

# Extended Abstract – Influence of Integrated Academic and Co-Curricular Activities on Student Success

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**Abstract** - The Michigan State University College of Engineering CoRe (Cornerstone and Residential) Experience integrates the first-year engineering academic program and an engineering living-learning community to support the academic, personal, and professional growth of early engineering students during this important transition year. Our long-term goal is to provide the foundation for these students to be more successful engineers. To assess the influence of the support structure CoRe has implemented, we surveyed all current engineering students from those just completing their first-year to those graduating. Among other questions, the survey asked about their use of the support functions provided during their first year and their current attitudes towards engineering and our program. Our goal in collecting the survey data was to evaluate our approach to helping students choose and become qualified to pursue a degree in the College of Engineering. Early results suggest some areas of success and provide guidance for future improvements.

*Index Terms* – first-year engineering, living-learning community, STEM.

## INTRODUCTION

Increasing the number of STEM graduates from U.S. universities is a national priority. The Michigan State University (MSU) College of Engineering has responded to this need through a large-scale initiative, the CoRe (Cornerstone and Residential) Experience. The CoRe Experience integrates first-year engineering academics and co-curricular activities to support the academic, personal, and professional growth of early engineering students. Our short-term goal is to assist our students in gaining admission to the College of Engineering. Our historical data shows that the vast majority of students who gain admission to the College persist to graduation.

The MSU College of Engineering employs a secondary admission policy. Admission to the College means that a student: i) has chosen to remain in an engineering major and ii) has satisfied the academic requirements to enter that major. Our activities seek to support students along both of these dimensions. To the first point, we believe that students are more likely to remain in an engineering major if

they believe it is an enjoyable and/or worthwhile undertaking. We have both academic and co-curricular activities that seek to demonstrate the value, relevance, and importance of engineering to these students. To the second point, students must maintain a sufficient grade point average across a variety of introductory technical courses, including the CoRe academic program, to gain admission to the College. Again, a variety of academic and co-curricular supports are in place, including tutoring, mentoring, and advising, that assist students in satisfying the requirements.

To ascertain the effectiveness of the support system provided by the CoRe Experience, we recently administered a survey to students in the College. The purpose of this survey was to obtain baseline feedback and reflection on the first-year experiences of engineering students who took any of the three introductory engineering courses at Michigan State University, EGR 100, and EGR 102 or CSE 231, between Fall semester, 2008 and Spring semester, 2012.

## CoRe Experience Structure

The first-year engineering course, EGR 100, Introduction to Engineering Design, a team-based design project course, was piloted in Spring, 2008, offered full-scale in Fall, 2008, and has been offered each semester since. This course is required of all incoming engineering students. EGR 102, Introduction to Engineering Modeling, an engineering problem-solving and computation course, follows in sequence and is required of all engineering majors other than computer science and computer engineering. Students in those two majors instead take CSE 231, Introduction to Programming I, a Python®-based programming course, as their introductory computing requirement [1].

Beginning in 1993, the MSU College of Engineering was actively involved with the *Residential Option for Science and Engineering Students* (ROSES) initiative. This was a residential living-learning program intended to provide a supportive and collegial environment for new first-year students intending to pursue majors and careers in technical fields. Starting in Fall semester 2009, the *Engineering Residential Experience* (ERE), transitioned that small-scale science and engineering residential program with approximately 150 students to a large-scale living-

learning community program with a potential to accommodate our 1200 incoming undergraduate engineering students. The academic and residential programs were merged and renamed the CoRe (Cornerstone and Residential) Experience in January, 2012 [1]. Our academic (Cornerstone) and co-curricular (Residential) programs and services are co-located, with facilities for each housed in two adjacent University residence halls [2]. Included in our co-curricular efforts to assist students in their academic, professional, and personal development, we offer advising, engineering-specific tutoring, and special topical programs.

## Survey Details

Students in our survey population can be characterized on two dimensions. *Persisters* are those that at the time of the survey were classified as engineering students vs. *Leavers*, those that had begun as engineering students but are now in non-engineering majors [3]. *Residents* are those who chose to live in the first-year engineering residence hall vs. *Non-residents* who lived in other residence halls.

The goal of the survey analysis was to provide information on student perception of the CoRe Experience, its positive impacts and opportunities for improvement. We asked 33 questions of persisters and 31 questions of leavers about their perceptions of the first-year engineering curriculum and residential program. The survey was conducted by the College of Engineering through the office of the Assistant Dean of Student Advancement and Program Assessment. The survey results were analyzed by that office and by the Center for Engineering Education Research (CEER).

Survey respondents were represented as follows:

### Persister respondents:

- 703 (23%) responses from 3082 invitations
- 72.4% men and 27.6% women
- 40% chemical and mechanical engineering majors
- Class standing at time of the survey:
  - 20.1% first-year
  - 19.6% second-year
  - 22.3% third-year
  - 38.0% fourth-year students
- 172 (24.5%) residents
- Mean GPA: 3.34/4.00

### Leaver respondents:

- 96 (9.8%) responses from 980 invitations
- 64.6% men and 35.4% women
- Mean GPA: 2.92/4.00

This paper discusses preliminary results of student perceptions of the MSU CoRe Experience. We were particularly interested to determine if our efforts helped students prepare for the rest of their academic careers. Our initial analysis focuses on four program activities; the

introductory courses, advising, tutoring, and special programs; and the attitudes of persisters vs. leavers, and residents vs. non-residents.

## PRELIMINARY RESULTS

Our goal is to use the survey data to determine the impacts of co-location of our academic and co-curricular activities and programs on student success. At this time, we have only preliminary results with regard to student attitudes. The following is a summary of the results from persisters.

### I. Introductory Courses

For our introductory courses, the learning objectives are focused on student competency in the design methodology, problem solving, computational skills, communication, teamwork, and professionalism. When asked if our courses were meeting these objectives, persisters generally agreed, with mean responses below a value of 2.5 on the rating scale (1 = strongly agree; 2 = agree; 3 = disagree; 4 = strongly disagree) for all categories related to learning objectives for all students surveyed, regardless of the semester they took the courses. In regards to whether the courses were preparing students for subsequent coursework, student attitudes were more mixed, with mean responses between 2 and 3 on the rating scale.

Persisters also provided valuable comments about improving our courses. The themes of these comments included connection between lecture and laboratory activities, project ideas, and team dynamics.

### II. Advising

The College of Engineering employs professional academic advisors, with some of these focused specifically on first-year advising. The first-year advisors are located in the residence hall with our academic and co-curricular programs. Our students used academic advising services with 43% attending two to three times per semester. Residents used advising services more (65% attending two to three times per semester) than non-residents (36% two to three times per semester). Surprisingly, over one-third of student responders (34%) indicated they never attended an academic advising session.

### III. Tutoring

Both resident and non-resident persisters viewed the tutoring program offered through the CoRe Experience program favorably with over 90% of respondents indicating it as a positive or very positive experience. However, we found that residents used tutoring more often than non-residents. Nearly 54% of residents indicated they attended tutoring at least once per week while only 18% of non-residents attended as regularly.

### IV. Special Programs

Our evening programs, which primarily consist of talks by faculty or industry representatives or other professionals, are

held in our program residence halls. Survey results show an attendance rate of 36% of residents and 21% of non-residents participating two to three times per semester. Nearly 35% of residents and 47% of non-residents indicated they never attended an evening program.

We also offer several social activities for our students. These programs are typically offered during the work day in one of our program residence halls. Survey results show participation rates as very low (28% for residents and 3% for non-residents). However, it should be noted many of these programs are new and did not exist at the time when our older students were in our first-year program.

One of our special programs, Connector Faculty, is used as a retention tool by matching first-year students with faculty in their respective disciplines to provide guidance to our new students through informal interactions [4]. As expected, since this is not a residence hall-centric activity, we found no difference in participation levels or attitude (83% positive or very positive) between resident and non-resident students.

## GENERAL CONCLUSIONS

Data from leavers was inconclusive as the number of responses was relatively small. In nearly every survey category regarding use of our when asked about our support programs and activities, leavers comprised a large majority of the “never participated” responses. Therefore, their attitudinal data was not statistically significant in our analysis. However, the fact that they did not participate may be an indicator of the reasons why they eventually left engineering. Further analysis of the data may assist us in designing future activities to support retention of these students.

We found student attitudes toward our program to be generally positive with regards to both academic and co-curricular activities. These attitudes did not differ between residents and non-residents. We also found, as expected, that the frequency of usage of services and activities by residents was considerably higher than that of non-residents. The data suggest that having our academic and co-curricular programs and services co-located is helpful to students.

We plan to administer the survey annually to compare results from the various cohorts as they progress through the program. Ultimately, the aggregated, longitudinal results should aid us in our student retention efforts by highlighting reasons why students persist or leave.

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