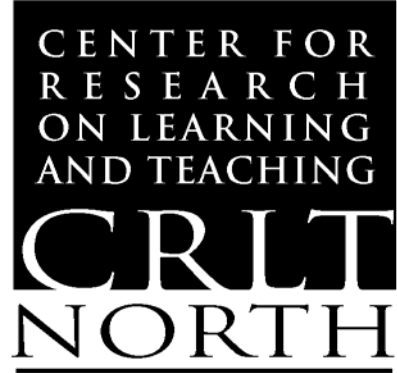


University of Michigan



CRLT NORTH

Report for College of Engineering 2006-2007

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CRLT North
Report for College of Engineering
July 1, 2006 – June 30, 2007

During the 2006-2007 academic year, CRLT North (in conjunction with the central CRLT office) provided a number of services for the College of Engineering. This report provides a summary of those services.

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Report Overview

The Center for Research on Learning and Teaching (CRLT) North represents a partnership between the College of Engineering and the central campus CRLT. 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 central CRLT office 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 career;
- National leadership to enhance the visibility of U-M in engineering education; and
- Research in engineering education to explore issues related to teaching and learning in engineering.

During 2006-2007, Cynthia Finelli and Tershia Pinder-Grover served as primary professional staff of CRLT North. Additional programming and consultations were provided by staff from the central CRLT office including: Chad Hershock, Mary Piontek, and Erping Zhu. Program support was provided by Natalie Taliaferro. Staff biographies are listed at the end of this report.

Statistical Summary of CRLT North Services

CRLT North has had almost 2,500 contacts from clients in the College of Engineering:

- Approximately 1,446 College of Engineering participants* in attendance at programs
 - 378 at orientation sessions for faculty or GSIs;
 - 744 at seminars or workshops about teaching and learning;
 - 287 at engineering performances by the CRLT Players Theatre Troupe; and
 - 37 at Preparing Future Faculty events.
- Approximately 1,035 engineering client services via individual or small group consultations* :
 - 21 midterm student feedback sessions or other classroom interventions for faculty;
 - 86 midterm student feedback sessions or other classroom interventions for GSIs;
 - 142 faculty, administrators, or staff served by other consultations or services (some brief, some intensive); and
 - 786 graduate students served by other consultations or services (some brief, some intensive).

Other statistics about engineering services provided by CRLT North and the central CRLT office include:

- 12,372 page views at the CRLT North Web site since January 1, 2007;
- More than 2,798 total U-M students served by midterm student feedback sessions or other classroom interventions; and
- \$47,500 in grants administered by CRLT.

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

College-Wide Programs

CRLT North and the central CRLT office provide several college-wide programs to promote a culture of teaching and learning in engineering. During 2006–2007, these included: a seminar series for engineering faculty, GSIs, administrators, and staff; university-wide programs; performances by the CRLT Players; the summit *Educating a STEM Workforce*; facilitation for the *NSF-ADVANCE Science and Technology Excellence Program*; committee service; and publicity for teaching and learning initiatives.

CRLT North Seminar Series

During 2006-2007, CRLT North offered 10 engineering-focused seminars and programs. These programs allowed participants 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. There were 236 participants at the sessions (87 unique faculty and 105 unique GSIs attended), and the average overall rating of satisfaction with the quality of the workshops/seminars was 4.3/5.0. The following sessions were offered on north campus:

- *Teaching Strategies (for GSIs)*. Emine Cagin, Daniel Georgiev, and Amy Kao, Engineering GSI Mentors;
- *Graduate Student Work-Life Balance (for GSIs)*. Alina Chu, Marcial Lapp, and Sarah Root, Engineering GSI Mentors;
- *Research and Scholarship in Engineering Education: Poster Session (for faculty and GSIs)*—co-sponsored by the Office of the Associate Dean for Undergraduate Engineering. 13 posters were presented, and more than 50 members of the College of Engineering community attended;
- *Ethics of College Teaching (for GSIs)*. Michael Cherry, Irina Dolinskaya, and Alireza Tabatabaeenejad, Engineering GSI Mentors;
- *Active Learning in Engineering (for faculty)*. Tershia Pinder-Grover and Chris O'Neal;
- *Best Teaching Practices: Perspectives from Experienced Engineering GSIs (for GSIs)*. Michael Cherry and Sarah Root, Engineering GSI Mentors, with panel of four GSIs;
- *Instructional Technology in Engineering Courses (for faculty)*. Guy Meadows, Professor, Joanna Mirecki-Millunchick, Associate Professor, and Jeff Ringenberg, GSI;
- *Teaching Problem Solving (for GSIs)*. Alina Chu and Amy Kao, Engineering GSI Mentors;
- *Graduate Student Mentoring: A Performance by the CRLT Players (for GSIs)*; and
- *Who is Cheating in Engineering and Why? A Research Talk (for faculty)*. Cindy Finelli;

University-Wide Programs

165 faculty and 79 GSIs from engineering participated in activities sponsored by the CRLT office. These included the following initiatives:

- 70 faculty and 79 GSIs at CRLT seminars;
- 14 engineering faculty (out of 156) at the fall 2006 Provost's Seminar on Teaching titled *Preparing Students for the Ethical Challenges of Professional Life*;
- 12 engineering faculty (out of 78) at the winter 2007 Provost's Seminar on Teaching titled *How Students Learn: Sharing Research and Practice*;
- 11 engineering faculty (out of 62) at in the first ever Teaching Innovations dinner;
- 8 engineering faculty (out of 75) at the International Faculty dinner; and
- 50 engineering faculty (out of 413) at in the Enriching Scholarship program during spring.

CRLT Players Theatre Troupe

The CRLT Players Theatre Troupe consists of local professionals and student actors who enact performances to explore pedagogical practices, enhance teaching and learning, and support diversity at the U-M. The CRLT Players perform interactive sketches based on scripts that reflect research on students' classroom experiences (especially students of color and women in science and engineering) and ways in which gender affects the hiring and retention of women faculty in science and engineering. Following the presentation of a scenario, the audience dialogues with the characters about the issues raised. A trained facilitator guides the discussion and provides research-based information relevant to the performance. The CRLT Players often incorporate audience suggestions into a revised scenario. This use of theatre has a powerful impact on instructors, helping them to gain insights and ideas for improving classroom practices or institutional climate.

For the College of Engineering in 2006-2007, the CRLT Players performed the *Gender in the Classroom* sketch (exemplifying the "chilly" climate that women students may encounter in science and engineering classrooms) and the *Graduate Student Mentoring* sketch (exploring common dynamics and possible dilemmas in the faculty-graduate student mentoring relationship). The troupe also performed previews of *Off-Course*, a new student focused sketch depicting common issues of team dynamics. Audiences for the performance included engineering GSIs, graduate students, and undergraduate students. The performances included:

- *Gender in the Classroom*. Two performances with a total audience of 213 GSIs;
- *Graduate Student Mentoring*. One performance with an audience of 14 graduate students; and
- *Off-Course*. Two performances for sketch development with an audience of about 60 attendees.

Educating a STEM Workforce Summit.

CRLT North collaborated with the Office of Women in Science and Engineering, the Institute on Social Research, and the Combined Program on Education and Psychology to plan the summit *Educating a STEM Workforce: New Strategies for U-M and the State of Michigan*. The summit featured keynote presentations by James Duderstadt and Phillip Bowman, a panel discussion on K-12 and undergraduate research and one on successful K-12 and undergraduate programs, and several concurrent group discussions. The proceedings of the summit included ten papers, and 46 individuals attended.

NSF-ADVANCE Science and Technology Excellence Program

CRLT North staff attended a training session for facilitators of department "change teams" and a three-day conference with the teams. The office will assist the engineering change teams in implementing proposals to create new department communication plans and faculty mentoring programs.

Committee Service

During 2006-2007, CRLT North served on the following College of Engineering and U-M committees:

- *Diversity and Outreach Council (DOC)*. Besides participating in biweekly meetings, CRLT North was involved in the following initiatives on behalf of the full council:
 - Coordinating the online seminar *Assessing and Meeting Needs of Underserved Parent Populations*;
 - Coordinating the *LGBTQ Ally Training* Program with the Office of Lesbian, Gay Bisexual, and Transgender Affairs. Because of this session, there are 27 LGBTQ Allies in the College of Engineering;
 - Nominating Wayne Jones for the university-wide *Harold Johnson Diversity Service Award*. He subsequently was chosen for the award; and
 - Assisting with designing an evaluation plan for the Ypsilanti Public School District Partnership program.

- *Diversity in the Curriculum Subgroup.* Staff from CRLT North chaired biweekly meetings of the subgroup and presented information about the subgroup at two College of Engineering Curriculum Committee meetings. Other initiatives of the subgroup included:
 - Furthering plans for a student-focused theater sketch with two main purposes: (1) to expose students to common team dilemmas and (2) to generate a list of strategies students can use to deal with those dilemmas. To assess the sketch, a special survey about students' perceptions of teamwork was administered in all ENG 100 sections this winter to collect baseline data (this included acquiring IRB approval). Plans are underway to perform the sketch in some section of ENG 100 in fall 2007; and
 - Developing a race and ethnicity course for the College of Engineering. After an unsuccessful proposal to the College of Engineering Curriculum Committee to adopt the LSA Race and Ethnicity requirements in engineering, the team began to develop a new course. The team expects to offer a 1- or 2-credit pilot class on diversity in engineering to be taught by engineering faculty in winter 2008.
- *Ethics in Public Life Initiative.* CRLT North is represented on both the Steering Committee and the Working Group of President Coleman's Ethics in Public Life Initiative. CRLT North also worked with several engineering faculty, administrators, and staff to develop and submit the successful proposal *Engineering Ethics: Practical Strategies for a Shifting Paradigm* to the initiative

Publicity for Teaching and Learning Initiatives

The Web site for CRLT North, www.engin.umich.edu/teaching/crltnorth, includes an up-to-date list of CRLT North workshops and a link to register for them, information about Engineering GSI Mentors and Engineering GSI Teacher Training, information about scholarship and research in engineering education at U-M, and several links to pages at the CRLT Web site. There were 12,372 page views (i.e., hits) at the CRLT North Web site since January 2007 (statistics from earlier in the academic year are not available). These hits included access to the workshop registration page and other visits.

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 2006–2007, these included programs for new faculty, classroom interventions, and consultations on proposal preparation and other teaching and learning issues. The central CRLT office also provided engineering services.

Programs for New Faculty

- *College of Engineering New Faculty Orientation.* Staff from CRLT North participated in the *Keys to the College* (orientation for new faculty in the College of Engineering) to discuss services available through CRLT North and present faculty feedback on those services. There were 18 new engineering faculty in 2006-2007, and 9 of them sought individual consultations through CRLT North.
- *Seminars for New Faculty.* During the academic year, CRLT North coordinated sessions for new faculty. There were 62 participants at the following programs:
 - A workshop on *Characteristics of Quick Starters*;
 - A lunch program for new faculty to meet members of the Engineering Teaching Academy;
 - A seminar on *Preparing a CAREER Proposal* featuring a panel of four recent engineering CAREER awardees and comments from two NSF program officers; and
 - A program for new engineering faculty to visit and observe classes of Engineering Teaching Academy members. 11 classes were available in fall, and 8 were available in winter.
- *University-Wide New Faculty Orientation.* In conjunction with the Provost and Executive Vice President for Academic Affairs, the central 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. Nine engineering faculty (out of 168) participated in the program.

Classroom Interventions

- *Midterm Student Feedback 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 2006–2007, CRLT North conducted:
 - 19 midterm student feedback sessions for 22 distinct faculty (some courses were taught by teams of instructors), 1 of which also included a video consultation. 763 undergraduate and graduate students were served by these sessions; and
 - One unique midterm student feedback session for a research-lab. 18 graduate students were served by this session.
- *Other Classroom Interventions.* CRLT North also offers classroom observation sessions. During 2006–2007, CRLT North conducted one such session.

Consultations

CRLT North provides individual consultations to faculty, administrators, and staff. During 2006-2007, these consultations served individuals from various departments, programs, and committees, including:

- Academic departments in engineering (Aerospace Engineering; Atmospheric, Oceanic, and Space Sciences; Biomedical Engineering; Civil and Environmental Engineering; Chemical 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; ASEE Student Chapter; the course ENG 580: Teaching Engineering; Department Chairs; Media and Marketing; Minority Engineering Programs Office; the Office of Engineering Outreach and Engagement; the Office of International Programs; the Undergraduate Management Team; and Women in Science and Engineering Office); and
- Units outside of engineering (Department of Mathematics; English Language Institute; Ethics in Public Life Task Force; the Institute for Social Research; the Institute for Research on Women and Gender; the Michigan Daily; Rackham School of Graduate Studies; the School of Education; and the School of Information).
- *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 2006–2007, CRLT North conducted:
 - 12 consultations regarding NSF CAREER proposals;
 - 11 consultations regarding other NSF research proposals (including the Graduate Teaching Fellows in K-12 Education; Integrative Graduate Education and Research Traineeship; Partnerships for Internal Research and Education; Science, Technology, Engineering and Math Partnerships; Research Experiences for Teachers; and Research on Gender in Science and Engineering programs);
 - One consultation regarding a National Governor's Association proposal; and
 - Four consultations regarding other proposals for internal U-M competitions.
- *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 course design, integrating innovative approaches to teaching and learning, interpreting student ratings, and improving teaching and learning in a class. During 2006–2007, CRLT North conducted:
 - 47 consultations with individuals on issues related to teaching and learning (34 consultations with 25 unique faculty and 13 consultations with 11 unique administrators or staff);
 - Nine miscellaneous consultations for groups of engineering faculty and/or administrators;
 - A meeting with the department chairs; and
 - Presentations at three department faculty meetings (Chemical Engineering, Electrical Engineering and Computer Science, and Nuclear Engineering and Radiological Sciences)
- *Ongoing Consultations with Administrators.* CRLT North met regularly with the Associate Dean of Graduate Education and Research to consult about faculty development, teaching-related issues, and GSI training. CRLT North is also represented on the Associate Dean of Academic Affairs' Management Team.

CRLT-Administered Grants

Engineering faculty received a total of \$47,500 in grants administered by CRLT:

- \$25,500 as a Large Lecture Course Grant for a team of faculty to investigate the introduction of active learning into Materials Science and Engineering courses;
- \$10,000 from the Gilbert Whitaker Fund for the Improvement of Teaching to develop and implement a web-based whiteboard for classroom use;
- \$6,000 from the Faculty Development Fund for designing an Electrical Engineering and Computer Science course in socially relevant computing; and
- \$6,000 from the Faculty Development Fund for developing Mechanical Engineering course modules on tools for digital product design processes.

Services for Engineering Graduate Student Instructors

CRLT North works closely with the Associate Dean for Research and Graduate Education to provide an array of programs for engineering GSIs. During 2006–2007, 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; and support for the American Society of Engineering Education student chapter.

Programs for New Instructors

- *Engineering GSI Teaching Training.* Each term, CRLT North organizes and facilitates teaching orientation programs for new GSIs in the College of Engineering. 121 engineering GSIs attended the fall 2006 program, and 100 engineering GSIs attended the winter 2007 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. In the winter term, a special “office hours” practice teaching session was added. Evaluations of orientations were positive (97% of fall participants and 96% 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 4.0/5.0 in fall and 4.2/5.0 in winter).
- *Other GSI and Tutor Orientation Programs.* Representatives from CRLT North (e.g., the Engineering GSI Mentors) were present at orientations for the Electrical Engineering and Computer Science and Mechanical Engineering Departments as well as for Introduction to Engineering courses. CRLT North also provided training for tutors from the Electrical Engineering and Computer Science Department Learning Center on four occasions. Approximately 129 students attended these events. Also, the central CRLT office holds a university-wide GSI Teaching Orientation Program each term, and one engineering student attended this program in winter 2007.

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 2006-2007, CRLT North held informational meetings for potential EGSMs for this first time, and 7 of 19 who attended were subsequently hired as EGSMs. During 2006-2007, EGSMs attended biweekly training sessions conducted by CRLT North on topics that included: understanding student learning styles; research on different consultations; research on student ratings; and multicultural teaching issues. There was also training on conducting classroom observations and midterm student feedback sessions and on facilitating practice teaching 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. Evaluations continue to be stellar. According to results of the GSI survey conducted at the end of fall and winter terms, 99% of the GSIs who responded knew of the EGSM program and 90% knew their EGSM by name in each term. 49% and 36% of the respondents contacted their EGSM for a teaching-related service during the fall and winter terms respectively.

Nine EGSMs served 226 GSIs in fall 2006, and nine EGSMs served 227 GSIs in winter 2007. In all, EGSMs provided 682 separate services for those GSIs. Services provided are listed in the following table.

Type of service	Term (Total services provided)		
	Fall 2006 (323)	Winter 2007 (359)	Total (682)
Classroom interventions	49	37	86
Scheduled consultations	56	48	104
Other face-to-face consultations	96	142	238
E-mail consultations	72	69	141
Resource E-mails	50	63	113

Highlights of the Engineering GSI Mentor Program include:

- *Classroom Interventions*
 - 68 midterm student feedback sessions for 55 unique GSIs. 1,514 undergraduate and graduate students were served by these sessions; and
 - 18 classroom observations with follow up consultations for 17 unique GSIs. 503 students were served by these classroom interventions.
- *Consultations*
 - 104 scheduled consultations on teaching;
 - 238 other face-to-face (or informal) consultations and 141 E-mail consultations; and
 - 113 resource E-mails sent to GSIs.
- *Other Group Consultations.* EGSMs held 56 group consultations for a total of 155 individuals (these services are not reflected in the table). These included:
 - Several group consultations using the “Take Your GSI to Lunch” program;
 - A program for graduating seniors conducted at the request of the Industrial and Operations Engineering Department;
 - Roundtable sessions for GSIs in various departments;
 - A series of sessions for GSIs to develop transition materials for several laboratory courses; and
 - A new weekly “office hours” program started during the winter 2007 term to provide on-the-spot assistance for all GSIs.

Other GSI Activities Provided by CRLT North

- CRLT North also consults with graduate students about teaching and learning as well as about career-related issues. In 2006-2007, CRLT North conducted 16 consultations with 12 unique graduate students.
- CRLT North made a presentation about mentoring with GSI-faculty teams and the Engineering GSI Mentor Program for about 25 students in the class ENGR 580: Teaching Engineering.

Preparing Future Faculty Events

- *Month-Long Seminar.* In May, CRLT North staff co-directed the Eighth 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 47 participants in the seminar, 8 were engineering graduate students.
- *Getting Ready for an Academic Career: One-day Conference.* The central CRLT office also offered a one-day Preparing Future Faculty Conference in October 2006 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. 24 engineering graduate students (out of 146 participants) 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 2 engineering mentees (out of 26 total).
- *Workshop on Faculty Work and Postdocs at Liberal Arts Colleges.* 3 engineering students attended the session.

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 2006-2007, CRLT North supported the group in the following ways:

- Providing feedback for graduate students about presentation style at four sessions of the 2006 Summer Seminar Series (the overall attendance at the series was approximately 60 graduate students);
- Meeting with executive officers of the group to assist in planning programs and strategizing about the ASEE Student Chapter;
- Serving on an ASEE student panel for about 24 participants about careers in academia; and
- Assisting in selecting the ASEE Outstanding GSI for 2007.

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.

Workshops and Conferences

National workshops and conferences at which CRLT North participated included:

- *2006 Professional and Organizational Development Network in Higher Education Conference* (10/26/06–10/28/06);
- *36th ASEE/IEEE Frontiers in Education Conference*, (10/28/06–10/31/06);
- *2007 American Educational Research Conference*, (04/09/07–04/12/07); and
- *2007 American Society of Engineering Education Annual Conference*, (06/23/07–06/27/07).

National Service

- Staff from CRLT North provides national service by assuming roles that included:
 - U-M representative for the National Academy of Engineering's Center for the Advancement of Scholarship on Engineering Education;
 - Chair of the Educational Research and Methods Division of ASEE;
 - Reviewer for the *Journal of Engineering Education*;
 - Reviewer for the *International Conference on Research in Engineering Education*; and
 - Reviewer for the *ASEE North Central Section Spring Conference*.

Consultations with Individuals Outside of U-M

CRLT North consulted with 15 individuals outside of U-M on issues related to teaching and learning. CRLT North also hosted visitors interested in issues around faculty development in engineering from the following institutions: Akita University, Hiroshima University, Nagoya University, Pohang University of Science & Technology, Korea, and the Pontificia Universidad Catolica de Chile.

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. To better assist faculty interested in developing scholarly investigations of teaching and learning and to conduct more rigorous research themselves, staff from CRLT North attended a day-long program on *Statistics: A Review* offered by the Center for Statistical Consultation and Research and a 5-day session *Questionnaire Writing Workshop* offered by Institute for Social Research. Current research efforts of CRLT North include: an engineering study on the effects of different types of consultations on faculty teaching practices; a multi-institution study to explore ethical decision-making in engineering; two projects to introduce active learning in engineering; research on assessing team member effectiveness; a study of the effects of the applied honors math course; and several projects related to retention and diversity in engineering.

Effects of Different Consultations on Teaching

CRLT North, with assistance from the central CRLT office, conducted research to address the question, "How are teaching practices of engineering faculty affected by different types of instructional consultations?" 57 volunteers – all of them engineering faculty teaching undergraduate, lecture-based courses – were randomly assigned to a control group that received no instructional consultation or to one of several groups that received consultations based on various data (numerical student evaluations of teaching, student comments collected during a midterm student feedback session, and a videotape recorded during a regular class session).

There were two main findings. First, the effectiveness of consultations depends on the type of data used to guide the consultation. Those based on student comments collected during a midterm student feedback session have the greatest positive effect on teaching. Second, faculty benefit most when an instructional consultant helps to interpret data and identify strategies for improvement. The findings support the systematic use of midterm student feedback sessions for engineering instructors and the need for instructional consultants to collaborate with individual instructors to improve their performance.

Project results were presented at the 31st Annual Professional and Organizational Development Network in Higher Education Conference and at the Research and Scholarship in Engineering Education Poster Session at U-M. Materials about the project have been forwarded to several external individuals, and a manuscript about the project has been submitted to the *Journal of Engineering Education*.

Ethical Decision-Making in Engineering

The research team includes the Managing Director of CRLT North as well as engineering faculty from California Polytechnic University and Lawrence Technological University. The team was recently expanded to include faculty and graduate students from the School of Education at the U-M

The next phase of the project involves conducting site visits of 20 institutions to interview students, faculty, and administrators, and then administering a survey to assess the impact of various aspects of the curricular and co-curricular experiences on 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.

Highlights of the project include:

- A four-year NSF award of \$548,181 effective 03/01/07;
- Manuscripts published in the *Journal of Engineering Education* and *Research in Higher Education* and accepted for publication in the journal *Ethics and Behavior*;
- Online publication of reflective essays at *Annals of Research on Engineering Education*;
- External presentations about the research at the 2007 Annual Meeting of the American Educational Research Association and the 2007 Annual ASEE Conference and Exposition; and

- Presentations to the U-M community at the *Research and Scholarship in Engineering Education Poster Session* and at a research talk funded by the Ethics in Public Life Initiative.

Active Learning in Engineering

CRLT North is involved in two projects related to active learning in engineering. These include:

- Through the University of Michigan's Carnegie Academy of Scholarship on Teaching and Learning (CASTL) Institutional Leadership Program, CRLT North works with the Director of Academic Programs in Engineering to compile approaches for introducing active learning in large engineering courses. Other aspects of the project include assessing the impact of the approaches and disseminating the most effective ones to the College of Engineering community. The team has organized two seminars on the topic: one for faculty teaching first year courses, and one for all of engineering. 38 instructors attended the two events; and
- Two Materials Science and Engineering instructors received a CRLT Large Lecture Course grant to introduce active learning into MSE courses. CRLT North has worked collaboratively with them to design and implement innovative exercises in two introductory MSE classes and to assess the success.

Instrument to Assess Team Member Effectiveness

The eight-member team includes the Managing Director of CRLT North and individuals at Clemson University, Purdue University, North Carolina State University, Rose-Hulman Institute of Technology, and Tri-State University. The project is funded through a National Science Foundation grant entitled *Designing a Peer Evaluation Instrument That is Simple, Reliable, and Valid*. The team created a brochure to publicize the new instrument and website and is analyzing data collected during the project.

Effects of Applied Honors Math course

Many engineering students qualify to enroll in the applied honors math course (based on math placement test scores and Advanced Placement Test scores), but for some reason do not take the course. CRLT North collaborates with faculty from the School of Education and the Department of Mathematics, to compare the academic success of students who qualify and do take the course and students who qualify but do not enroll in the course. The project is funded by the Associate Dean of Undergraduate Education in Engineering.

Retention and Diversity in Engineering

CRLT North collaborates with others (including faculty, administrators, and staff from engineering, the School of Education, the Women in Science and Engineering Office, and Lourdes College) on several projects. These include a study of the impact of the first year experience on engineering student retention (resulting in an inventory of student retention data for underrepresented minorities and women students in engineering at U-M, and a research presentation at the *2006 Frontiers in Education Conference*) and a project to evaluate the impact of ENGR 110 on student retention and persistence in engineering and to evaluate the simulcasting experience in that course. Other projects include a research-based article about approaches that have been successful at U-M in improving diversity and retention in undergraduate engineering, one to identify factors that influence career choice, and one on the role of professional identity integration in engineering women's academic achievement.

Funded Research Proposals

1. Finelli, C. J., King, P. M., and Dey, E. L. Collaborative research: A holistic assessment of the ethical development of engineering undergraduates. *National Science Foundation–Engineering Education Program*. \$548,181 awarded 03/01/07.

Key Publications

Relevant presentations and publications by CRLT North are listed alphabetically below.

1. Carpenter, D. D., Harding, T. S., Finelli, C. J., Montgomery, S. M., & Passow, H. J. (2006, July). Engineering students' perceptions of and attitudes towards cheating. *Journal of Engineering Education*, 95(3), 181–194.

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, 100*. San Francisco: Jossey-Bass. In press.
3. Davis, C.-S. G., Finelli, C. J., Gregerman, S., Holloway, J. & Meadows, L. (2007, May). Undergraduate initiatives to improve diversity and retention in engineering. *Educating a STEM Workforce: New Strategies for the University of Michigan and the State of Michigan*, Ann Arbor, MI.
4. Finelli, C., Gottfried, A., Kaplan, M., Mesa, V., O'Neal, C., & Piontek, M. (2006, Oct.). Evaluating methods to improve teaching in engineering. Poster presented at *Research and Scholarship in Engineering Education: Poster Session*, Ann Arbor, MI.
5. Finelli, C. J., Harding, T. S., Carpenter, D. D., & Mayhew, M. J. (2007, June). *Academic integrity among engineering undergraduates: Seven years of research*. Presented at the 2007 ASEE Annual Conference & Exposition, Honolulu, HI.
6. Finelli, C. J., Kaplan, M. L., & O'Neal, C. M. (2006, Oct.). *How different types of instructional consultations affect faculty teaching practices*. Paper presented at 2006 Annual Professional and Organizational Development Conference, Portland, OR.
7. Harding, T. S., Finelli, C. J., & Carpenter, D. D. (2006, Oct.). Cheating in college and its influence on ethical behavior in the workplace. Poster presented at *Research and Scholarship in Engineering Education: Poster Session*, Ann Arbor, MI.
8. 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). In press.
9. Mayhew, M. J., Harding, T. S., Finelli, C. J., & Carpenter, D. D. (2007, Apr.). *Examining the underlying motivations of undergraduates to behave unethically*. Paper presented at the 2007 Annual Meeting of the American Educational Research Association, Chicago, IL.
10. Meadows, L. A., Nidiffer, J, Ball, S. R., Davis, C.-S. G., Finelli, C. J., & Schultz, W. W. (2006, Oct.). Work in progress: An initial assessment of the effect of the first year experience on under-represented student retention in engineering. *36th IEEE/ASEE Frontiers in Education Conference*. San Diego, CA. 10/28/06–10/31/06. Available on CD-Rom.
11. Ohland, M. W., Bullard, L. F., Felder, R. M., Finelli, C. J., Layton, R. A., Loughry, M. L., & Schmucker, D. G. (2007, May). CATME: Comprehensive Assessment of Team Member Effectiveness.
12. Passow, H. J., Mayhew, M. J., Finelli, C. J., Harding, T. S., & Carpenter, D. D. (2006, Sept.). Factors influencing engineering students' decisions to cheat by type of assessment. *Research in Higher Education, 47*(7), 643–684.
13. Pinder, T. (2007) Videotaped practice teaching: Emphasis on active learning. In C. Ross & J. Dunphy (Eds.), *Strategies for Teaching Assistant and International Teaching Assistant Development*. Jossey-Bass. In Press.

CRLT North Staff

- *Cynthia Finelli, Managing Director of CRLT North*
Cynthia Finelli earned B.S.E.E., M.S.E.E., and Ph.D. degrees from the U-M in 1988, 1989, and 1993. 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 also holds an appointment as Associate Research Scientist of Engineering Education at U-M.
- *Chad Hershock, Coordinator of STEM GSI Initiatives*
Chad Hershock earned a B.S. in Biology from the University Scholars Program at Pennsylvania State University and an M.S. and Ph.D. in Biology from the University of Michigan. He also completed a Postdoctoral Fellowship in Ecology and Evolutionary Biology at U-M. Chad has been teaching and/or mentoring undergraduate research at U-M since 1994, including lecturing at the Ann Arbor, Dearborn, and Biological Station campuses. Prior to joining CRLT in 2005, he worked as a research scientist and project manager at BioMedware, Inc. At CRLT, Chad consults with faculty and GSIs, conducts campus-wide workshops on teaching and course design, and participates in research. Currently, Chad coordinates CRLT's campus-wide GSI teaching orientations, co-directs the Rackham-CRLT Preparing Future Faculty Seminar, and acts in the CRLT Players Theatre Troupe.
- *Tershia Pinder-Grover, Coordinator of Engineering GSI Initiatives*
Tershia Pinder-Grover earned a B.S. in Fire Protection Engineering from the University of Maryland and a M.S. and Ph.D. in Mechanical Engineering from the U-M. In addition to numerous academic and leadership awards, Tershia received the National Collegiate Engineering Award and the U-M Scholar Power Ph.D. Student Achievement Award. She has also served as a GSI and an Engineering GSI Mentor. She joined CRLT North in August 2005. In her role, Tershia is responsible for overseeing the Engineering GSI Mentor Program, planning teacher training for new engineering GSIs, and developing workshops and seminars. She also consults with faculty and GSIs on various teaching and learning issues and co-directs the Rackham-CRLT Preparing Future Faculty Seminar.
- *Mary Piontek, Evaluation Researcher*
Mary Piontek earned a B.A. and M.A. in English Literature and a Ph.D. in measurement, research, and evaluation from Western Michigan University. She has considerable experience doing evaluation research in educational settings and has consulted with foundations, school districts, institutions of higher education, and organizations on program evaluation and educational research issues. In her current role, Mary works with individual faculty members, schools, and departments that need assistance assessing the effectiveness of initiatives to improve teaching and learning. She is the co-author of *Evaluation Strategies for Communicating and Reporting: Enhancing Learning in Organizations, 2nd Edition* (Sage, 2004).
- *Natalie Taliaferro, Program Assistant for Engineering*
Natalie Taliaferro earned a B.A. in Spanish from the U-M in 2005. Shortly after, she joined CRLT as a Program Assistant. In her role, Natalie coordinates the CRLT North Seminar Series, teacher training for new engineering GSIs, and other programs specifically geared towards engineering faculty and GSIs.
- *Erping Zhu, Instructional Technology Specialist and Instructional Consultant*
Erping Zhu earned a Ph.D. in instructional systems technology from Indiana University. Prior to joining CRLT, Erping was an instructional designer at Florida Gulf Coast University. In her current role, she consults with faculty about integrating technology into their teaching and developing courses that incorporate instructional technology. Erping also collaborates with colleagues from U-M technology units to provide services and programs to faculty that include the Enriching Scholarship week. She also co-directs the Teaching with Technology Institute. She has authored book chapters, encyclopedia entries, and journal manuscripts. Her research focuses on technology and teaching, scholarship of teaching, and online learning and instruction.