

Oakton Community College and the National Science Foundation Project:
Center for Promoting STEM (DUE-0622329)

ACTIVITIES

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Built and expanded upon previously successful project, the Center for Promoting STEM (CP-STEM) at Oakton Community College was established in 2006 to increase the number of students who pursue studies and receive a degree in Science, Technology, Engineering and Mathematics. The goals of CP-STEM are:

- To encourage and enhance student success in STEM courses;
- To develop STEM activities and programs in a supportive, rewarding environment;
- To partner with professional organizations, businesses, and high schools in an effort to promote and sustain STEM activities;
- Study, investigate, and incorporate innovative STEM teaching techniques;
- To contribute to the literature on teaching and learning through program assessment;
- To distribute the successful results of CP-STEM activities.

CP-STEM offers the following programs: STEM Enrichment Program, Study Sessions, Mentoring Program, STEM Internship Program (Peer Tutor Training program, STEM Lab Assistant Training Program, Worksite Internships), STEM Success Seminars, STEM Faculty Leadership program, Student-Industry-Teacher Simulations. CP-STEM also sponsors student clubs that organize academic, career and social activities.

The Peer Tutor Training Program won the 2003 Innovation Award of the Illinois Council of Community College Administrators (ICCCA) in November, 2003. The Student-Industry-Teacher Simulations Program won the 2005 ICCCA Innovation Award in November, 2005.

In an article titled *For Achievers, a New Destination: Two year colleges you may want to attend and leave*, by Beth Frerking (Education Life Supplement Late Edition - Final, Section 4A, Page 23, April 22, 2007), New York Times featured Oakton Community College a successful two-year college model. Specifically, Frerking stated that Oakton Community College “recently received a continuing grant of nearly \$800,000 from the National Science Foundation to bolster learning in science, technology, engineering and mathematics, particularly for underachieving students.”

This report covers the project activities occurred between August 1, 2006 and July 31, 2007.

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PROJECT EXECUTIVE SUMMARY

(August 1, 2006 — July 31, 2007)

The following table summarizes the programs and activities that CP-STEM offered, organized, and sponsored, and the number of students involved in each program and activity in 2006-2007. In addition, the following are additional highlights of the activities:

- January 15, 2007, Gloria Liu, co-project director, was hired as coordinator of CP-STEM, and has spent her 75% of time on CP-STEM. Beginning July 1, Gloria Liu will work 100% of time on CP-STEM when Oakton Community College will fund 50% of her salary.
- Janice Schakowsky, Representative for the 9th District of Illinois, spoke to Oakton STEM students at the 8th CEO, Scholar and Expert Forum, on December 11, 2006.
- Glenbrook South High School and Loyola Academy have become Oakton’s partners for CP-STEM, in addition to Evanston Township High School District, Maine Township High School District, and Niles Township High School District.
- Oakton Community College and University of Wisconsin at Stout have drafted a transfer articulation agreement for biotechnology concentration.
- CP-STEM collaborated with North Suburban Educational Region for Vocational Education (NSERVE, <http://www.nserve.info/>) to develop and deliver SIT SIMs. CP-STEM considers this collaboration as a step toward sustaining CP-STEM activities.
- December 6, 2007, Dr. Elizabeth Teles, NSF program officer, conducted a site visit to Oakton Community College. Her visit report serves as a reference for Oakton’s project.
- In addition to the project director and co-project directors, 20 Oakton faculty members have been actively involved in the STEM Enrichment Program, STEM Mentoring Program, SIT SIMs, and other project activities.
- Ten students facilitated 19 STEM study sessions.
- STEM Enrichment Program continues its success. 83% of students in the program received a grade of A, B, or C; while 71% of students in the control group received a grade of A, B, or C.
- Oakton is still compiling the number of STEM degrees and certificates offered in 2006-2007.

Executive Summary : Project Activities	
Activities	Number of student participants
<i>STEM Enrichment Program:</i> In fall 2006, 18 students enrolled in MAT052, 10 in COL101 and 25 in EGL101. In spring 2007, 26 students enrolled in MAT120, 42 students in EGL102.	121
<i>STEM Mentoring Program:</i> Offered in fall, 2006 and spring, 2007.	62
<i>Peer Tutor Training Program:</i> Offered in summer 2007.	1
<i>Student-Industry-Teacher Simulations:</i> Delivered on April 13, 2007. Eight teachers, and 101 students from four high schools participated.	101
<i>Study Sessions:</i> offered in fall 2006, spring 2007, and summer 2007.	364
<i>AMATYC Math Competitions:</i> Oakton students ranked 4 th in the Midwest region and 38 th in the country in spring 2007.	177

<i>CEO, Scholar and Expert Forum</i> : organized in fall, 2006 and spring, 2007.	105
<i>Engineering Physics Club Events</i> : In 2006-2007, the club organized 3 field trips, a bridge building contest, and a pizza night.	122
<i>WYSE competition</i> : On February 2, 2007, Oakton sponsored a competition.	200
<i>The Futures Unlimited</i> , a whole day event that brings 8 th grade female students to Oakton for hands-on STEM sessions and STEM role model sessions with successful women working in STEM areas.	430
<i>Undergraduate Research Presentation</i> : organized on May 1, 2007	30
<i>Project Management</i> : The PIs met weekly. Two advisory committees (IAC, and CIAA) met once in Spring 2007.	N/A
<p><i>Dissemination</i>:</p> <ul style="list-style-type: none"> ✓ Maintained the project web site. ✓ Presented at the MAA Mathfest in San Jose, CA, August 3-5, 2007. ✓ Presented at the NSF STEP Grantee Meeting, March 20-22, 2007 ✓ Presented at the AMATYC annual conference, Nov.2-5, 2006. ✓ Presented at the 2006 PKAL annual assembly, October 2006. ✓ A paper has been published on the AMATYC website. ✓ An annual letter was sent to Advisory Committee members, high school districts and mathematics chairs, industry partners, and NSF officers. 	N/A
Total number of students involved in 2006-2007:	1713

Chapter One: STEM Enrichment Program

1.1. Description of STEM Enrichment Program

The STEM Enrichment Program is to help under-prepared students improve their math, English and study skills through five courses, MAT052 (Elementary Algebra), COL101 (College Study Seminar), MAT120 (Intermediate Algebra), EGL101 (Composition I) and EGL102 (Composition II). MAT052, COL101, and EGL101 are offered in each fall, while MAT120 and EGL102 are offered in each spring. Each semester, thirty qualified students in these courses who complete the program successfully will receive a fellowship of \$400.

Contents of these courses are woven with study skills and rich materials in STEM to enhance students' learning and increase students' interests in these areas. Students in the program participate in seminars, field trips, and student clubs. They work with their faculty mentors for prompt and individualized help.

1.2 STEM Enrichment Program in 2006-2007

In fall 2006, 18 students enrolled in MAT052, 10 in COL101 and 24 in EGL101. Among them, 10 students actively participated in the seminars, worked with mentors, passed the classes, and hence received a fellowship of \$400. In spring 2007, 26 students enrolled in MAT120-004/005, 42 students in EGL102-006/011. Among them, 12 students actively participated in the seminars, worked with mentors, passed the classes, and hence received a fellowship of \$400.

In 2006-2007, the following classes were offered by the STEM Enrichment Program:

Courses	Instructors	# of Students
MAT052-015*, fall 2006	Julie Shotsberger	18
COL101-001*, fall 2006	Dave Geller	10
EGL101-040, fall 2006	Virginia Gibbons	25
MAT120-004/005, spring 2007	Julie Shotsberger	26
EGL102-006, spring 2007	Virginia Gibbons	27
EGL102-011, spring 2007	Maureen Douglas	15
	Total	121

*MAT052 and COL-101 were tandem courses and team-taught.

The following table shows the success rates of the treatment classes and control classes.

Treatment Classes	Success Rate*	Completers	Control Classes	Success Rate*	Completers
MAT052-015	6(67%)	9	MAT052	33(69%)	48
EGL101-040	22(88%)	25	EGL101	32(71%)	45
MAT120-004	4(67%)	6	MAT120	37(59%)	63
EGL102-006/011	11(92%)	12	EGL102	65(82%)	79
Overall	43(83%)	52	Overall	167(71%)	235

*Success means students received grades of A, B, C.

In addition, Linda Jang, Oakton adjunct faculty of mathematics, assisted in developing the MAT052 pre and post test this summer.

The following is the list of students in the program who met their mentors, attended seminars, participated in field trips and STEM activities, and hence received tuition reimbursement:

MAT 052 and COL101		EGL 101	
Janet Yllaconza	B01493089	Kruti Patel	B01487065
Robert Morse	B02000522	Sana Noormohammad	B02000611
Claudia Calderon	B01283437	Kristina Garcia	B02001855
Michael W. Spina	B01368512	Daniel Chien	B01368512
		Shilpi Chona	B01490220
		Caryn Asprec	B01489922

MAT 120-004/005		EGL 102-006/011	
Cherise Ehlert	B01245644	Caryn Asprec	B01489922
Janine Franzkowiak	B01437749	Justin Chatroop	B01478836
Maria Mendoza-Pepin	B01464715	Shilpi Chona	B01490220
Alex Soreanu	B01468357	Nuzhat Chowdhury	B01478840
		Kristina Garcia	B02001855
		Sana Noormohammad	B02000611
		Michael Pennett	B01454015
		Erik Shaakov	B01474838

Chapter Two: STEM Mentoring Program

2.1 Description of STEM Mentoring Program

STEM Mentoring Program is designed for students who are interested in STEM majors and careers, and who are taking college level STEM courses. Students in the program take a STEM course, work with a faculty mentor on a regular basis to discuss the challenges of the course and other academic issues, and participate in STEM activities. Students in the program receive a \$200 NSF-Oakton STEM Fellowship each semester after they completed the program successfully.

2.2 The STEM Mentoring Program in 2006-2007

In fall 2006, 28 students participated in the mentoring program. 11 of these met the program requirements and received a fellowship of \$200. The following students received the Oakton-NSF Fellowship in fall 2006.

Student	Academic Interest	ID Number
Pamela Emmanuel	Science	B01342073
Aaron Franceschi	Technology, Engineering	B01320467
Rustom Hakimiyan	Engineering	B01417823
Manishkumar Kapatel	Engineering	B01482864
Luca Lollino	Engineering	B01473021
Aeneas Macwan	Science	B01428960
Sarah Masri	Science, Education	B01165765
Danial Majeed	Engineering	B01410947
Leo Romanovsky	Engineering	B01441760
Bozena Sawicka	Engineering	B01489612
Frederick Wezeman	Engineering	B01492480

In spring 2007, 34 students participated in the mentoring program, and 23 of them met the program requirements, and hence received a fellowship of \$200. The following students received the Oakton-NSF Fellowship in spring 2007.

Student	Academic Interest	ID Number
Rodrigo Aihara	Engineering	B01488890
Shahroo Behzadi Teshnizi	Science	B01400867
Adib Chaus	Science	B02000441
Adrian Emmanuel	Science	B01474870
Roque Fernandes	Technology	B01434979
Mary Ibrahim	Undecided	B01491215
Manishkumar Kapatel	Engineering	B01482864
Ali Khiabani	Science	B02002420
Alexander Krichnkov	Engineering	B01444964
Kelly Leffert	Engineering	B01356415
Luca Lollino	Engineering	B01473021
Shfae Mohamed	Science	B02010444
Marla Morehead	Engineering	B01482633
Pratik Patel	Engineering	B01471297
Vijay Patel	Engineering	B01478970
Anthony Savushkin	Science	B01237837
Bozena Sawicka	Engineering	B01489612
Khushali Shah	Mathematics	B01436023
Vrushank Shah	Science	B01486933
Rashad M. Shehadeh	Science	B01485353
James Spiegelman	Engineering	B01438920
Febin Varughese	Pharmacy	B01491872
Frederick Wezeman	Engineering	B01492480

In 2006-2007, the following ten faculty members mentored a total of 62 students in the STEM Enrichment Program and Mentoring Program.

Mentor	Discipline
Jinhee Canfield	Mathematics
Majid Ghadiri	Electronics
Theodore Gotis	Physics
Wade Jarrell	Chemistry
Gordon McClarren	Mathematics
Katherine Schuster	Education
Julie Shotsberger	Mathematics
Bill Strond	Biology
George Tootelian	Engineering
Peter Winkler	Biology

We quoted the following from students during end-of semester interviews about some of the best features of SMP:

- That they were very informative, and opened my eyes to a wide variety of opportunities I never knew existed.
- Talking to the mentor.
- Being guided towards career build up.
- The field trip to Itasca, the machine was so amazing and very nice presentation the annual pizza night, the presentation was nice and I finally know what they do.
- The Engineering Pizza night was the best activity. Having access to professionals is one of the greatest benefits of being involved with STEM.

Chapter Three: Peer Tutor Training Program

3.1 Description of Peer Tutor Training Program

The *Peer Tutor Training Program* trains high school juniors and seniors who have strong math skills (i.e., AP enrolled, National Honor Society) to become Oakton peer tutors. High school juniors and seniors who complete AP Calculus and are interested in tutoring mathematics courses below the AP Calculus level are selected to participate in the program. Participants learn techniques, methods, theories and approaches that improve learning. Through readings, class discussion, case studies, journals, group work, activities and a practicum, participants develop the academic and personal skills that help students achieve their academic goals. The program is limited to 6 participants each summer. Participants of the program are paid for training and practicum and receive CRLA (the College Reading and Learning Association) certification upon successful completion of training. They also tutor Oakton students. We anticipate at least one will return to continue tutoring in the fall and spring semesters.

In Summer 2007, Daniel Jung of Niles North High School participated in the Peer Tutor Training Program.

Chapter Four: Student-Industry-Teacher Simulations (SIT SIMs)

4.1 Description of SIT SIMs

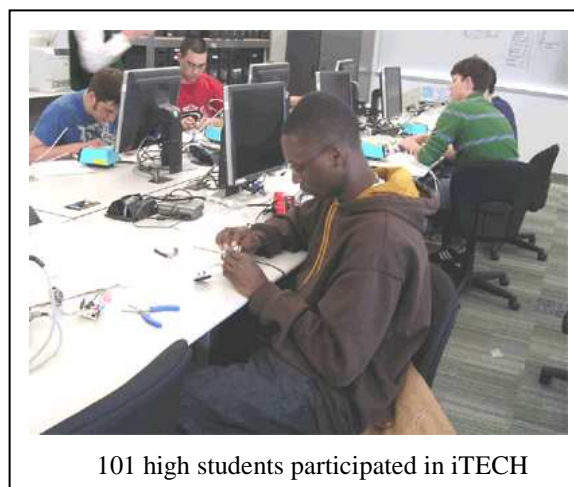
SIT SIMs are work-related simulations developed by teams of industry professionals and community college STEM faculty to provide high school students with work-based, hands-on learning opportunities. Math and science teachers at participating high schools select groups of five high-potential students to participate. Teachers participate alongside students. Students experience real-world STEM problem simulations presented by industry professionals and gain confidence from working in teams with teachers and other students.

4.2 SIT SIMs in 2007

In 2007, CP-STEM collaborated with North Suburban Educational Region for Vocational Education (NSERVE, <http://www.nserve.info/>) to develop and deliver SIT SIMs through iTECH. NSERVE is a career and technical education consortium working with school districts in the northern Cook County suburbs. The collaboration allowed CP-STEM to focus on development and deliver of SIT SIMs. NSERVE took responsibility for contacting high schools, recruiting students, and providing budget for food.

On April 13, 2007, 101 high school students and eight teachers from four high schools participated in iTECH, a whole day event. Dr. Monica Regalbuto, Argonne National Laboratory, presented the keynote speech, “Developing Safe Nuclear Energy to Meet Growing Global Demand.” Four participating high schools were:

- Glenbrook South High School
- Maine East High School
- Maine South High School
- Maine West High School



4.3 Description of SIT SIMs presented at 2007 iTECH

Title	Discipline	Oakton Faculty	Industry Professional
Fab Lab	3D Printing	Dave Geller	
Game Maker	Animation and Gaming	Michele Reznick	Sally Field Mullan, College of DuPage
What's That Sound	Automotive Engineering	Theodore Gotis	Joe Janas, Tony Asghari Continental Automotive
Disease Detectives	Biotechnology and	Carol Ward	Paul Kroeger

	Epidemiology		Abbott Lab.
Web 2.0	Blogs and Podcasts	John Stryker	
Digital Bird Call	Circuit Design	Majid Ghadiri	Stuwart Schwab
Busted!	Crime Forensics	Jim Lucas	
Thinking Small To Do Big Things	Nanotechnology	Connie Churchill	
Tag, You're It	RFID	Majid Ghadiri	Jad Rasul, Motorola

Disease Detectives (Biotechnology) – In a world threatened by AIDS, SARS, and biological warfare, how do scientists track diseases? Participants will simulate the outbreak of an infectious agent, and use rapid diagnostic technology to see if they are “infected.”

Busted! (Crime Forensics) – Police are fighting crime in exciting new ways, through biometrics, thermal imaging, and video surveillance. Participants will be introduced to facial reconstruction software and learn how infrared technology helps catch criminals in the dark.

Game Maker (Animation and Gaming) – Create your own computer game without having to write a single line of code. Using drag-and-drop actions, participants will develop their own videogame, complete with backgrounds, animated graphics, music, and sound effects.

Tag, You're It (RFID)– Primarily used in supply chain management and security applications, radio frequency identification (RFID) improves data accuracy while reducing time and labor costs. Participants will track themselves and each other in a high tech game of tag.

Web 2.0 (Blogs and Podcasts) – Transparent data retrieval on the Web has been made easier for programmers through the release of AJAX (Asynchronous JavaScript + XML). Participants will create a podcast using Audacity, and upload it to a blog for later access.

Fab Lab (3D Printing) – Rapid prototyping, or 3D printing, is being used to reduce the “time to market” cycle for new products. Participants will explore this new technology and learn its applications – and limitations – in CAD product development and engineering.

Digital Bird Call (Circuit Design) – Learn how to design a circuit that will reproduce the frequencies of a bird call. Participants will start with a design, and move on to construction and testing. At the end of the day, take your circuit project home and pester your own pet.

Thinking Small To Do Big Things (Nanotechnology) – Nanoscience is one of the most stimulating research fields of the 21st century. That’s because materials change fundamentally at the nano level. Participants in this workshop will explore future nanoscale applications.

What’s That Sound? (Automotive Engineering) – How do engineers work to eliminate vibration in automobile components? Participants will explore the applied physics of resonance, which is manifest in the sound of musical instruments, as well as in the ebb and flow of ocean tides.

Chapter Five: Study Sessions

5.1 Description of Study Sessions

The Study Sessions program is a STEM retention program based on Supplemental Instruction (SI), a peer assisted study model developed by Dr. Deanna C. Martin, Ph.D., at the University of Missouri—Kansas City in 1973(www.umkc.edu/cad/SI/Index.htm). Study Sessions help students in high risk courses to master course contents, develop and integrate learning and study strategies. They offer students the opportunity to attend regularly scheduled, out-of-class review sessions, in addition to the regular instruction and tutoring. Trained professional tutors facilitate the sessions by encouraging the students to actively engage with the content. Ten study sessions are offered for students enrolled in specific high-risk courses including pre-calculus, calculus, College Physics and College Chemistry. Participation is voluntary and open to all students in the course. Study sessions meet two hours per week. Times are scheduled based on student surveys conducted during the first week of class. Sessions begin during the first week of a semester. Non-participating students in participating sections form the Study Sessions control group.

The program is offered in classes in which the instructors invite, support, and encourage participation in the program. Facilitators communicate with instructors frequently about course content and about issues students raised during sessions. The instructors of the courses regularly share of student grades with the Study Sessions program director. The instructors are not informed which students have participated in Study Sessions so that students' grades can not be influenced. Facilitators participate in intensive eight-hour training sessions before the semester begins in order to address student learning styles, instructional strategies for strengthening students' academic performance, specific teaching/learning theory and techniques data collection, confidentiality and interacting with faculty members.

5.2 Study Sessions in 2006-2007

In 2006-2007, 19 classes were supplemented with study sessions as listed in the following table:

Fall 2006		
Classes	Facilitators	# of students
Calculus I - MAT 250 050	Wesam Yakoub	20
College Algebra - MAT 140 050	Wesam Yakoub	20
General Physics I - PHY 221 001	Young Min Ahn	22
Organic Chemistry I - CHM 223 001	Nadia Margulis	12
Organic Chemistry II - CHM 224 001	Nadia Margulis	13
Spring 2007		
Classes	Facilitators	# of students
Calculus III - MAT 252 001	Christina Lucuta	18
Organic Chemistry II - CHM 224 001	Nadia Margulus	15
Intermediate Algebra - MAT 120 004	Kinga Kucharska	16
Intermediate Algebra - MAT 120 005	Kinga Kucharska	14
General College Chemistry I - CHM 121 051	Anthony Savuchkin	25
Microbiology - BIO 151 001	Mart Dela Cruz	20

Microbiology - BIO 151 003	Mart Dela Cruz	21
Microbiology - BIO 151 004	Mart Dela Cruz	19
Summer 2007		
Classes	Facilitators	# of students
Elementary Organic Chemistry-CHM 207 850	James Kruczinski	15
Microbiology – BIO 151 801	Mart Dela Cruz	24
Microbiology – BIO 151 802	Mart Dela Cruz	21
Microbiology – BIO 151 803	Mart Dela Cruz	12
College Algebra – MAT 140 702	Daniel Jung	27
Calculus I – MAT 250 702	Lee Cohn	30

Study session data were collected for fall 2006, spring 2007, and summer 2007 semesters. Data for summer 2007 is not included in the following analysis since it is still ongoing and will end on July 26, 2007 after this report is submitted. Fall 2006 and spring 2007 data are analyzed below.

Among the 13 classes with study sessions in fall 2006 and spring 2007, 80 students attended study sessions while 123 classmates who served as the control group did not. The treatment group had a more significant success rate (85%) than the control group (58%). The success rate includes grades of A, B, and C. Appendix One shows the demographics of study session participants and STEM Attitude Survey participants.

Chapter Six: STEM Seminars and Activities

In 2006-2007, CP-STEM organized and co-sponsored many STEM activities directly and through two students clubs engaged in the STEM activities, the STEM Club and the Engineering and Physics Club. STEM activities held in 2006-2007 included STEM Seminars and club activities. The STEM Club focuses on math and sciences while the Engineering and Physics focuses on engineering and physics.

On February 2, 2007, 200 high school students from the following 11 high schools participated

- Buffalo Grove High School
- James B. Conant High School
- Evanston Township High School
- Loyola Academy
- New Trier High School
- Niles North High School
- Niles West High School
- Notre Dame High School
- Regina Dominican High School
- Schaumburg High School
- Willows Academy

The STEM Club organized the AMATYC (the American Mathematical Association of Two Year Colleges) Student League Math Competitions.

	Fall 2006	Spring 2007	Annual
Midwest Region*	9 th	4 th	5 th
In the Country	62 nd	38 th	48 th
# of Oakton participants	103	74	177

*The Midwest region consists of Wisconsin, Illinois, Michigan, Indiana, Ohio, and Kentucky.

In addition, the STEM Club continued organizing a CEO, Scholar and Expert Forum:

- The 8th CEO, Scholar and Expert Forum held on December 11, 2006.
 - * Keynote speaker: Janice Schakowsky, Representative for the 9th District of Illinois.
 - * Title of Keynote speech: Oakton Community College Forum on STEM
 - * Number of students attended: 65
- The 9th CEO, Scholar and Expert Forum held on April 26, 2007.
 - * Keynote speaker: Professor Shi-Jiang Li at Medical College of Wisconsin
 - * Title of Keynote speech: Five Nobel Prizes on NMR and MRI and its Implications to Our Lives
 - * Number of students attended: 40



Representative, Jan Schakowsky presented awards to students who won the Oakton Mathematics Competition.

The Engineering Physics Club organized the following events:

- *International Manufacturing Technology Show*, September 7, 2006. 10 students went on the field trip.
- *JUNO Lighting's Idea Lab*, October 31, 2006. 11 students went on the field trip.
- *Pizza Night*, March 22, 2007. Five professional engineers from ISPE talked to students about jobs and internships in engineering. 67 attended the event. One of the attendees later applied for a job at ISPE and was hired.
- *Graphic Tool Corp.*, April 12th, 2007, 19 students participated in the trip. <http://www.graphictool.com/>
- *Bridge Building Contest*, on July 18, 2007. 15 Oakton students have registered to participate.

CP-STEM also co-sponsored the following two events:

- Futures Unlimited, a whole day event that brings 8th grade girls to campus for hands-on sessions in STEM areas as well as role model sessions with successful women working in STEM areas. Held on May 17, 2007, Futures Unlimited had 430 8th grade female student participants.
- Undergraduate Research presentation by two Oakton STEM students, Farah Chaus and Pamela Emmanuel, on *A Practical Method for Biofilm Susceptibility Testing of Coagulase – Negative Staphylococci*, on May 1, 2007. 30 students attended the presentation.

Chapter Seven: Articulation and Outreach

CP-STEM has worked to strengthen articulations with four year institutions and high schools. Efforts included:

- Assisted by CP-STEM, Oakton Community College and University of Wisconsin at Stout have drafted a transfer articulation agreement for biotechnology concentration. This will serve as an example for articulation with other universities and colleges.
- CP-STEM has worked with Oakton's math, biology, chemistry and physics departments to develop course guides for concentrations in biology, chemistry, computer science, math, and physics.
- Oakton Community College has actively participated in the PKAL events. In 2006, Julie Shotsberger, Associate Professor of Mathematics, and Melodie Graber, Assistant Professor of Biology became PKAL F21 members. Oakton will continue recommending STEM faculty members to be involved with PKAL.
- Tingxiu Wang attended a Skyway Athletic Conference planning meeting on April 27, 2007. Tingxiu Wang and Gloria Liu will attend another meeting on July 19, 2007. Skyway Athletic Conference is a consortium consisting eight community colleges in the metropolitan of Chicago: College of Lake County, Elgin Community College, McHenry County College, Moraine Valley Community College, Morton College, Oakton Community College, Prairie State College, and Waubensee Community college. The Conference has a co-curricular program that provides opportunities for students to engage in academic competitions. Currently they organize four events, Jazz Festival, College Bowl, Writers Festival, and the Art Competition. Skyway is organizing a new poster competition in STEM.
- Tingxiu Wang and Gloria Liu attended the Science and Mathematics Faculty Round Table at DePaul University on May 9, 2007.
- CP-STEM continues active outreach activities. Jinhee Canfield, instructor of mathematics, and George Tootelian, adjunct faculty of physics and engineering, were appointed as high school liaisons for CP-STEM. Their responsibilities include:
 - Collaborating and coordinating with Oakton's Office of Admissions.
 - Visiting Oakton's nine area public high schools once every fall and spring semesters including Evanston, Glenbrook North, Glenbrook South, Niles North, Niles West, New Trier, Maine East, Maine South, and Maine West.
 - Facilitating the dissemination of project throughout Oakton's district.
- Glenbrook South High School and Loyola Academy have officially agreed to be Oakton's partners on the project.
- Gloria Liu and Joe Kotowski, coordinator and co-project director, have been invited to serve on the Advisory Committee for the Project Lead-the-Way (PLTW). They attended PLTW's first advisory meeting on May 22, 2007.
- Julia Hasset, chair of mathematics, and Bob Sompolski met with representatives of Evanston Township High School for clearer math placement articulation.

Chapter Eight: Dissemination

The Project web site is <http://www.oakton.edu/cp-stem/>.

- PDs' paper, *How Much We Know about STEM*, has been accepted for presentation at the AMATYC 33rd Annual Conference, which will be held in Minneapolis, Nov. 1-4, 2007. They will also set up a poster at the conference. Their paper is expected to be published in the Online Proceedings of the Thirty-Third Annual Conference of the American Mathematical Association of Two Year Colleges.
- Gloria Liu and Tingxiu Wang will present at the MAA Mathfest, in San Jose, California, August 3-5, 2007. Their presentation title is *Mentoring Students for Success in STEM*. In addition, they will set up a poster.
- PDs attended 2007 STEP Grantee Meeting in Washington, DC, March 20-22, 2007, and presented at the Poster Session.
- Annual highlights were sent to Advisory Committee members, high school districts and mathematics chairs, industry partners, and NSF officers in December 2006.
- Gloria Liu and Tingxiu Wang attended the NSF Day at Parkland College, on December 7, 2007. They also set up a poster at the meeting.
- PDs presented "*Promoting STEM and SML*" at the AMATYC Annual Conference in Cincinnati, Nov. 2-5, 2006. They also set up a poster at the conference. In addition, American Mathematical Association of Two Year Colleges published the paper in the Online Proceedings of the Thirty-second Annual Conference of the American Mathematical Association of Two Year Colleges. <http://www.amatyc.org/publications/Electronic-proceedings/2006Cincinnati/Oakton.pdf>
- PDs presented at the Snapshot Session and Poster Session of the 2006 PKAL Annual Assembly, held at Sheraton Chicago Northwest, Arlington Heights, IL, October 4-6, 2006.

Chapter Nine: Project Management

Started January 15, 2007, Gloria Liu, co-project director, was hired as coordinator of CP-STEM, and has spent her 75% of time on CP-STEM since then. Beginning July 1, Gloria Liu will work 100% of time on CP-STEM. Oakton Community College will fund 50% of her salary.

A student employee has been hired beginning February, 2007, to assist in data entry, web site development, and other clerical support. The grant pays 10 hours per week, while OCC Division of Mathematics and Technology pays for another 10 hours per week.

CP-STEM appointed Dr. David Smith, Senior Lecturer in Psychology at Northwestern University, as the external project evaluator.

The project director and co-project directors meet once every week in 2006-2007 to implement and evaluate the project. They also meet with David Smith, project external evaluator, and David Rudden, Manager of Research and Assessment, biweekly on project evaluation. Dr. Thomas Hamel, vice president for academic affairs, maintains close contact with project directors to provide support.

CP-STEM has established two advisory committees, Institutional Advisory Committee (IAC) and Council of Industry and Academic Advisors (CIAA). IAC met on February 14, 2007, and CIAA met on March 19, 2007. The reports on the two meetings can be found in Appendices A and B, respectively.

December 6, 2007, Dr. Elizabeth Teles, program officer at NSF, paid a site visit to Oakton Community College. Her visit report serves as a reference for Oakton's project.



Drs. Elizabeth Teles and Corby Hovis visited Oakton on December 6, 2006. They met eight former Oakton STEM students who are studying at University of Illinois at Urbana-Champaign.

Chapter Ten: Other Activities

I. **Strategic planning:** CP-STEM has supported Oakton's strategic goals in the following aspects:

1. Offer innovative learning for local and global citizenship: CP-STEM offers innovative STEM programs and activities to meet the needs of our students and nation.
2. Provide WISE support for STEM students.
 - CP-STEM provides a welcoming service for students interested in pursuing STEM at Oakton.
 - CP-STEM provides an informing service for students to share knowledge and experience about how to succeed in STEM academic fields and careers.
 - CP-STEM provides a supportive service for students to receive mentoring and attend study session.
 - CP-STEM provides an engaging service for students to connect with STEM learning, with STEM cohort, and with successful STEM role models.
 - As a summary, CP-STEM provides a home to STEM students.
3. Anti-Bias college: Anti-bias at a diversified institution may have impact on improving students' academic potential and consequently increase retention. Through the Next Step Committee, one of Oakton's approaches to anti-bias is to use Crossroads' definition of institutional and systemic racism. In an educational institution, institutional and systemic racism can negatively affect teaching, delivery of service, and policy making. A goal is to

maximize students' academic potentials through an increased understanding of the effects of institutional and systemic racism on relationships and productivity. As a member of the Next Step Committee, Gloria Liu has organized two preliminary workshops on October 27, 2006 and June 14, 2007 open to all school personnel to introduce the concept of institutional and systemic racism. She also organized two 2.5 days training on March 27 – 29, 2007 and June 26 – 28, 2007 open to those who attended the preliminary workshops and three follow-up brown bag discussion sessions on November 16, 2006, April 20, 2007, and July 11, 2007. In 2006-2007, over 90 faculty, staff, and administrators have attended a preliminary workshop, a 2.5 day training, and/or a brown bag discussion.

4. Provide academic excellence.
 - Advance the STEM culture.
 - Encourage active and collaborative learning and student-faculty and faculty-faculty interactions.
 - Improve the success and persistence of STEM students.
5. Reinvent physical space and infrastructure.
 - CP-STEM will support student learning and improve comfort.
 - CP-STEM will enhance study and meeting space to foster the STEM cohort and meet the needs of our STEM students.
 - CP-STEM will provide an environment of innovative teaching. It will provide an environment to enhance team-teaching, promote student-student and student-teacher interactions, and integrate new technology into teaching. It will be a show room for innovative teaching in STEM, and attracting students to STEM studies.

CP-STEM will continue to establish more ways to support Oakton's strategic goals.

II. Internship: Oakton Community College has been working on revising its internship program. Business Institute at Oakton previously supervised the internship coordinator. Starting July 1, 2007, Academic Affairs took over supervision of the position. CP-STEM has collaborated with the internship coordinator to establish the program. CP-STEM has invited industry professionals to serve on the Council of Industry and Academic Advisors (CIAA). Attendees at the last CIAA meeting discussed internship among other topics.

III. More grants proposals: CP-STEM actively solicits more external funding. Gloria Liu collaborated with the Office of Grants and Alternative Funding to submit a Motorola grant proposal in June 2007 to develop a one week STEM summer camp program for junior high female students. Gloria also collaborated with John Carzoli, chair of physical sciences, Gregory James, dean of student affairs, Cary Schawel, professor of student development, the Office of Grants and Alternative Funding, and a number of staff to submit an NSF S-STEM grant proposal in February, 2007.

IV. Professional Development: STEM faculty professional development is instrumental to the quality of academic departments and programs. CP-STEM plans to offer faculty training in the following ways:

- Organize a Conference for Promoting STEM (CoPS) for community college and high school faculty in September 2007.
- Organize a series of faculty seminars in 2008-2009.

Appendix One: Demographics of STEM Students

The following are the demographics of students who participated in STEM study sessions and/or were identified as participating in a STEM course on the STEM Attitude Survey. Not all students participated in the project in 2006-2007 are included.

Gender		
Male	73	55%
Female	59	45%
Total	132	100%
Ethnicity		
White	51	39%
Asian/Pacific Islander	34	26%
Hispanic	7	5%
African-American	6	5%
American Indian	0	0%
Other or no response	34	26%
Total	132	100%
Age		
< 20	23	17%
20-24	73	55%
25-29	22	17%
30-34	7	5%
35+	7	5%
Total	132	100%
Average =	23.6	
Median =	22.0	

Cumulative GPA		
0.0 to 0.99	2	2%
1.00 to 1.99	11	9%
2.00 to 2.99	41	33%
3.00 +	72	57%
Total	126	100%
Cumulative Hours		
0 to 12	30	24%
13 to 24	30	24%
25 to 36	17	13%
37 +	49	39%
Total	126	100%
Average =	31.3	
Median =	26.0	

Appendix Two

Council of Industry and Academic Advisors

Meeting Report

March 19, 2007

The first meeting of the Council of Industry and Academic Advisors (CIAA) was held on March 19, 2007. Please see Appendix One for the meeting agenda and Appendix Two for the member list of CIAA.

Dr. Tom Hamel, Chair of CIAA and Vice President of Academic Affairs, made a welcome remark and described the purpose of this meeting. Attendees introduced themselves. Gloria Liu, Coordinator and Co-project Director, presented the objectives and overview of the project and gave highlights of the pilot project final report and Dr. Elizabeth Teles's NSF Site Visit Report.

The attendees broke into four discussion groups. Based on the Challenges and Areas for Attention specified in Dr. Teles' NSF Site Visit Report, the groups focused on the following topics with discussion questions:

Industry Connections

- What are essential components of a successful internship program?
- What kinds of positions are a "best fit" for the 2-year STEM student? At what stage are they ready for an internship experience?
- What skill sets are you looking for and how do you suggest we strengthen them?
- How do we cultivate potential internship relationships for students?
- What are your interests and how might we serve your needs?

Sustainability

- What are available alternative funding resources to sustain activities?
- How have other similar projects sustain themselves?
- What are some best practices of sustainability? Challenges?
- What are your comments on institutional structure and sustainability?

2-year to 4-year Articulation

- Program transfer
- Course transfer
- Transfer to private and/or out of state institutions not bounded by Illinois Articulation Initiative (IAI)
- What are your interests and how might we serve your needs?

Partnership with High Schools

- How can we promote an atmosphere supportive of innovative STEM teaching?
- How do we determine the effectiveness of innovative STEM teaching?
- How might we encourage the value of writing in STEM?
- Obstacles for high school students to attend Oakton
- Ways to involve high school teachers
- Ways to involve high school students
- What are your interests and how might we serve your needs?

Council of Industry and Academic Advisors (CIAA)

Project Directors:

- Dr. Tingxiu Wang (co-chair), Professor, Mathematics, Director of CP-STEM
- Gloria Liu, Coordinator and Co-Director of CP-STEM
- Joe Kotowski, Professor, Mechanical Design; Coordinator, Engineering Program, Co-Director of CP-STEM
- Dr. Bob Sompolski, Acting Dean, Mathematics and Technologies, Co-Director of CP-STEM

Oakton Representatives:

- Dr. Thomas Hamel (Chair), Vice President, Academic Affairs
- Dr. Nancy Prendergast, Assistant Vice President, Academic Affairs
- Dr. Carlee Drummer, Executive Director of College Advancement
- Roxann Marshburn, Director of Grants & Alternative Funding
- Dennis Graham, Dean, Division of Science & Health Careers
- Dr. Trudy Bers, Executive Director of Institutional Research, Curriculum and Strategic Planning
- Dr. John Carzoli, Chair, Physics, Chemistry, and Earth Sciences
- Michele Brown, Director, Admission and Enrollment Management
- Dr. Cecelia Hutchcraft, Chair, Biological Sciences
- Julia Hasset, Chair, Mathematics & Computer Science

National Members:

- Dr. Harry Ungar, former NSF program officer, Chemistry
- Jeanne Narum, Director, Project Kaleidoscope (PKAL), English
- Dr. Deborah Hughes Hallett, Professor of Mathematics at University of Arizona; Adjunct Professor at Public Policy at Kennedy School of Government, Harvard University
- Dr. Mel George, Emeritus President of University of Missouri & PKAL Village Elder, Math
- Dr. Charles Bomar, University of Wisconsin, Stout, WI, Biotech

High School Districts and Chicago Organizations:

- Dr. Laura Cooper, Assistant Superintendent, Evanston Township High School District
- Kenneth Wallace, Assistant Superintendent, Maine Township High School District
- Dr. Roger Stein, Assistant Superintendent, Niles Township High School District
- Cynthia Jaskowiak, Assistant Superintendent - Curriculum and Instruction, New Trier High School District
- Martha Eldredge Heck, Executive Director, North Suburban Educational Region for Vocational Education (NSERVE)

Industry/Business Members

- Dr. Ling Ye, Manager, R&D Global Collaborations, Hospira, Inc., Chemist
- Tony Asghari, Principle Staff Engineer, Continental Automotive Systems
- Susan Farquhar, 2nd Vice President & Actuary, Trustmark
- Dan Hogan, Professor, Northwestern University Infrastructure Technology Institute
- Gregory Willard, President, Quality Control Corporation

Chicago University Members

- Dr. Carolyn Narasimhan, Associate Professor, Mathematics, Associate Dean, DePaul University
- Dr. Don Wink, Professor, Chemical Education, University of Illinois at Chicago
- Dr. Norman Lederman, Chair, Math and Science Education Dept., Illinois Institute of Technology

Appendix Three

Institutional Advisory Committee

Meeting Report

February 21, 2007

The first meeting of the Institutional Advisory Committee (IAC) was held on February 14, 2007. Please see Appendix One for the meeting agenda and Appendix Two for the member list of IAC.

Dr. Tom Hamel, Chair of IAC and Vice President of Academic Affairs, made a welcome remark and described the purpose of this meeting. Attendees introduced themselves. Gloria Liu, IAC Co-chair, presented the objectives and overview of the project and gave highlights of the pilot project final report and Dr. Elizabeth Teles's NSF Site Visit Report.

Then the attendees were broken into three discussion groups. Based on the Challenges and Areas for Attention specified in Dr. Teles' NSF Site Visit Report, the groups focused on the following topics with discussion questions:

A. Marketing:

1. What questions do you have about?
2. What are strengths and weaknesses?
3. What are the obstacles for high school students to come to Oakton?
4. How can we promote STEM at Oakton?
5. What is the perception of CP-STEM? Are our activities consistent with these perceptions?
6. What student profile describes the kinds of students perfect for Oakton?
7. How might we entice high school students to join Oakton fellowship?
8. What prides do students have when attending Oakton? Why students attend Oakton?
9. How can we recruit different students to Oakton?

B. Pedagogy:

1. How can we promote an atmosphere supportive of innovative STEM teaching?
2. How do we determine the effectiveness of innovative STEM teaching?
3. How might we encourage the value of writing in STEM?

C. Internal Processes:

1. What is unique about STEM?
2. How do we raise awareness in advising?
3. How do we foster a sense of identity?
4. What processes supports or hampers CP-STEM objectives?
 - a. Registration and Records
 - b. Advising
 - c. Scheduling
 - d. Room Reservation
 - e. Office of Institutional Research
 - f. Enrichment Program Application and Flyer
 - g. Admissions

Notes of three groups can be found in Appendix Three. Based on the discussion, the project directors reached the following action plan:

I. Marketing:

- Create 11x14 posters to post in high schools. The poster can highlight the accomplishments of CP-STEM, benefits by choosing STEM at Oakton, and alumni experiences.
- Project directors will participate in local high school networks, for example, the Metropolitan Math Club.
- Disseminate project results through NCTM, NCTS, Illinois Council of Mathematics, etc.

II. Pedagogy:

- Increase project based activities involving design, development, and solution for a particular application, for example, bridge building, robots and airplanes.
- Organize colloquiums for STEM faculty and students.
- Develop degree outlines and course guide: collaborate with Science, Biology and Math chairs to develop academic plans in biology, chemistry, mathematics, mathematics education, science education, physics, computer science (technical emphasis), and computer science (information emphasis).
- Enhance EGL101 and EGL102 STEM Section to teach reading and writing for different disciplines, for example, writing lab reports, physics solutions in paragraphs, and a letter to your grandmother explaining rotational motion.

III. Internal Processes:

- Increase awareness of STEM careers among teachers and counselors through joint division meetings, Oakton Conference for Teaching Excellence, and high school visits.
- Advertise the fellowships we offer.
- Explore the possibility to have a designated visible space for CP-STEM.
- Set up posters and brochures on the campuses.
- Explore ways to create a STEM cohort.

Institutional Advisory Committee

Chair: Tom Hamel, Vice President, Academic Affairs

Co-Chair: Gloria Liu, Coordinator, CP-STEM, OCC

Members

Project Team:

- Tingxiu Wang, Professor of Mathematics, Director of CP-STEM
- Gloria Liu, Coordinator and co-director, CP-STEM
- Joe Kotowski, Chair and Professor of Engineering, Co-director of CP-STEM
- Bob Sompolski, Dean, Division of Mathematics and Technologies, Co-director of CP-STEM

High School Members

- Patricia Duggan, Chair, Applied Technology, Maine South High School
- Michael Smith, Chair, Mathematics, Maine West High School
- Ed Murphy, Director of FL/ESL, Niles West High School
- Lisa Stone, Director of Mathematics, Niles West High School
- Lois Wisniewski, Director of Science and Math, Niles North High School
- Donna Hoffman, Instructor of Mathematics, Glenbrook South High School
- Jill Meyer, Counselor, Evanston Township High School
- Tom Foley, Science Department, Maine East High School

Oakton Members:

- Dennis Graham, Dean, Division of Science and Health Careers
- Roxann Marshburn, Director, Grants and Alternative Funding
- Bruce Oates, Director, Registration and Records
- Donna Younger, Director, Learning Center
- David Rudden, Manager, Office of Institutional Research
- Bill Paige, Manager, College Advancement
- Cliff Casey, Manager, Advising and Counseling
- Dale Cohen, Admissions Specialist
- Victoria Ortega, Minority Recruiter, Admissions
- Alison May, TRiO Coordinator
- Lynn Woodbury, Chair of English
- John Carzoli, Chair of Physics and Chemistry,
- Cecelia Hutchcraft, Chair of Biology
- Majid Ghadiri, Chair of Electronics and Electronics Servicing
- Michele Reznick, Coordinator, Computer Technologies and Information Systems
- Julie Shotsberger, Associate Professor of Mathematics
- Connie Churchill, Professor of Chemistry
- George Tootelian, Adjunct faculty of Engineering and Physics
- Cary Schawel, Professor of Student Development
- Virginia Gibbons, Professor of English