

Creating an Environment of Success for First-Year Engineering Students Using Learning Communities

*Steven Mickelson, Tom Brumm,
and Anthony Ellertson*

Abstract

In 1998, our department turned to the pedagogical innovation termed “learning communities” in an effort to enhance student retention and to bring coherence and meaning to our first-year student curriculum. We have found that our learning community has provided an opportunity for agricultural engineering students to become involved in the Agricultural and Biosystems Engineering (ABE) department from the moment they arrive on campus. Not only has the learning community helped us to increase our retention, it has helped us to address many of our program objectives including students’ abilities to function on multi-disciplinary teams, communicate effectively, and have knowledge of important contemporary issues. Results of our assessment efforts, which encompass both quantitative and qualitative strategies, suggest that students are overwhelmingly satisfied with the program, are involved in our department, and are successful in their academic progress toward their engineering or technology degree.

A brief look at the literature

With a history that can be traced to an experimental educational program in the 1920s (the Meiklejohn Experimental College at the University of Washington), learning communities can now be found at four to five hundred colleges and universities across the nation.¹ According to Smith, “Learning communities are a broad structural innovation that can address a variety of issues from student retention to curriculum coherence, from faculty vitality to building a greater sense of community within our colleges.” Learning communities usually involve purposive groupings of students and coordinated scheduling. In addition, they may involve coordinated approaches to learning and an emphasis on connecting material across disciplinary boundaries.²

As Tinto³ points out, the learning community courses for which students co-register are not random; rather, “they are typically connected by an organizing theme, which gives meaning to their linkage. The point of the theme is to engender coherent interdisciplinary...learning that is not easily attainable through enrollment in unrelated, stand-alone courses” (p. 2). Despite the age of many learning community programs, Tinto reports that current perceptions of learning communities have been based largely on anecdotal evidence and institutional reports or assessments described at conferences or national meetings. Recently, however, a study was conducted for the National Center of Teaching, Learning, and Assessment that suggests learning communities impact student learning in several ways:

1. Learning community students formed study groups that extended beyond the classroom.
2. Learning community students became more actively involved in their learning than did other students.
3. Learning community students perceived their learning experience was enriched by the other learning community participants.

4. Learning community students “persisted at a substantially higher rate” (than comparable students in a traditional curriculum).
5. Learning community students perceived themselves as more engaged academically and socially.
6. Learning community students reported an increased sense of responsibility for their own learning as well as the learning of their peers (p. 12).

The study reported by Tinto is important and offers a look at students’ experiences and perceptions in two types of institutions where learning communities have been especially nurtured: community colleges and large, urban commuter campuses; however, many other types of higher educational settings were not included in the study. For our purposes, we are most interested in large, research oriented land-grant universities, like Iowa State University, places where students often have difficulty becoming engaged in the university.⁴ To that end, we have been conducting an on-going assessment of our learning community, the results of which we will report in this paper.

The ABE LC at Iowa State University

In our department, the umbrella term Agricultural & Biosystems Engineering Learning Community (ABE LC) has evolved to now encompass two complementary undergraduate programs available to our first- and second-year students who are majoring in agricultural engineering or agricultural systems technology: the ABE *learning* community, which is created by having students co-enroll for specially selected linked courses, and the ABE *living learning* community, a reserved portion of a specific residence hall. Other features of the ABE learning community include peer mentors and tutors, faculty-student dinners, and student service learning opportunities. The ABE LC has been described in detail in previously published papers.^{5,6,7}

ABE Learning Community Objectives

The following comprehensive objectives guide the ABE LC initiative:

- To build community for entering first-year students within the Agricultural Engineering (AE) and Agricultural Systems Technology (AST) curricula
- To increase the retention of the first-year students in the AE and AST programs
- To increase recruitment of students into the ABE curricula, especially underrepresented students (women and minorities)
- To enhance learning and team skills using collaborative, learning-based educational methodology in the learning community courses
- To improve written communication skills by creating a writing link between the first-year composition courses and other technical courses in the AE and AST curricula

Learning Community Course Links

The primary support for our LC are course links. By having students take a common set of linked courses, we hope to create community and meaning for our incoming first-year students. Students must enroll for two of the three classes in the learning community core in order to participate. Listed below are the course links for the first-year students in agricultural engineering (AE).

AE First-Year Learning Community Core

Fall 1999, 2000, 2001, 2002, 2003

- Engr 101 (R cr.)[†] Engineering Orientation for AE Students
- Engr 170 (3 cr.) Engineering Graphics and Design
- Engr 104 (3 cr.) First-Year Composition I (course link with Engr 170)

Spring 2000, 2001, 2002, 2003

- A E 110 (1 cr.) Experiencing Agricultural & Biosystems Engineering
- Engr 160 (3 cr.) Engineering Problem Solving with Computational Laboratory
- Engl 105 (3 cr.) First-Year Composition II (course link with AE 110 & Engr 160)

Assessment of the ABE LC

Since the beginning of the ABE LC, we have used a number of assessment tools to evaluate the successes and the opportunities for improvement in our learning community. Importantly, we have hired a doctoral student for each of the past three years who is dedicated to coordinating and implementing our assessment program. This position has been funded through a competitive university grant that funds much of our learning community initiative. Notably, our assessment program is approved through our university human subjects committee. Following the discussion of our assessment methods, we will present the findings from our research regarding the student participants.

Both quantitative and qualitative assessment methods have been used for data collection. Specifically, we have gathered information through student records (retention, grade point, academic progress), student and peer mentor surveys, student and peer mentor focus groups, and student writing samples.

Our assessment program has yielded large amounts of data, a result that has both positive and negative implications. On the positive side, we have a wealth of information from which to draw; however, that volume of data has been a bit unwieldy to process. At this time we have been most interested in discovering if the LC has in fact helped us to achieve the five comprehensive objectives guiding our LC initiative. We have strong evidence addressing four of the five objectives:

1. The ABE LC fosters an increased sense of community students majoring in the ABE department. (Objective 1: To build community for entering first-year students within the AE and AST curricula.)

[†] R cr. is an abbreviation for *required credit*. Engineering 101 is a course that all engineering students must take, but it is a course for which students receive no formal course credit.

2. ABE students persist at a substantially higher rate than ABE students did prior to the LC initiative. (Objective 2: To increase the retention of the first-year students in the AE and AST programs.)
3. Students who have participated in the ABE LC report that the LC has enhanced their academic experience and success; however, some students report being tired of spending too much time with the student cohort. (Objective 4: To enhance learning and team skills using collaborative, learning-based educational methodology in the learning community courses.)
4. Students report that the Fall 2000 first-year linked learning community courses (English 104/Engineering 170) helped them to perceive the importance of first-year composition and that this linked course experience has helped them in a future technical course (Engineering 160). (Objective 5: To improve written communication skills by creating a writing link between the first-year composition courses and other technical courses in the AE and AST curricula.)

Conclusions

The ABE Learning Community continues to achieve its objectives. We have built a strong sense of community among the students within the department. Student retention rates have soared; longitudinal data shows that first-year students persist into the sophomore and junior years. Students who have participated in the ABE LC report that the LC has enhanced their academic experience and success. There is tangible evidence of improvement in students' writing and communication skills through the link to the first-year composition courses.

We have not achieved the objective of increasing the number of female and minority students. While the number of females in the ABE Department have increased over the last three years, it has not been dramatic. The number of minority students has not changed during the same time period. Focused efforts to address this objective are planned for the future.

Bibliography

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