

Annual Report for 2005-06

A. Summary of 2005-06 Activities

In Fall Semester 2005, we have placed 263 students into the First-Year Engineering Experience in which groups of ~20 students enrolled in the same 2-to-4 classes together (what we call Learning Communities). Some of the Learning Communities were discipline-specific (Civil and Construction Engineering, Engineering Undecided) while the remaining were based on mathematics placement (Calculus I, Pre-Calculus, Algebra II). Some of the Learning Communities have a formal faculty mentoring structure (faculty mentors met with students within the structure of a class) while others have an informal faculty mentoring structure through co-curricular activities. A profile of Fall Semester 2005 participants of the First Year Engineering Experience is as follows:

- 40 Female and 238 Male; 18 African-Americans, 7 Hispanics, and 5 Asian/Pacific Islanders.
- Mean number of high school science courses taken is 4.0, range is 2 – 8: more than required for college entrance.
- Mean number of high school math courses taken is 4.5, range is 1 – 8: more than required for college entrance.
- Mean ACT scores – for 257 students

ACT English	ACT Math	ACT Reading	ACT Science	ACT Composite
21.4	24.6	22.8	24.1	23.2

- 124 have an ACT Math Score greater than 27 (44.6%); 90 have an ACT Math Score between 24 and 26 (32.4%); 60 have an ACT Math Score between 19 and 23 (21.6%); and 5 have an ACT Math Score between 16 and 18 (1.8%).
- 28% were first-generation students (neither parent attended college).
- 35% are employed (8% work on campus and 15% off-campus); average on-campus work = 12 hours/week, off-campus work = 16.4 hours/week.

I. Results of Academic Performance

1. Academic Performance in First-Year STEM Courses:

The successful completion rates (Grade >C) of 1st Year STEM courses for 2005-06 STEP participants were compared with non-STEP WMU students in the table below. Withdrawal from a class is not considered successful. The comparison group consisted of non-STEP students, both 1st year as well as returning WMU students, enrolled in the course.

Course	Enrollment		% Grade >C			
	STEP	Comparison	STEP	Comparison	p-value	Significantly different at p = 0.1
General Chemistry I (Fall 05)	142	500	54.6	43.6	0.017	Yes
General Chemistry I (Sp 06)	84	432	52.4	46.3	0.307	No
Physics I-Calculus base (Sp 06)	66	123	81.8	72.4	0.129	No
Physics I-Algebra base (Sp 06)	9	92	77.8	55.4	0.131	No
Calculus I-Sci & Engr. (Fall 05)	95	84	73.7	65.5	0.233	No
Calculus I-Sci & Engr. (Sp 06)	64	48	57.8	60.4	0.781	No
Calculus I-General (Fall 05)	12	114	58.3	78.9	0.162	No

Calculus I-General (Sp 06)	9	118	77.8	51.7	0.074	Yes
Calculus II-Sci & Engr. (Sp 06)	50	30	56.0	53.3	0.817	No
Pre-Calculus (Fall 05)	90	326	78.7	70.5	0.095	Yes
Pre-Calculus (Spring 06)	51	196	68.6	56.1	0.091	Yes
Algebra II (Fall 05)	59	335	76.3	74.0	0.710	No
Algebra II (Spring 06)	9	235	44.4	67.2	0.176	No
Technical Writing (Fall 05)	246	175	82.8	76.6	0.138	No
Engineering Graphics (Fall 05)	155	176	81.3	64.2	0.000	Yes

2. MATH 1110 Project

In Fall Semester 2005, 39 students were enrolled in a pilot section of MATH 1110 in which a set of homework problems, jointly developed by a mathematics professor and a chemistry professor, were assigned to illustrate the mathematics skills needed in CHEM 1100. Of the total 150 points assigned for homework, the “chemistry” problems constituted 40 points. Sixteen of the 39 students enrolled in this pilot MATH 1110 in Fall Semester 2005 continued in CHEM 1100 in Spring Semester 2006. Their performance in the “chemistry” homework problems, MATH 1110, and CHEM 1100 is shown below:

Student	Math/Chemistry Homework Problems (Total = 40)	MATH 1110 Grade (Fall Semester 2005)	CHEM 1100 Grade (Spring Semester 2006)
Student #1	30	C	E
Student #2	28	B	B
Student #3	25	CB	E
Student #4	20	CB	E
Student #5	33	B	E
Student #6	36	BA	E
Student #7	40	B	C
Student #8	30	CB	C
Student #9	24	CB	D
Student #10	16	CB	D
Student #11	32	B	C
Student #12	38	BA	CB
Student #13	28	CB	C
Student #14	36	B	D
Student #15	19	CB	W
Student #16	10	CB	W

Successful Course Completion Rate (Grade >C) = 6/16 or 37.5% and is below the successful course completion rate of the overall STEP students (52.4%) or the comparison group (46.3%).

The experimental MATH 1110 was again taught in Spring Semester 2006 with 31 students, and it will continue in Fall Semester 2006 with ~120 students (3 sections of MATH 1110). Performance

of those students who continue in CHEM 1100 will be tracked to determine the effectiveness of the MATH 1110 Project.

3. 2nd Year Return Rate

The 2nd Year Return Rate for the 2005-06 STEP participants will be determined on Census Day for Fall Semester, 2006.

4. Co-Curricular Activities

Faculty mentors were encouraged to organize and engage their mentees in co-curricular activities to learn about their disciplines, the College, and WMU. Students were encouraged to submit written summaries about the co-curricular activities for extra credit in Technical Communication and Introduction to Engineering and Technology.

A rubric based on Bloom's learning taxonomy was created to determine if the career awareness and lifelong learning objectives of the STEP co-curricular activities have been met. A sample of 129 written summaries were holistically evaluated and scored by three faculty mentors using the rubric. The findings, summarized in the table below, indicate that co-curricular activities, professional as well as social and cultural activities, can be effective in increasing the awareness of first-year students about career opportunities in engineering and technology and giving them insight into their future profession. Based on the written summaries of the co-curricular activities, a majority of the students (almost 90%) showed they have benefited from the activities by expressing interest in or acknowledging the value of the activities, by seeing the connection of the activity to career development, or by applying the information learned or the experience gained.

<p>Level 1 corresponds to the Knowledge category of Bloom's cognitive domain. Students are disinterested or uninterested in the co-curricular activities, or they are unaware of the activities' value. Students provided rote responses with superficial information about the co-curricular activities (what/when/where/who).</p>	<p>Level 2 corresponds to the Comprehension category of Bloom's cognitive domain. Students express interest in the co-curricular activities or acknowledge some value of the activities, and they are able to report the activities in their own words.</p>	<p>Level 3 corresponds to the Application and Analysis categories of Bloom's cognitive domain. Students see a connection between the activities, career development, and lifelong learning, or they recognize a lack of prior knowledge and experience and express the willingness to apply the information learned or the experience gained.</p>	<p>Level 4 corresponds to the Synthesis and Evaluation categories of the Bloom's cognitive domain. Students demonstrate the interest to seek additional information or knowledge or express the willingness to seek additional opportunities to participate in co-curricular activities, and they become champions for others to participate in the co-curricular activities.</p>
10.1%	66.7%	22.5%	0.7%

II. Student Satisfaction with First-Year Engineering Experience

Surveys of participants were conducted during the last week of class and final week of Fall Semester 2005, and involved 194 students (69.8% of all participants). All respondents but one student were CEAS students.

STEP-related Behaviors and Value Perceptions

Behaviors: Scale = SD to SA (1 – 5)		Value: Scale = Low to High (1 – 5)	
a. I know at least 6 STEP students...	4.4	a. cohort group enrollment	3.7
b. I have studied w. STEP students.	3.8	b. finding a study group	3.5
c. I enjoy/benefit studying with others.	4.0		
d. I have summarized co-curricular activities for IME 1020 credit.	3.7	c. having a faculty mentor	3.1
		d. co-curricular activities	3.1
e. I check wmich.edu email daily.	4.0		
f. I know where to get tutoring.	3.5	e. tutoring	3.1
g. I have used a tutor.	2.5		

Expected & Realized Benefits of STEP Participation

- 32% expected they would meet other students; 86% “agree” or “strongly agree” with the statement “I know at least 6 STEP students in my classes.”
- 26% hoped to find study groups or partners; 74% “agree” or “strongly agree” with the statement “I have studied with other STEP students” and 76% “agree” or “strongly agree” with the statement “I enjoy and benefit from studying with other students.”
- 79% of STEP participants said they checked their “wmich.edu” email account daily; faculty mentors reported poor results in corresponding with their mentees via email.
- While 54% of students indicated they knew where to get tutoring help for core courses, only 32% have used a tutor (65.9% seek tutoring help in mathematics and 19.5% in chemistry).

B. How We Are Using Assessment Data from 2005-06 for 2006-07 Programming

1. Placing students into Learning Communities has achieved the objectives of building connection among students and students forming study groups. For Fall Semester 2006, we have increased the number of students involved to 376 from 253 CEAS students in 2005. New learning communities of First-Year Engineering Experience have been created for electrical and computer engineering, chemical and paper engineering, Lee Honors College, and students placed into MATH 1100/1090.
2. While 79% of 2005 First-Year Engineering Experience participants said they checked their “wmich.edu” email account daily; faculty mentors reported poor results in corresponding with their mentees via email. For Fall Semester 2006, we have identified anchor classes in 12 of the 15 Learning Communities in which there will be frequently and regular contact between the students and the faculty mentors who are the instructors of the anchor classes.
3. While 54% of students indicated they knew where to get tutoring help for core courses, only 32% have used a tutor. To promote usage of content tutoring, we have asked students in Fall Semester 2006 to sign consent forms that allows the instructors of first-year mathematics and science classes to release in-semester progress (attendance and exam results) so we can implement intervention in a timely manner. We suggest faculty mentor/TA to contact students prior to each exam dates to prompt them to use content tutoring.

4. We have revised the 3-credit-hour ENGR 1010, "Introduction to Engineering and Technology," to two 1-credit-hour sequence: ENGR 1001, "Introduction to Engineering Design," to be taught in Fall Semester, and ENGR 1002, "Introduction to Engineering Analyses," to be taught in Spring Semester to engage students throughout the entire first-year. Six sections of ENGR 1001 involving five CEAS faculty will be taught in Fall Semester 2006 (compared to three sections of ENGR 1010 involving two CEAS faculty in Fall Semester 2005).
5. Traditionally, students placed into MATH 1100/1090 have low retention and graduation rates in engineering. One learning community has been created in Fall Semester 2006 for students placed into MATH 1100/1090 with the purpose of channeling these students into applied sciences or engineering technology programs, or retaining them in technology-related programs in WMU such as Integrated Supply Management, Computer Information System, and Industrial Education.
6. Co-curricular activities have achieved the objectives of increasing the awareness of career opportunities and giving insight into future profession for 90% of students. However, traveling to Parkview campus to attend CEAS lectures might be a barrier. For Fall Semester 2006, 3 CEAS lectures will be held in Kohrman Hall – see Potential Co-Curricular Activities.
7. Even though seats were reserved in Spring Semester 2007 to allow students to continue in cohorts, only a small percent of students were able to take advantage of this arrangement because they either did not respond to email from faculty mentor or sign up for an advising session too late. For 2006, we plan to use the anchor class to notify the students and help them sign up to meet with academic advisors in time to take advantage of reserved seats for Spring Semester 2007.