIs), presented by Engineering GSI Mentors;
- *Faculty Advising Faculty: A Performance by the CRLT Players* (for faculty), co-sponsored with the NSF ADVANCE Project at U-M;
- *Faculty Talk About Effective Teaching* (for faculty) panel, featuring professors Amy Cohn, Ken Powell, and Steve Skerlos;
- *Research and Scholarship in Engineering Education* poster session, featuring 13 posters and attended by more than 60 individuals. Co-sponsored with the Office of the Associate Dean for Undergraduate Engineering;
- *Research on Best Practices in College Teaching* (for GSIs), presented by Engineering GSI Mentors;
- *Student Teams in Engineering: Turning Dysfunctional into Functional* (for GSIs), presented by Engineering GSI Mentors;
- *Student Teams in Engineering* (for faculty), presented by Cynthia Finelli; and
- *Writing a Teaching Philosophy Statement* (for GSIs), presented by Engineering GSI Mentors.

The average overall rating of the seminars was 4.3/5.0. This excerpt from an unsolicited E-mail illustrates the impact of the workshops:

"I just wanted to let you know that my attending your workshops is paying off. I received the [...] teaching award this year! Thank you for your advice and hosting of the workshops!"

Other Programs for Engineering

- *Engineering Ethics: Practical Strategies for a Shifting Paradigm*. Through funding from President Coleman's Ethics in Public Life Initiative, CRLT North coordinated a visit by Dr. Juan Lucena, Associate Professor of Liberal Arts and International Studies at Colorado School of Mines. He had a roundtable discussion about collaborations for the journal *Engineering Studies*, and he gave one presentation for faculty and one for students. Approximately 28 faculty and 18 students attended.
- *NSF-ADVANCE Science and Technology Excellence Program*. CRLT North is facilitator/partner to the Materials Science and Engineering Department change team that proposes to improve the department climate. The team met more than ten times (including twice with the chair), developed and administered a faculty climate survey, and planned a department retreat.

- *Diversity and Outreach Council*. CRLT North participated in biweekly meetings of the full council.
- *Academic Practices for a Positive Learning Environment (APPLE)*. CRLT North participated in weekly meetings of the Planning Committee. The group forwarded a final proposal for creating the APPLE committee to Dean Munson in May. As proposed, the APPLE Committee will be composed of senior faculty in the college who will first explore the literature on how diversity influences and affects learning environments and will then identify effective practices for ensuring that all students achieve academic success at their highest ability. The committee will be proactive in educating faculty on the complexities of today's diverse classroom by using workshops and other means to promote the adoption of effective teaching methods and strategies to improve the learning environment.
- *Multidisciplinary Design Minor*. CRLT North met with faculty involved in developing the minor and participated in a mini-retreat to plan for launching the program in fall 2008. The minor is part of a proposal to President Coleman's Multi-disciplinary Learning and Team Teaching Initiative.
- *Engineering Teaching Academy*. CRLT North participated in several meetings of the Engineering Teaching Academy and will assist in planning a series of lunch sessions to talk about teaching.

CRLT Programs

150 individuals participated in activities sponsored by the main CRLT office. These included the following initiatives:

- 23 faculty and 56 graduate students at 16 separate *CRLT Seminar Series* events;
- 30 engineering participants at the *Enriching Scholarship* program during spring 2008;
- 18 engineering faculty (out of 152) at the *International Faculty Dinner*;
- Six engineering faculty and four GSIs attended the *Investigating Student Learning Symposium*;
- Six engineering participants (out of 33) at the *Leveraging Technology: New Roles for GSIs* session; and
- Seven engineering faculty (out of 69) at the winter Provost's Seminar on Teaching titled *The Philosophy and Practice of Grading*.

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. CRLT Players performances for engineering for 2007-2008 include:

- *Gender in the Classroom*, exemplifying the "chilly" climate that women students may encounter in science and engineering classrooms. Two performances with a total audience of 218 GSIs;
- *Faculty Advising Faculty*. One performance with an audience of 13 faculty;
- *The Road to Reappointment: How to Get Good Advice along the Way*, a modified version of the *Faculty Advising Faculty* sketch that was specially designed for assistant professors. One performance with an audience of 22 assistant professors; and
- *Sexual Harassment Trigger Vignettes*. One performance with an audience of 38 deans, associate deans, staff, chairs, and lecturers.

Publicity for Teaching and Learning Initiatives

The Web site for CRLT North, www.engin.umich.edu/teaching/crltnorth, includes information about CRLT North workshops, 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 Web site. There were 26,494 page views (i.e., hits) during the year. These hits included access to the workshop registration page and other visits. Other publicity for CRLT North included an updated brochure and an article about CRLT North that appeared in the September issue of the *Michigan Engineer*.

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. During 2007-2008, these included programs for new faculty and lecturers, classroom interventions, and consultations on proposal preparation and other teaching and learning issues. The main CRLT office also provided engineering services, notably the awarding of several education-related grants.

Activities for New Faculty

- *New Faculty Fellows Program.* 20 engineering faculty began at U-M during the 2007-2008 academic year, and all of them were invited to participate in the “Faculty Fellows” program. (Other “relatively” new faculty were also invited to participate.) CRLT North assisted in planning the year-long program and discussed services available at CRLT North at the Keys to the College session. Specific contributions made to the program by CRLT North included:
 - *Boice's Characteristics of Quick Starters (or Ways Junior Faculty Can Succeed)*, presented by Cynthia Finelli;
 - *Meet Members of the Engineering Teaching Academy*, an informal luncheon discussion;
 - *Preparing an NSF CAREER Proposal*, featuring a panel of four recent CoE CAREER winners and comments from two NSF program officers;
 - *The Road to Reappointment: How to Get Good Advice Along the Way* (for Assistant Professors only), co-sponsored with the U-M ADVANCE Program; and
 - A class observation program for new engineering faculty to visit classes of Engineering Teaching Academy members. Four classes were available in fall, and four were available in winter.

The interactions CRLT North had with new faculty form the basis for long-term relationships that are likely to affect the teaching and learning climate across campus. There were 20 new engineering faculty in 2007-2008, and 11 of them (i.e., 55%) sought individual consultations through CRLT North.

- *Programs for New Lecturers.* CRLT North presented an information session at the first-ever New Engineering Lecturers Orientation, and about 10 lecturers attended.
- *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 campus-wide New Faculty Orientation in fall to introduce new faculty to the university. The program included interactive sessions where faculty shared experiences and strategies about good teaching principles and techniques. 16 engineering faculty (out of 145) participated in the program.

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 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 2007-2008, CRLT North conducted 18 MSFs for 23 distinct faculty (some courses were taught by teams of instructors). More than 850 students were served by these sessions.
 - One faculty member who participated in the MSF process had this to say:

“The students and [the consultant] provided several concrete suggestions that I was able to incorporate this semester... This process has also helped me to develop a long-term goal of becoming more confident and assertive in front of a classroom. It was very helpful to be able to talk to somebody outside my department about my concerns related to teaching. I have felt a lack of confidence in my teaching skills, but this is difficult to discuss with colleagues in my department.”

- *Other Classroom Interventions.* CRLT North also offers classroom observation and consultations on videotaped class sessions.
 - During 2007-2008, CRLT North conducted two videotaped classroom sessions.
 - The following quote illustrates feedback from video-based classroom intervention:

"I found all aspects of your assistance to be quite professional, including the pre-meeting preparation, the informative and friendly consultation, and post-meeting follow-up. The degree of attention given to my recorded lecture and the subsequent thoughtful suggestions for improvement were unexpected and much appreciated."

Consultations for Faculty

During 2007-2008, CRLT North consultations served individuals from various departments, programs, and committees, including:

- 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; Corporate and Government Relations; the course ENG 580: Teaching Engineering; Department Chairs; Graduate Chairs, GSI Coordinators; Media and Marketing; Multicultural Engineering Programs Office; the Office of Engineering Outreach and Engagement; the Office of International Programs; Research and Graduate Education; the student chapter of the American Society of Engineering Education; Undergraduate Education; and Women in Engineering); and
- Units outside of engineering (Department of Mathematics; English Language Institute; Government Relations; Rackham School of Graduate Studies; and the School of Education).
- *Consultations on Proposal Preparation.* CRLT North provides assistance and expertise to help individuals conceptualize, develop, and conduct evaluations related to educational innovation and to plan, implement, analyze, and disseminate evaluation research (especially for the NSF CAREER proposal).
 - During 2007-2008, CRLT North conducted 16 consultations regarding NSF CAREER proposals. These included:
 - Consultations during this or the previous academic year with 18 of the 28 engineering faculty (i.e., 64%) who were eligible to submit NSF CAREER proposals in July 2008; and
 - Consultations with 75% (three of the four) of the U-M engineering faculty who won the CAREER award in 2008.
 - During this academic year, CRLT North conducted 12 consultations regarding other NSF research proposals (including the Broadening Participation Research Initiation Grant, Course Curriculum and Laboratory Improvement, Engineering Research Center, Integrative Graduate Education and Research Training, International Research Experiences, Materials Research Science and Engineering Center, and Research Experience for Teachers programs);
 - CRLT North conducted nine consultations regarding internal U-M competitions.
 - These unsolicited E-mails are from faculty who consulted with CRLT North:

"I would like to thank you, again, for all your help with my CAREER proposal! I really appreciate it!!! The proposal has been submitted and I am very excited about it.... Your helpful and insightful comments played the pivotal role in shaping the proposal into its current form."

"Just a quick note to let you know that the NSF grant that you worked with me on is going to be funded! I have not received the reviews at the point, but I am sure the educational component was very helpful in the funding outcome. You are awesome at what you do."

- *Other 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 2007-2008, CRLT North conducted:
 - 24 individual consultations with 18 unique faculty; and
 - Two long-term course revision efforts (for faculty in the Chemical Engineering and Material Science and Engineering Departments), both of which involved collecting data about the initial courses, consulting with department faculty, and evaluating changes in the courses based on student perceptions and/or performance.

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, 18 different engineering administrators attended the sessions.
- *Individual and Group Consultations.* During 2007-2008, CRLT North conducted:
 - 14 consultations with ten unique administrators or staff;
 - Four miscellaneous consultations for groups of engineering faculty and/or administrators, including one series of conversations with the U-M Vice President for Government Relations; and
 - Three customized presentations (at meetings of the department chairs, the graduate chairs, and the GSI coordinators) about conducting Engineering GSI teacher training prior to the start of classes.
- *Ongoing Consultations with Administrators.* CRLT North met regularly with the Associate Dean of Undergraduate Education to consult about faculty development, teaching-related issues, and GSI training. During 2007-2008, CRLT North also met as needed with the Associate Dean for Research and Graduate Education and was represented on the Management Teams for both the Associate Dean of Academic Affairs and the Associate Dean for Undergraduate Education.

CRLT-Administered Grants

In 2007-2008, the main CRLT office administered eight grants competitions for faculty to improve teaching and learning, and engineering faculty have been very competitive for these grants. A total of 13 engineering faculty (or teams of faculty) received grants totaling \$66,995.

- *Investigating Student Learning Competition.* In 2008, CRLT offered this competition for the first time. Awardees attended a one-day spring symposium on research about teaching and learning. During the coming year, 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. The Associate Dean for Academic Affairs in engineering matched funding for engineering faculty who were awarded grants, and as a result, the following seven engineering research projects (out of 12 funded proposals) are being funded:
 - David Chesney, Electrical Engineering and Computer Science. "Is Storytelling an Effective Learning Tool in Engineering?" \$3,000;
 - Jason Daida, Atmospheric, Oceanic, and Space Sciences. "Developing Pedagogical Methods that Facilitate the Translation of Problems into Computer Programming Solutions," \$3,000;

- Aileen Huang-Saad, Biomedical Engineering. "Evaluating the Effect of 'Self-Directed Choices' on Learning in a Team-Based Class Environment," \$3,000;
 - Gregory Hulbert, Mechanical Engineering. "On the Effectiveness of Team-Based Term Projects in Undergraduate Engineering Dynamics Education," \$3,000;
 - Joanna Mirecki-Millunchick, Materials Science and Engineering. "Investigating the Effectiveness of Screencasts as Learning Tools," \$4,000;
 - Jamie Phillips and Emine Cagin, Electrical Engineering and Computer Science. "Implementation and Assessment of Inductive Teaching and Learning Methods for Semiconductor Device Physics," \$4,000; and
 - Perry Samson, Mary Mello, and David Reed, Atmospheric, Oceanic, and Space Sciences. "Quantifying Distraction in an Internet-Enabled Classroom," \$4,000.
- *Other Competitions.* Engineering faculty have also been awarded three grants (out of 12 total) through the Faculty Development Fund, two Stage I grants (out of 9) through the Gilbert Whitaker Fund for the Improvement of Teaching, and one grant (out of 22) through the Lecturers' Professional Development Fund. That funding is as follows:
 - Miriam Adam, Biomedical Engineering. "Video Feedback and Skills Improvement in Oral Presentations," \$10,000 from Whitaker I grant;
 - Scott Fogler, Chemical Engineering. "Active Learning in Large Class Sizes," \$5,684 from the Faculty Development Fund;
 - Aileen Huang-Saad, Biomedical Engineering. "Establishing Methods for Enabling Student Innovation in Biomedical Engineering," \$6,000 from the Faculty Development Fund;
 - Gerald Keeler, Atmospheric, Oceanic, and Space Sciences. "Wind Energy Resource Utilization: An Interdisciplinary Investigation of the Interaction Between Atmosphere and Technology," \$9,921 from Whitaker I grant;
 - Pauline Khan, Technical Communications. "Business and Communication Professional Development," \$1,495 from the Lecturers Professional Development Fund; and
 - Rachael Schmedlen and Rob Sulewski, Biomedical Engineering and Technical Communications. "Revisions to Engineering 100," \$9,895 from the Faculty Development Fund.

Services for Engineering Graduate Student Instructors

CRLT North works closely with the associate deans in engineering to provide an array of programs for engineering GSIs. During 2007-2008, these programs included: the mandatory teacher training program for new engineering GSIs; the Engineering GSI Mentor program which pairs every engineering GSI with an experienced mentor; several preparing future faculty events; support for the American Society of Engineering Education student chapter; and the U-M Graduate Teacher Certificate program.

Activities for New Graduate Student Instructors

- *Engineering GSI Teaching Training.* Each term, CRLT North organizes and facilitates teaching orientation programs for new GSIs in the College of Engineering. This year, almost half of the overall engineering GSI population attended the orientation – 148 GSIs and Instructional Assistants attended the fall 2007 program, and 92 attended the winter 2008 program. Orientation participants received 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 programs also featured two required practice teaching sessions for every GSI and included a special “office hours” practice teaching session.
 - Evaluations of orientations were positive (84% of fall participants and 91% of winter participants replied yes to the question, “I would recommend this program to other new GSIs,” and the average rating on the question, “I have a better understanding of my role and responsibilities as a GSI” was 3.9/5.0 in fall and 4.1/5.0 in winter).
 - These excerpts from the session evaluations further illustrate the value of the program:

“Overall, the sessions presented useful information for GSIs wishing to improve their teaching.”

“It is useful in improving teaching methods and making GSIs think about how they are going to teach.”

“The training was very helpful for me in understanding the ways of active learning.”

- *Other GSI orientation programs.* Representatives from CRLT North (e.g., the Engineering GSI Mentors) were present at orientations for the following departments:
 - Chemical Engineering;
 - Electrical Engineering and Computer Science;
 - Industrial and Operations Engineering;
 - Introduction to Engineering classes; and
 - Mechanical Engineering.

Approximately 130 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 2007 and one attended in winter 2008.

Engineering GSI Mentor Program

CRLT North hires, trains, and manages the Engineering GSI Mentors (EGSMs), a group of experienced GSIs who each mentor 20-30 other engineering GSIs. In 2007-2008, CRLT North held informational meetings for potential EGSMs, and two of 11 who attended were subsequently hired as EGSMs. During 2007-2008, EGSMs attended a total of 14 biweekly training sessions conducted by CRLT North on topics that included: academic integrity, authority issues, conducting effective consultations, instructional technology, and international GSI issues. There were also training sessions each term on conducting classroom observations and midterm student feedback sessions and on facilitating practice teaching sessions. A total of 14 EGSMs attended these sessions.

To ensure the quality of the program, GSIs evaluated the mentors every term, and CRLT North conducted mid-term performance review meetings for each EGSM. CRLT North also initiated weekly office hours for EGSMs. Evaluations of the program continue to be stellar. According to results of the GSI survey conducted at the end of fall and winter terms, 98% of the GSIs who responded knew of the EGSM

program and at least 85% knew their EGSM by name in each term. 48% and 43% of the respondents contacted their EGSM for a teaching-related service during the fall and winter terms respectively.

Ten EGSMs served 241 GSIs in fall 2007, and nine EGSMs served 222 GSIs in winter 2008. In all, EGSMs provided 910 separate services for those GSIs, as shown in the following table.

Type of service	Term (Total services provided)		
	Fall 2007 (571)	Winter 2008 (339)	Total (910)
Classroom interventions	36	32	68
Scheduled consultations	69	29	98
Other face-to-face consultations	277	125	402
E-mail consultations	109	100	209
Resource E-mails	72	47	119
Practice teaching sessions	8	6	14

Highlights of the Engineering GSI Mentor Program include:

- *Classroom Interventions*
 - 43 midterm student feedback sessions for 36 unique GSIs (1294 undergraduate and graduate students were served by these sessions); and
 - 25 classroom observations with follow up consultations for 25 unique GSIs (467 students were served by these classroom interventions).
- *Individual Consultations*
 - 98 scheduled consultations on teaching;
 - 402 other face-to-face (or informal) consultations and 209 E-mail consultations;
 - 119 resource E-mails sent to GSIs; and
 - 14 practice teaching sessions.
- *Group consultations and activities.* EGSMs held 33 group consultations for a total of 129 individuals (these services are not reflected in the table). These included:
 - 26 group consultations attended by 66 GSIs using the “Take Your GSI to Lunch” program;
 - Five GSI roundtable sessions that were attended by 38 GSIs;
 - A college-wide mixer for GSIs that was attended by 14 GSIs; and
 - An information session for 11 students conducted for the Chemical Engineering Department.

Preparing Future Faculty Events

- *Month-Long Seminar.* In May, CRLT North staff co-directed the Ninth Annual Rackham-CRLT Seminar on College Teaching: Preparing Future Faculty. The seminar covered three main topics: (1) preparing for the academic job search, including creating a teaching philosophy and course syllabus; (2) learning about U.S. higher education and faculty work-life, including one-day visits to local colleges and universities; and (3) discussions on effective and reflective teaching. Of the 49 participants in the seminar, six were engineering graduate students.
- *Getting Ready for an Academic Career: One-day Conference.* The main CRLT office also offered a one-day “Preparing Future Faculty Conference” in October 2007 to help graduate students and postdoctoral scholars prepare for the transition to faculty jobs. It featured sessions about pursuing an academic career, preparing for the job search process, faculty work-life and expectations at different types of colleges and universities, and compiling a teaching portfolio and developing a curriculum vitae for the job market. For the first time, the program also included a panel on “Starting and running a research lab.” 54 engineering graduate students (out of 262 participants) attended.

- *Alliance for Graduate Education and the Professoriate Preparing Future Faculty Conference.* CRLT North collaborated with Rackham to develop this new program for graduate students at U-M, Michigan State University, and Wayne State University. There were three U-M engineering graduate students (out of 19 participants).
- *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 two engineering mentees (out of 26 total).
- *Faculty Worklife and Postdocs at Liberal Arts Colleges.* Two engineering students attended this session.

Support for the American Society for Engineering Education Student Chapter

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 2007-2008, CRLT North supported the group in the following ways:

- Feedback for graduate students about presentation style at two sessions of the 2007 Summer Seminar Series (the overall attendance at those two sessions was approximately 30 graduate students); and
- Assistance in selecting the ASEE Outstanding GSI for 2008.

U-M Graduate Teacher Certificate Program

With Rackham, the main CRLT office established a new program for students to earn a Graduate Teacher Certificate. This program serves all graduate students, including those in CoE. Of the 108 graduate students currently participating in the program, 12 are engineering students.

Other GSI activities

- CRLT North also consults with graduate student instructors about teaching and learning as well as about career-related issues. In 2007-2008, CRLT North conducted 16 consultations with 12 unique graduate students.
- CRLT North attended the class Engineering 580: Teaching Engineering to discuss the teaching philosophy statement. 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 participated in several national workshops and conferences, served on national committees and review panels, and provided consultations for individuals outside of the U-M community.

National Workshops and Conferences

CRLT North participated in the following national workshops and conferences:

- *Rigorous Research in Engineering Education*. Golden, CO, 08/02/07–08/04/07;
- *Building Connections within the Engineering Education Research Community*. Arlington, VA, 09/27/07–09/28/07;
- *Developing Engineering Education Scholars*. Milwaukee, WI, 10/09/07;
- *IEEE/ASEE Frontiers in Education Conference*. Milwaukee, WI, 10/10/07–10/13/07;
- *2007 POD Network Conference*. Pittsburgh, PA, 10/25/07–10/28/07; and
- *2008 American Society of Engineering Education Annual Conference*. Pittsburg, PA, 06/21/08–06/25/08.

National Service

- CRLT North provides national service by assuming roles that included:
 - 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;
 - Reviewer for *2008 American Society of Engineering Education Annual Conference*;
 - Reviewer for *2008 Frontiers in Education Conference*;
 - Reviewer for *Advances in Engineering Education*;
 - Reviewer for *Journal of Engineering Education*; and
 - Reviewer for *Science Education*.

Consultations with Individuals Outside of U-M

- CRLT North consulted with 42 individuals outside of U-M on issues related to teaching and learning. The individuals were from the following 35 organizations and institutions:

Carnegie Mellon University;	Rowan University;
Cornell University;	South Dakota School of Mines and
Eastern Michigan University;	Technology;
Harvard-MIT;	University of Arkansas;
Japan College Accreditation Association;	University of Colorado-Boulder;
Japan Professional School of Education;	University of Connecticut;
Kettering University;	University of Detroit Mercy;
Lawrence Technological University;	University of Massachusetts;
Massachusetts Institute of Technology;	University of Michigan alumnae;
Michigan Technological University;	University of Nebraska at Lincoln;
Misericordia University;	University of Nevada Las Vegas;
Nagoya University;	University of New Mexico;
National Institute of Standards and	University of Pittsburgh;
Technology;	University of San Diego;
National Science Foundation;	University of Texas at Austin;
Norfolk State University;	University of Washington;
Old Dominion University;	Virginia Tech; and
Pennsylvania State University;	Wichita State University
Purdue University;	

Research and Scholarship in Engineering Education

CRLT North recognizes the importance of its role in reforming engineering education and furthering the mission of the College of Engineering to promote excellence in engineering education. Current research efforts of CRLT North include: a multi-institution study as well as a local, longitudinal one to explore ethical decision-making in engineering; an engineering study on the effects of different kinds of consultations on teaching; research assessing the impact of a new student teamwork sketch; several projects to introduce active learning in engineering; research on the impact of the EGSM program on the mentors; a study of the effects of the applied honors math course; an evaluation of a more efficient approach for conducting large course MSFs; and several initiatives to support others in their pursuit of scholarly projects.

College Experiences that Promote Ethical Development

- *Project description.* This project that 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 work involves conducting site visits at 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 those 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 1 of the four-year NSF project is complete.
 - Nineteen diverse partner institutions for data collection and one institution for testing research protocols, instruments, and methodology have been identified. Together, these institutions produce approximately 10% of the graduating engineers in the U.S. The deans of all of the engineering colleges have committed to participating in the project, and a campus liaison has been identified at each institution.
 - One 50% GSRA (a fourth year student in the School of Education) was part of the research team for all of Year 1.
 - Visits to ten partner institutions – each including one-on-one interviews with two key college administrators, a faculty focus group, and a student focus group – are complete. In all, 22 college administrators, 62 faculty, and 66 students have participated.
 - All data collected from the interviews and focus groups has been transcribed, and preliminary analysis has begun. A thorough analysis has not yet occurred, so no major findings are available.
 - A manuscript about the work appeared in the journal *Ethics and Behavior*.
 - External presentations about the research were made at the *2008 Annual Meeting of the American Educational Research Association*, the *NSF Engineering Education Awardees Conference*, and the University of Texas. Papers were accepted for presentation at the *American Moral Education Conference* and the *Research in Engineering Education Symposium*.

Ethical Development of Engineering and Non-Engineering Students

- *Project description.* This study is an investigation into the commonalities and differences in the way in which engineering and non-engineering students develop the skills of ethical-decision making. In particular, approximately 100 engineering and non-engineering students at U-M were surveyed at both their first year (in 2005) and senior year (in 2008). Data analysis is underway.
- *Project highlights.* Papers were accepted for presentation at the *Frontiers in Education Conference* and the *Research in Engineering Education Symposium*.

Effects of Different Kinds of Consultations on Teaching

- *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 interpret the available data and 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.
 - A manuscript was accepted in the *Journal of Engineering Education*. It is scheduled to appear in October 2008.

Impact of Student Teamwork Sketch in ENG 100

- *Project description.* The *Off-Course* theater sketch was developed to better educate first year engineering students about working in diverse student teams. The sketch has two purposes: (1) to expose students to common team dilemmas, and (2) to provide students with strategies to deal with those dilemmas. The sketch was originally created by the CRLT Players, and the U-M Educational Theater Company of the Office of New Student Programs (under the direction of Callie McKee) refined the sketch and took responsibility for performing it. This research project, conducted during the 2007-2008 academic year, is designed to determine the impact of the sketch on students' perceptions of teamwork in an introductory engineering course.
- *Project highlights.*
 - In 2007-2008, there were 17 sections of ENG 100, and the *Off-Course* sketch was performed in nine of these sections (2/9 sections in fall 2007 and 7/8 sections in winter 2008). Approximately 580 students attended the performances.
 - As one way to measure the impact of the sketch, a 16-item survey about students' perceptions of teamwork was designed and administered. Students in all nine class sections in which the sketch was performed and in five “control” sections completed the in-class surveys at the beginning of the term (1007 surveys completed) and again at the end of the term (718 surveys completed). Analysis of the data is underway to evaluate the impact of the sketch.
 - The 13 faculty in whose sections the sketch was performed were invited to complete a survey about the value of the sketch. Eight faculty completed the survey, and data analysis is underway.

Active Learning in Engineering

- *Project description.* CRLT North is involved in three projects related to active learning in engineering. These include:
 - Two faculty members from the Materials Science and Engineering (MSE) Department received a CRLT Large Lecture Course grant to introduce instructional technologies that engage students inside and outside of the classroom. CRLT North has worked collaboratively with them to design and implement innovative exercises in two introductory MSE classes and to assess the success of their efforts.

- One MSE faculty member is collaborating with CRLT North to investigate the value of screencasts (i.e., digital screen captures with real-time audio commentary) and examine 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 will be used 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?” A paper describing preliminary results was accepted for presentation at the *Frontiers in Education Conference*.
- As a follow-up from the 2006-2007 Carnegie Academy of Scholarship on Teaching and Learning Institutional Leadership program, CRLT North met with engineering faculty to compile resources for introducing active learning in engineering courses. Data collection included examples of active learning activities in different classroom contexts and video recordings of instructors using active learning. A book chapter was published which highlights the use of active learning for graduate student instructors.

Impact of the EGSM Program on Mentors

- *Project description.* The EGSM program has obvious impact on the GSIs who receive guidance and advice from the mentors; however, little research has been conducted to determine how the mentors benefit from the program. To investigate these benefits, CRLT North surveyed current and former EGSMs to determine how their training and mentoring experiences helped prepare them for their careers in both academic and industrial settings. All EGSMs indicated that the program influenced their professional practice. For example, EGSMs who pursued an academic career reported improvements in their classroom communication skills, while EGSMs who pursued an industrial career noted the ability to translate these skills to effectively deliver information during research presentations. Preliminary results also indicate that, regardless of career path, alumnae from the EGSM program continue to mentor beyond their time in the program, and they value both giving and receiving constructive feedback. Further analysis of the data is underway.
- *Project highlights.* External presentations about this work were made at the *Professional and Organizational Development Network in Higher Education Conference* and at the *2008 ASEE Annual Conference and Exposition*.

Effects of the Applied Honors Math Course

- *Project description.* Many engineering students qualify to enroll in the applied honors math course (based on math placement test scores and Advanced Placement test scores) but 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 the University of Michigan?” Data analysis is complete, and a manuscript (titled “In search of the Holy Grail: Measuring impact of a course on students’ success”) is underway to be submitted to *Journal of Engineering Education*.

Efficient Approaches for Conducting Large Course MSFs

- *Project description.* This work is to design and evaluate a revised, more efficient process to the typical large class MSF. For the College of Engineering, the process is expected to build upon the existing online midterm student evaluations. A process has been designed, and the project is expected to begin in fall 2008.

Assistance for other Scholarship of Teaching and Learning Initiatives

- *Dissertation Committees.* CRLT North served on the following dissertation committees:
 - Janel Sutkus, Center for the Study of Higher and Postsecondary Education. She defended her thesis, *An assessment of admissions strategy effects and self-selection issues in an enrollment study of Kettering University*, on 06/06/08.

- Cindy Veenstra, Industrial and Operations Engineering department. She defended her thesis, *Modeling engineering freshman success*, on 12/18/07.
- *Rackham Certificate for Research in Engineering Education*. CRLT North met with several faculty and administrators from engineering, LSA, the School of Education, and Rackham to develop a certificate program for engineering doctoral students to learn more about research in engineering education. A final proposal was forwarded to Dean Dave Munson in May, and it is expected that the certificate will be available beginning in winter 2009.
- *P360 and P2 study (the Engineer of 2020): Penn State*. CRLT North worked with researchers from Penn State who are conducting an NSF study about the Engineer of 2020 to prepare for the team's visit at U-M. In addition, CRLT North participated as an interviewee and had follow up conversations with team.

Grants and Key Publications

Funded Research Proposals

1. Finelli, C. J., & Sutkus, J. A. "A longitudinal study of the ethical development of engineering and humanities students at the University of Michigan." *University of Michigan Office of the Vice President for Research & Horace H. Rackham School of Graduate Studies – Research on Ethics in Public Life Program*. \$5190 awarded 01/01/08.

Refereed Journal Publications

The following manuscripts appeared in print or were accepted for publication this academic year:

1. Finelli, C. J., Ott, M., Gottfried, A. C., Hershock, C., O'Neal, C., & Kaplan, M. (2008). Utilizing instructional consultations to enhance the teaching performance of engineering faculty. *Journal of Engineering Education*, 97(4). Accepted for publication, to appear in October.
2. Davis, C.-S. G., & Finelli, C. J. (2007). Diversity and retention in engineering. In M. Kaplan & A. T. Miller (Eds.), *The Scholarship of Multicultural Teaching and Learning. New Directions for Teaching and Learning*, 111, pp. 63–71. San Francisco: Jossey-Bass.
3. Harding, T. S., Mayhew, M. M., Finelli, C. J., & Carpenter, D. D. (2007, Sept.). The Theory of Planned Behavior as a model of academic dishonesty in humanities and engineering undergraduates. *Ethics and Behavior*, 17(3), 255–279.

Other Publications and Presentations

1. Carpenter, D. D., Finelli, C. J., & Harding, T. S. (2008, July). *Investigating the linkages between unethical professional behaviors and engineering undergraduate cheating*. Paper to be presented at the Research in Engineering Education Symposium, Davos, Switzerland.
2. Finelli, C. J. (2007). Academic integrity among engineering undergraduates. *University of Texas Faculty Innovation Seminar*. Austin, TX. 10/03/07.
3. Finelli, C. J., Harding, T. S., Carpenter, D. D., & Sutkus, J. A. (2007, Sept.). *Academic integrity among engineering undergraduates: Seven years of research by the E³ Team*. Poster presented for the NSF Engineering Education Awardees Conference, Arlington, VA.
4. 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 to be presented at Research on Engineering Education Symposium, Davos, Switzerland.
5. Harding, T. S., Finelli, C. J., & Carpenter, D. D. (2008, Nov). *Understanding ethical decision-making in engineering education – An empirical study*. Paper accepted for presentation at the Association for Moral Education 34th Annual Conference, South Bend, IN.
6. Litzinger, T. A., Atman, C., Finelli, C. J., & Fortenberry, N. L. (2008, June). *Engineering education centers and departments as drivers of change*. Workshop presented at the 2008 ASEE Annual Conference & Exposition, Pittsburgh, PA.
7. Mayhew, M. J., Hubbard, S., Harding, T. S., Finelli, C. J., & Carpenter, D. D. (2008, March). *Using structural equation modeling to validate the Theory of Planned Behavior as a model for predicting student cheating*. Paper presented at the 2008 Annual Meeting of the American Educational Research Association, New York, NY.
8. Pinder-Grover, T. (2007, Oct.). *Fostering a Teaching Community through Graduate Student Peer Mentoring*. Paper presented at the 32nd Annual Professional and Organizational Development Network in Higher Education Conference.
9. Pinder, T. (2007). Teaching Practice: Emphasis on Active Learning. In C. Ross and J. Dunphy (Eds.) *Strategies for teaching assistant and international teaching assistant development* (76–80), San Francisco, John Wiley & Sons.

10. 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*. Paper accepted for presentation at the 38th Frontiers in Education Conference, Saratoga, NY
11. Pinder-Grover, T., Root, S., and Cagin, E. (2008, June). Preparing graduate students to be successful as teaching mentors and as future professionals. *Proceedings of the 2008 ASEE Annual Conference*, Pittsburgh, PA.
12. 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*. Paper accepted for presentation at the 38th Frontiers in Education Conference, Saratoga, NY.

CRLT North Staff

During 2007-2008, 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, Debbie Meizlish, A.T. Miller, Mary Piontek, Chris O'Neal, Mary Wright, and Erping Zhu. Program support was provided by Autumn Fabricant, Jeri Hollister, and NatalieTaliaferro.

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, 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.