August 19, 2008 STEP Advisory Board Report

The STEP Advisory Board held a meeting on August 19, 2008. Present were:

- Diane Anderson, V.P. for Student Affairs, WMU
- Daina Briedis – Associate Professor of Chemical Engineering, Michigan State University
- Dana Butt – STEP Program Director
- Bill Cobern – Director, Mallison Institute for Science Education, WMU
- Laura Darrah – Assistant Director, Resident Life, WMU
- Paul Engelmann – Chair, Dept. of Industrial and Manufacturing Engineering, WMU
- Len Ginsberg – V.P. for Research, WMU
- Tim Greene – V.P. for Academic Affairs and Provost, WMU
- James Guzinski – Assistant Professor, Department of Chemistry, WMU
- Cynthia Halderson – SAMPI, WMU
- Dan Litynski – Dean, College of Engineering and Applied Sciences, WMU
- Ekkehard Sinn – Chair, Department of Chemistry, WMU
- Susan Stapleton – Associate Dean, College of Arts & Sciences, WMU
- Edmund Tsang – STEP PI and Associate Dean, College of Engineering & Applied Sciences, WMU

I. Results from 2007-08

In 2007-08, a total of 328 CEAS, 14 Chemistry, and 42 Biological Sciences students were placed in learning communities. In addition, 148 CEAS students participated in the Engineering House program at Bigelow Hall.

A. Performance in First-Year STEM Courses

	Fall 2007		Spring 2008	
	STEP	Comparison	STEP	Comparison
Calculus II (MATH 1230)			80.0	63.5
Calculus II (MATH 1710)			**78.9**	54.7
Calculus I (MATH 1220)	**82.1**	60.6		
Calculus I (MATH 1700)	**79.7**	37.6	60.9	47.8
Pre-Calculus (MATH 1180)	**78.6**	56.0	66.7	63.9
Algebra II (MATH 1110)	**75.5**	60.2	66.7	72.4
Algebra I (MATH 1100)	69.2	52.3		
CHEM 1100	**77.1**	69.2	53.2	60.0
PHYS 2050			**94.9**	73.6
PHYS 1130			60.0	50.7
IME 1020	**89.5**	65.6		
IME 1420	90.1	85.4		

Bold means statistically significant at α=0.05

B. Algebra II → Chemistry I

Semester	# of Students in Math 1110	#(%) Successful in Math 1110[1]	#(%) Passing Math 1110 and Continuing in CHEM 1100 the following semester[2]	% Continuing and Passing CHEM 1100	Average GPA in CHEM 1100	Average GPA in Math 1110 (for those taking CHEM 1100 the following semester)
Pilot-Fall 2005	39	29 (74.4%)	16 (55.2%)	6 (37.5%)	1.18	2.75
Fall 2006	39	28 (71.8%)	18 (64.3%)	16 (88.9%)	3.53	3.11
Fall 2007	77	58 (75.3%)	37 (63.8%)	18 (48.6%)	1.59	2.65

[1] Criterion for Success: Grades =/> C; withdraw is considered unsuccessful

[2] Students not continuing with CHEM 1100 the following semester either changed major, did not return to WMU, or chose to delay taking CHEM 1100 until two semesters or more later.

1. Chemistry 1100 Grade Distribution by Section: Fall 2005 to Spring 2008

	COURSE	CRN	TOTAL	A	B	C	D	E	W	I	% Grade =/> C	Avg. GPA	
Fall 05	CHEM1100	41969	200	8	20	54	64	42	12	0	41.0	1.40	
	CHEM1100	**41967 -- HC**	62	8	9	21	6	12	6	0	**61.3**	1.91	
	CHEM1100	41960	164	10	21	32	41	44	16	0	38.4	1.41	Overall
	CHEM1100	41971	185	10	35	67	30	29	14	0	60.5	1.81	**37 2**
Sp 06	CHEM1100	10033	229	23	31	105	18	43	9	0	69.4	1.88	Overall
	CHEM1100	10035	236	15	24	46	37	71	43	0	36.0	1.35	**4 4**
Fall 06	CHEM1100	**41604 -- HC**	73	17	18	24	5	7	2	0	**80.8**	2.46	
	CHEM1100	41598	226	142	46	14	3	12	8	1	89.4	3.38	
	CHEM1100	41605	223	15	40	74	29	38	27	0	57.8	1.82	Overall
	CHEM1100	41607	176	13	52	59	19	19	14	0	70.5	2.13	**52 5**
Sp 07	CHEM1100	10025	231	140	43	28	3	6	11	0	91.3	3.40	Overall
	CHEM1100	10027	189	13	32	71	41	16	16	0	61.4	1.91	**55 7**
Fall 07	CHEM1100	**41380 -- HC**	60	13	14	15	7	8	3	0	**70.0**	2.30	
	CHEM1100	41381	235	28	58	79	21	35	12	2	70.2	2.09	
	CHEM1100	41383	117	113	0	0	0	0	3	1	96.6	3.96	Overall
	CHEM1100	41376	228	15	41	64	43	38	26	1	52.6	1.75	**57 7**
Sp. 08	CHEM1100	10021	231	14	32	98	39	39	9	0	62.3	1.74	Overall
	CHEM1100	10023	218	22	36	43	45	43	29	0	46.3	1.73	**43 5**

C. Retention Rates for 2007-08, 2007-06; 2006-07, and 2005-06 Cohorts – will be determined after Census Day, Fall Semester 2008.

Discussions:

- A number of changes will be implemented in CHEM 1100, including the use of clicker and online homework. How do we encourage more students to do online homework? The more motivated students are using online materials while those who need the help most are not using the online resources.
- When do we teach students how to use the tutoring services?

- There might be a stigma associated with using tutoring. We will be changing the name from "tutoring center" to "student success center" in Bigelow.
- Edmund Tsang asked if he can be invited to participate in discussion on improving CHEM 1100.

- Freshmen = 85%, sophomores = 10%, juniors/seniors = 5%
- From Residence Life: less than 15% are women
- Most (82%) were "likely engineering" majors by April; 7% undecided or formerly engineering
- Decision to live in Engineering House was most often the student's (82%) rather than the parents deciding (2%) or having much influence (3%).
- Students who reported working were 30% of the respondents.

Satisfaction with the Engineering House experience:

- 79% gave positive responses to whether their expectations were met.
- Most positive aspects: convenient location (4.6 – SD to SA), other residents are friends (4.3), keep a good balance among various aspects of life (4.0), general atmosphere of the floor is open and welcoming (3.9), prefer to study by myself (3.8), courses have gone well this year (3.8), my studies confirm I am in the right major (3.8)
- Least agreed-with aspects: I often find that I am lonely (1.7), alcohol use had interfered with my studies (2.0), use of tutoring services (2.3), involvement in outside activities keeps me from studying as much as I should (2.5)
- 85% would recommend Engineering House to new engineering students, citing study help (27%), general good experience (23%), meeting other students (20%), and convenience (18%) as reasons.

Only 15% planned to continue living in Engineering House next year.

- Reasons to remain were mainly about location and convenience.
- Reasons to move included attraction to off-campus housing (34%), not liking dorms (13%), and wanting more or better space (13%), which included other locations on campus (12%).

Data from other sources reinforces the value of living in Engineering House.

- A Residence Life study of GPAs of 147 students in Engineering House and 148 first-year CEAS students in other residence halls found a small advantage for the House in Fall 2007 (2.61 vs. 2.55) and in Spring 2008 (2.37 vs. 2.28). Difference was not statistically significant.
- Fall Survey results from Engineering House residents (35%) were compared with non-EH students. Of 17 numerical items, statistically significant differences ($\alpha \leq .05$) were found for 5 items. EH residents were more likely to agree that they knew 6 STEM students in their classes (4.4 to 4.1), that they had studied with other STEM students (4.0 to 3.6), that they knew where to get tutoring (4.1 to 3.6), and they had used a tutor (2.9 to 2.3). In addition, they valued more highly finding a study group (3.7 to 3.4).

➢ ***Data reinforce the need to provide students with better academic support. Planning with Residence Life staff is ongoing.***

3) from the **Transfer Student Survey**, 2007-08 – 81 respondents

Student demographics:

- 20% of students were older than expected, 25-32 v. 19-24.
- More of the older students were first-generation (50% v. 38%) college students.

Academic beginning:

- Both groups were equally likely to plan to transfer from their first institution (65% and 63%).
- Older students were over twice as likely to start at a community college as at a 4-year institution (69% v. 25%). Younger students were only somewhat more likely to have started at a community college than at a 4-year institution (48% v. 37%).
- The most frequent reason for choosing the first institution for both groups was "low cost," cited by half of all students. For younger students, "close to home" was as important as cost, and "other reasons" was third. For older students, "exploring career options" was second and "close to home" third.
- Older students were twice as likely to complete an Associate's degree as younger students (44% v. 21%).

Transfer to WMU:

- Most frequent reason for transferring when they did was the same for both groups: they had taken all transferrable credits.
- Older students were more likely to develop interest in engineering in college, younger students in high school. For both, work experience and having an engineer in the family generated interest.
- Reasons for choosing WMU were similar for all: having the academic program they wanted (80%), the engineering college facility (50% and 54%), and proximity to home (41% and 50%).

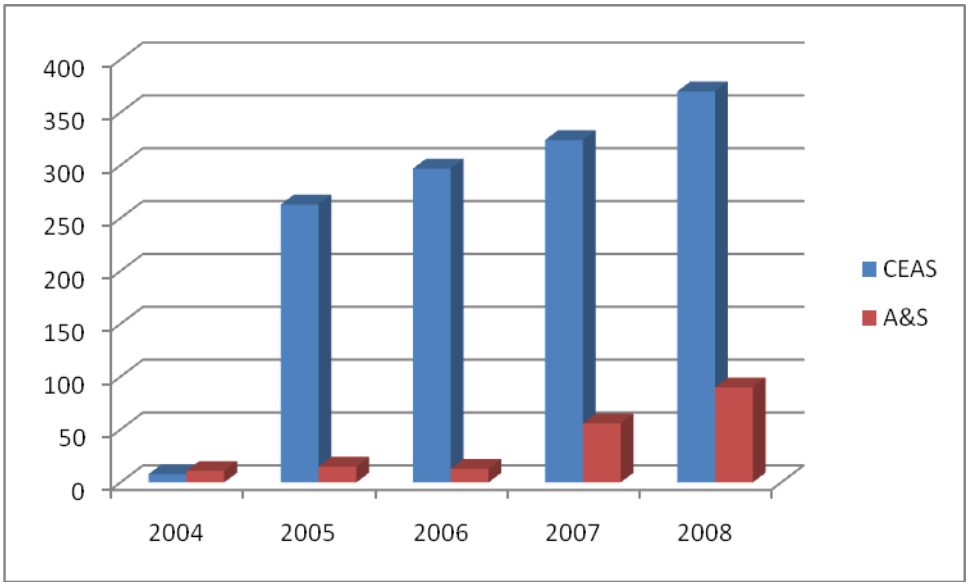
➢ ***Despite earlier interest in engineering, younger students are more likely to report inadequate preparation for study. Work with SAIC to collect data on transfer students from CC; work with CCs on career development, preparation, and transition.***

Upcoming Activities for 2008-09

A. Number of Students Placed:

A total of 367 CEAS students, 17 Chemistry students, and 73 Biological Sciences students were placed in learning communities in Fall Semester 2008. The 368 CEAS students placed

into learning communities represent 87% of the incoming class of first-time first-year students. Comparison with previous years is shown in table below.



Number of STEM Students Involved in STEP

B. Profile of first-time first-year CEAS students as indicated by first-semester mathematics enrollment is shown in table below (data for physical and life sciences students not available).

First Semester Math	2003 (%)	2004 (5)	2005 (%)	2006 (%)	2007 (%)	2008 (%)
Calculus II and higher	9.4	7.0	9.7	5.4	5.1	5.2
Calculus I	24.5	22.2	31.5	35.3	42.7	39.2
Pre-Calculus	25.3	23.7	24.9	31.0	31.1	29.8
Algebra II	27.0	30.3	23.4	17.7	13.7	18.9
Algebra I and lower	10.3	12.5	7.0	10.3	7.2	5.9
No Math Data	3.4	4.2	3.5	0.3	0.3	1.0
Total	100	100	100	100	100	100

First-Semester Mathematics Enrollment

C. New Initiatives in 2008-09

1. Fall Welcome/Academic Etiquette – CEAS will formally host a program, "Academic Etiquette: Communication Strategies for Success," on August 27 for CEAS students who have registered to participate in Fall Welcome.

2. Curriculum Improvement:
   a) ME 2560, "Statics" – Improve teaching and learning by incorporating computer software, experiments (two), and application of concepts of statics to civil engineering. Investigator: Javier M. Montefort.
   b) Engineering Mathematics – Create materials base on the application of algebra, trigonometry, and simple differentiation and integration in engineering. Part of a National Science Foundation CCLI (Course, Curriculum, and Laboratory Improvement) Phase 3 grant; timeline: 2008-09 (create course materials); 2009-2010 (implement pilot for ME/EE students placed in Pre-Calculus); 2010-2011 (revision of course materials); Amount: $99,988. Investigators: Edmund Tsang, Ikhlas Abdel-Qader, and James Kamman.

3. Virtual Engineering Communities – The goal of the project is to use a social networking tool to improve communication among students and between students and faculty mentors in the learning communities. The features of the networking tool for Virtual Engineering Communities, which is based on Blackboard/Vista, include a calendar; email; discussion groups; chat room; and survey tools. Investigator: Mark Kerstetter.

4. Engineering House Program – A total of 178 CEAS students (154 males and 24 females) will participate in the Engineering House program in Bigelow. This is an increase of about 38 students from 2007-08. Joint planning between CEAS and Residence Life was held throughout Spring Semester 2008. Kick-Off Event: Sunday, September 7, 6 p.m. in the Valley Pond area. All first-time first-year CEAS students are invited, and faculty and administrators will cook food for the students.

5. Mentoring of Female Students in Engineering House – Two female CEAS faculty mentors will serve as a resource for the 24 female students living in Bigelow Hall. The CEAS faculty will facilitate gathering and organize seminar to discuss the interest and need of the female first-year students related to academic, social, and work challenges. Investigators: Ikhlas Abdel-Qader and Claudia Fajardo.

6. Implement and Evaluate the Protocol on Faculty to Engage Residence Life Staff to Check on students

Discussion

- Share in-semester progress report and mid-term grade report with academic advisors so they can intervene in a timely manner
- Advising and career counseling should be a continuum

II. Path Forward

A. Sustaining Project After NSF Funding Ends (April 30, 2009)

1) A formal procedure has been established among the departments that teach first-year STEM courses to save seats and to cluster students in learning communities in both Fall and Spring Semesters of the first-year.

   No cost required to continue practice but # of CHEM 1110 seats saved (20) need to be reconciled with IME 1020 and IME 1420 Lab seats (24 each).

2) A formal procedure has been established to register students in learning communities in Fall and Spring Semesters where they take 3-to-5 courses together.

   No cost required to continue practice. Practice is more robust in CEAS than in A&S.

3) Need a champion in A&S

4) Cost-Breakdown

   Personnel

   - Project Manager to run the day-to-day activities -- $34,448.00
   - 18 Faculty Mentors @ $2,000/Mentors -- $36,000.00
   - 9 Student Assistants @ $2,240/Student Assistant -- $20,160.00
   - Tutors (40 hrs/wk x 14 wks/semester x 2 semesters x 2 tutors x $8/hr) -- $17,920

   Programs

   - Student Planner -- $1,000.00
   - Co-Curricular Activities -- $7,700.00
   - T-shirt (orientation) -- $3,000.00
   - Advising Incentives/Prizes -- $250.00

   Operations

   - Office Supplies/Printing/Mailing/Phone -- $5,600.00

5) College Transition Program → LSAMP (2008 to 2010)

   - Under-represented Minorities
   - In Conjunction with Fall Welcome + Adventure Center
   - $3,160
   - Comparison of Retention Rates – Not statistically significant

	2005-06		2006-07	
	CTP	Not CTP	CTP	Not CTP
Not of Students	16	21	19	51
Avg. ACT Math	20.4	22.6	19.0	21.2
2nd Year Retained to STEM	81.3%	71.4%	68.4%	58.8%
2nd Year Retained to WMU	93.8%	85.7%	89.5%	72.5%

B. STEP IC Proposal, "Build Collaboration between Academic and Student Affairs to Further Enhance Student Success in CEAS/STEM"

1. Letter of Intent submitted
2. CEAS vs. STEM
3. Goals, Activities, and Outcomes – are they the right ones??

Goal #1: Academic and Student Affairs collaborate to create structure and programming to Enhance STEM/CEAS Student Success

Activity: Faculty from CEAS and staff from Residence Life read and discuss literature on collaboration between academic and student affairs to identify structure and programming strategies to enhance student success at Western Michigan University

Outcome #1: Identify the cultural, philosophical, organizational, and programmatic characteristics and reward structure of CEAS and Residence Life at Western Michigan University; identify opportunities and develop strategies for collaboration (Year 1)

Outcome #2: Create a strategic plan for collaboration between CEAS faculty and Residence Life staff at Western Michigan University; identify indicators of success for formative and summative assessment (Year 1)

Outcome #3: Expand the number of STEM/CEAS faculty and Student Affairs staff at WMU who actively collaborate to enhance student success (Year 2)

Outcome #4: Evaluate and export the collaborative strategies between STEM/CEAS faculty and Student Affairs staff to The University of Alabama (Year 3)

Benchmark for Success: Collaboration between CEAS and Residence Life will be extended to other units of Student Affairs at WMU (e.g., University Counseling and Testing Center, Student Careers and Employment Services, and Parent and Family Programs); and a model strategic plan for collaboration between academic and student affairs will be evaluated at The University of Alabama to identify the elements that can be adapted and how.

Goal #2: First Year CEAS students in the Engineering House (EH) develop the life skills, academic habits, and sense of connection necessary for success in CEAS

Activity: Residence Life and CEAS collaborate to plan and implement EH program (EH) to develop students' life skills, academic habits, and sense of connection

Outcome #1: Students in EH participate at a higher rate than non-EH students in co-curricular activities (Years 1-3)

Outcome #2: Students in EH score at a higher level than non-EH students in the Evaluation Rubric based on Bloom's learning taxonomy (cognitive and affective) about their participation in co-curricular activities (Years 1-3)

Outcome #3: Students in EH use resources such as tutoring, etc. at a higher rate than non-EH students (Years 1-3)

Outcome #4: Students in EH respond at a higher rate and in a timely manner to CEAS correspondence than non-EH students (Years 1-3)

Outcome #5: Students in EH have a greater sense of connection to CEAS and WMU than non-EH students (Years 1-3)

Outcome #6: Students in EH are retained at a higher rate to CEAS/WMU than non-EH students (Years 1-3)

Outcome #7: Students in EH have a higher GPA than non-EH in first-year STEM courses (Years 1-3)

Benchmark for Success: By the end of the project, the overall 2nd Year retention rate to CEAS will improve from the current 70% to 75%; 3rd year retention rate to CEAS will improve from the current 53% to 65%; and eventually the 5-Year CEAS graduation rate will increase from the current 39.1% to >45% and 6 Year graduation rate to >55% for CEAS students. An additional 5% increase in retention and graduate will result in 20 more CEAS graduates, using enrollment of first-time first-year students for Fall Semester 2008.

Discussions

- Focus on CEAS, then integrate physical and life sciences in later years
- University 1020 does a good job in providing career assessment. Can this course contribute and how?