

# Work-in-Progress-Implement Hands-on Activities into Engineering Living and Learning Communities

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**Abstract** - Living and Learning Communities are a high-impact practice where first-year college students are placed in a common living area and are connected by major or interest. There are compelling reasons to initiate and maintain a Living and Learning Community for first-year engineering students at the University of Wisconsin -Platteville. Early engagement of engineering students into a community environment can have a positive impact on students and the recruitment and retention at the College of Engineering Mathematics and Science at University of Wisconsin -Platteville. In this project, we will work with a team who are involved with the College of Engineering Mathematics and Science Student Success Programs and Residence Life and University Academic Support Programs to create an academic cohort experience for first-year engineering students. It will be focused on implementing some fundamental engineering hands-on activities into the Living and Learning Communities for first-year engineering students. Statics is one of the first courses taken by students from the fundamental engineering courses. It is an essential prerequisite for many branches of engineering, such as mechanical, civil, aeronautical, and bioengineering, which addresses the various aspects of forces. One of hands-on activities in our Living and Learning Communities will demonstrate how to measure forces using “Hooke’s Law”. This activity will help students to better understand how a force could be simply a push or pull. It will also be a beneficial practice to implement some hands-on activities based on fundamental principles of mechanics into the Living and Learning Communities for first-year engineering students. These hands-on activities will allow students to engage and explore the subject they will study in the near future and develop connections and networking between students and faculty members.

*Index Terms* - implement, hands-on activities, living-learning communities, statics.

## 1. BACKGROUND

Living and Learning Communities (LLC) are a high-impact practice where first-year students are placed in a common living area and are connected by major or interest. LLCs are

receiving considerable attention by higher education scholars and practitioners [1]-[9]. This body of research work demonstrates that a LLC experience promotes intellectual communication between faculty and students, improves student GPAs and increases retention. From this research, the finding is that students living in LLCs also expressed more critical thinking and more civic engagement.

The first practice of learning community can be traced back to the 1920s and late the short-lived “experimental college” program at the University of Wisconsin introduced by Alexander Meiklejohn [2]. Since then, the learning communities have been growing among the universities in the US. Up to June 1, 2015, the national directory of learning communities administered by the Washington Center indicated that the directory listed programs at more than 300 colleges and universities and included some Camp B learning communities [10]. The University of Wisconsin at Madison, University of Wisconsin at Milwaukee, and other universities such as Iowa State, Michigan State University and Western Michigan University have robust Living and Learning communities.

It is really the time to initiate a LLC for first-year engineering students at the College of Engineering Mathematics and Science (EMS) at University of Wisconsin - Platteville (UWP). The decision to explore engineering Living Learning Communities also comes from a variety of our own sources:

- Recent UW-Platteville data from the NCEES and Pioneer survey suggest that students could benefit from and desire academic engagement opportunities with faculty/staff.
- As of June 2, 2015, 199 engineering admitted students requested to be placed into the first Engineering Interest Community and 104 students were assigned to Morrow Hall to accommodate their request. Eighty-four of the students who were placed into the community had general engineering majors, 1 was mathematics and 19 of these students decided to attend a different university.
- As of February 15, 2016, 104 students requested placement into the Engineering Interest

Community for Fall 2016. 100 of these students are men and 4 are women.

- The Women in STEM Living Learning Communities (one for freshman and one for sophomores) have been in place for 4 years and with 26 students in each community we are at full capacity.
- There are two **Women in STEM Living Learning Communities (LLC)** - one for freshman women (started in 2012) and one for sophomore and transfer women (started in 2013). More than half of the students who are in the freshman LLC choose to continue on to the sophomore LLC. To date, members of the LLC have retained at a rate of 84% (freshmen) (FIGURE1) and 92% (sophomore and transfer) (FIGURE2). By comparison, the average first-to-second year retention rate for all students in the College of EMS is 76.8%.

**Retention of Freshman LLC Members, 2012-15**

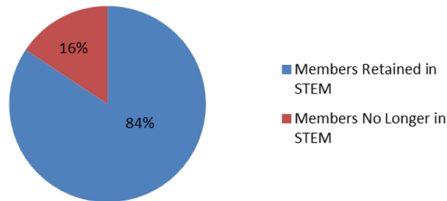


FIGURE 1

Retention of Freshman LLC Member (2012-2013)

**Retention of Sophomore/Transfer LLC Members, 2013-15**

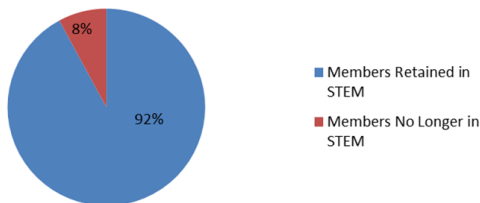


FIGURE 2

Retention of Sophomore/Transfer LLC Member (2013-2015)

The College of EMS Student Success Programs, Residence Life, University Academic Support Programs, and some faculty/staff will work as a team to establish Engineering Living Learning Communities for the college of EMS in Fall 2017. As the faculty of General Engineering Department and the director of the College of EMS Student Success Programs, we are very glad to be the faculty mentor working in this team to create an academic cohort experience for first-year engineering students.

## 2. IMPLEMENT HANDS-ON ACTIVITIES INTO ENGINEERING LLC

As described by Gablenick, MacGregor, Matthews, and Smith in their book *Learning Communities [1]: Creating Connections Among Students, Faculty, and Disciplines*, faculty who are teaching the common courses got involved with the LLC strengthen the social and intellectual connections between students and faculty.

### 2.1 STATICS COURSE

The first and the third authors have been teaching statics course since 2008. Statics is the first course taken by students from a list of fundamental engineering science courses. It is an essential prerequisite for many branches of engineering, such as mechanical, civil, aeronautical, and bioengineering, which address the various consequences of forces.

It will be beneficial from first-year engineering students to implement some hands-on activities based on topics covered in statics course into the LLC. These hands-on activities will allow students to engage and explore the subject they will study in the near future. It will also be beneficial in developing connections and networking between students and faculty members. It can be promoted by our College of EMS Student Success Programs and the LLC for first-year engineering students program.

### 2.2 ACTION PLAN

There will be about half-a-dozen “Hands-On” activities (TABLE 1) based on the statics concepts and implemented in our Engineering LLC beginning the Fall 2017 semester for our first-year engineering students. These activities will be related to the topics in our Statics course that students will study later in their study. Through these hands-on active engagements, we hope we can achieve these following goals:

- Provide a bridge between the formal academic program and out-of-classroom learning of students.
- Promote personal and intellectual growth and development of students through contact with members of faculty.
- Provide collaboration opportunities between students and faculty.
- Provide a transition between classroom and residence hall life leading to higher student retention, satisfaction, and success.

TABLE 1  
FIVE STATICS HANDS-ON ACTIVITIES

Activity	Description
1	Hooke's Law—Measuring Force
2	Adding Forces—Resultants and Equilibrants
3	Resolving Forces—Components
4	Center of Mass
5	Sliding Friction

### 3. OUTCOMES

Observations and data collection will be made from our LLC program based on first-year students from the College of EMS who either do or do not live in LLC. We expect to see some good results for student retention, performance and major decision. Regarding to the first-year retention and performance, we will collect the data from the students who are not living at LLC in the fall 2016 and will compare the results with the students who are going to live at LLC in the fall 2017. The future results will be demonstrated in TABLES 2 and 3.

TABLE 2:  
FIRST-YEAR RETENTION (FALL TO FALL)

Year	LLC	Non-LLC	Difference
2016-2017			

TABLE 3:  
PERFORMANCE (END OF FIRST FALL GPA)

Year	LLC	Non-LLC	Difference
2016-2017			

Also we would like to evaluate several other criteria as outcomes between LLC students and Non-LLC students. We will employ statics course as an example and will collect the data based on grades, interests, attendance, academically supportive residence hall climate and interaction with instructor. The future results will be provided in TABLE 4.

TABLE 4  
OTHER OUTCOMES BETWEEN LLC STUDENTS AND  
NON-LLC STUDENTS

Students	Outcomes				
	Grades	Interests	Attendance	Academically supportive residence hall climate	Interaction with instructor
LLC students					
Non LLC students					
Difference					

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