Measuring the Success of Learning Communities

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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 first-year, first time student retention in the major of Agricultural Engineering (AE) from 63.6% in 1997 to 79.0% in 2003 in the department (ABE) from 78.8% in 1997 to 89.5% in 2003, 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 Tinto[3] 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] A brief overview will be given here to provide the necessary background for this paper.

Overview of the ABE Learning Community Initiative

The Department of Agricultural and Biosystems Engineering (ABE) at Iowa State University administers two separate curricula, the Agricultural Engineering (AE) curriculum in the College of Engineering, and the Agricultural Systems Technology (AST) curriculum in the College of Agriculture. The learning community was designed to enhance our students' academic and social lives, in addition to providing an opportunity for several of our students from our two majors to have at least one class together (first-year composition). Comprehensive objectives, as well as specific ABE LC objectives were designed to guide our program development and on-going assessment.

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 structure for our LCs 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 in at least 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 – Fall 2003

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

Spring 2000 – Spring 2004

- 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)

Importantly, due to university placement policies, not all students are required to take English 104 and English 105. At Iowa State University (ISU), students are placed into first-year composition based on their ACT scores; therefore, many of our students majoring in engineering test out of English 104 due to their high ACT scores. In addition, some students bring college credit for English when they matriculate from high school; therefore, not all ABE students take English 104 or even English 105 at ISU. Because the numbers of students who take first-year composition varies and is usually slightly (or some semesters more than slightly) different than the group of students enrolled in the linked engineering courses, AST and AE students are frequently placed in the same first-year composition sections, a strategy needed to fill one section of English (26 students).

[†] 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.

We had originally hoped that combining AE and AST students into one section of English 104 would help to create community between these two groups of students and have continued the practice because the students due appear to enjoy and thrive in the environment. Engineering 101, 160, and 170 are multi-section courses at ISU; however, we offer ABE specific sections for our students that are primarily taught by ABE faculty. This strategy not only enables us to cluster our students into one course, it also allows us to adjust the curricula to include topics and projects of particular interest to ABE students. Agricultural Engineering 110 is an experiential introductory course that is unique to our department and was described previously[8]. Tutoring for math and physics courses is also provided for AE LC participants.

Link with the English Department

The link between the engineering and English curricula allows ABE students to address their communication competency at an early stage in their programs. Originally, we worked with the Department of English to link special sections of first-year composition courses (English 104 and English 105) with the ABE curricula. The result has been composition courses that have an agricultural and biosystems engineering and technology theme underlying the composition curriculum. These specialized composition courses allow ABE students to read and write about subjects related to agriculture, engineering, and technology, instead of the more general topics common in first-year composition courses. Importantly, we have also adjusted the curricula for the engineering courses to incorporate an increased emphasis on writing. In this rich environment, writing is introduced as an important life skill.

Five objectives related to the ABE LC guide the first-year composition curricula:

- To begin to understand the integrated nature of communication within the agricultural engineering and technology profession
- To learn academic writing processes, techniques, and skills
- To learn basic technical writing skills
- To begin to understand the concept of audience analysis
- To learn social skills related to team building and team success

Additionally, the following more traditional first-year composition objectives are also addressed: to develop strategies for reading critically, to increase analytical skills applied to professional disciplinary discourses, to develop strategies to revise your [the student's] own writing, to adapt your [the student's] writing to specific purposes and readers, to use a variety of informational sources, to use a variety of organizational strategies, and to avoid errors that distract or confuse readers.

Program Evolution

The ABE LC has evolved in many ways over the last three academic years. During the first year (1999), the modifications made by the English instructor in the first year composition courses were significantly more than those made by the engineering faculty in the engineering linked courses. However, after observing several English class periods,

the engineering instructor gradually learned more about how the English material could be integrated into his engineering course. An example of this is the use of in-class student peer review. The peer review process and materials were originally used in English 104 as tools for students to provide meaningful feedback to each other prior to an assignment's due date. This activity and the associated materials were adapted and implemented in Engineering 170 at the end of the first semester (Fall 1999) with a written assignment accompanying an open-ended team design project. During the second (2000) and third (2001) years, the engineering faculty member in the LC links took on more of a leadership role in developing more meaningful connections between the linked courses. This became necessary due to the turnover from semester to semester in the English instructors.[‡]

An additional key development after year one was the establishment of a sophomore learning community. We had not intended to develop a learning community for non-first-year students; however, we accommodated the students' requests to create an advanced ABE LC. Presently, the sophomore LC involves a clustering of courses for which the students can elect to co-register; however, there are not the strong between-course linkages as is the case in the first-year LC. As more ABE faculty are becoming involved with the ABE LC program, we are encouraging the development of such interdisciplinary links.

Assessment of the program has also evolved over the last three years with the development of more focused pre- and post- surveys, focus groups, and the use of new competency based software for assessing student outcomes related to ABET.

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 each year 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.

Assessment Methods

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.

[‡] First-year composition courses are frequently taught by graduate students or by adjunct staff, which has made it difficult to establish a long-term relationship with any one instructor. We have had four different composition instructors since the learning community was implemented.

Student Records. Student records are an example of assessment data that is readily available, but that is often left untapped. Presently, we have used student records to track retention rate. In the future, we intend to use this data to track students' academic achievement and progress. Importantly, our students have given us their permission (via a consent form) to review this information for the purpose of assessing our learning community initiative.

Surveys. We have found surveys to be an easy, efficient, and effective way to gather information from our learning community participants. A combination of forced answer Likert-type questions combined with open-ended questions provides us an opportunity to assess our target objectives and to gather meaningful reflective comments from the students. The data is useful for program planning on a semester-by-semester basis. In addition, we have maintained continuity in the survey tools, which has allowed us to compare data from year to year.

Focus Groups. We began using focus groups in the Fall 2000 semester as a method to augment our survey data. Focus groups are a qualitative research method which have high face validity and which are relatively inexpensive and time efficient.[9] For each focus group session, we recruit 5-9 students, a size we have found manageable yet large enough to foster between participant dialogue. If the size of a focus group is too large, the group is likely to fragment and participants may begin to have more than one conversation. Importantly, peer mentors involved with the learning community and faculty members are not placed in focus groups with students due to the hierarchical imbalance between the groups. According to Morgan,[10] participants in a homogeneous group are more likely to speak freely about a topic. The focus groups are conducted by our doctoral student researcher, an individual with whom the students are comfortable yet who is not responsible for students' academic progress. This individual also processes the focus group transcripts so the anonymity of the students is protected.

Writing Samples. A rather unique aspect of our assessment program has been the collection of student writing samples. Because writing is such an important feature of our learning community, we saw the students' writing activities and assignments as potential sources for gathering important assessment data. Particularly, we have found several of the students' first-year composition assignments as rich sources of information regarding the students' perceptions of their learning community experience. Again, the students have given us permission to use these documents in our LC assessment activities.

Findings regarding student participants

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.)

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.)

Increased sense of community.

Evidence of community building in the department is a comprehensive objective linked to several of the specific LC objectives. Specifically, we believe excitement for the AE and AST fields, increased departmental involvement, increased student/faculty interaction, increased lower level/upper level student interaction, and increased involvement in professional societies and student branches all suggest students have an increased sense of community with the department.

Results from surveys conducted at the end of each fiscal year provide the evidence of the community building taking place from the student perspective. Students were asked to respond to statements related to the AE LC objectives. For all five statements shown in Figure 1, on the average, the students agreed to strongly agreed.

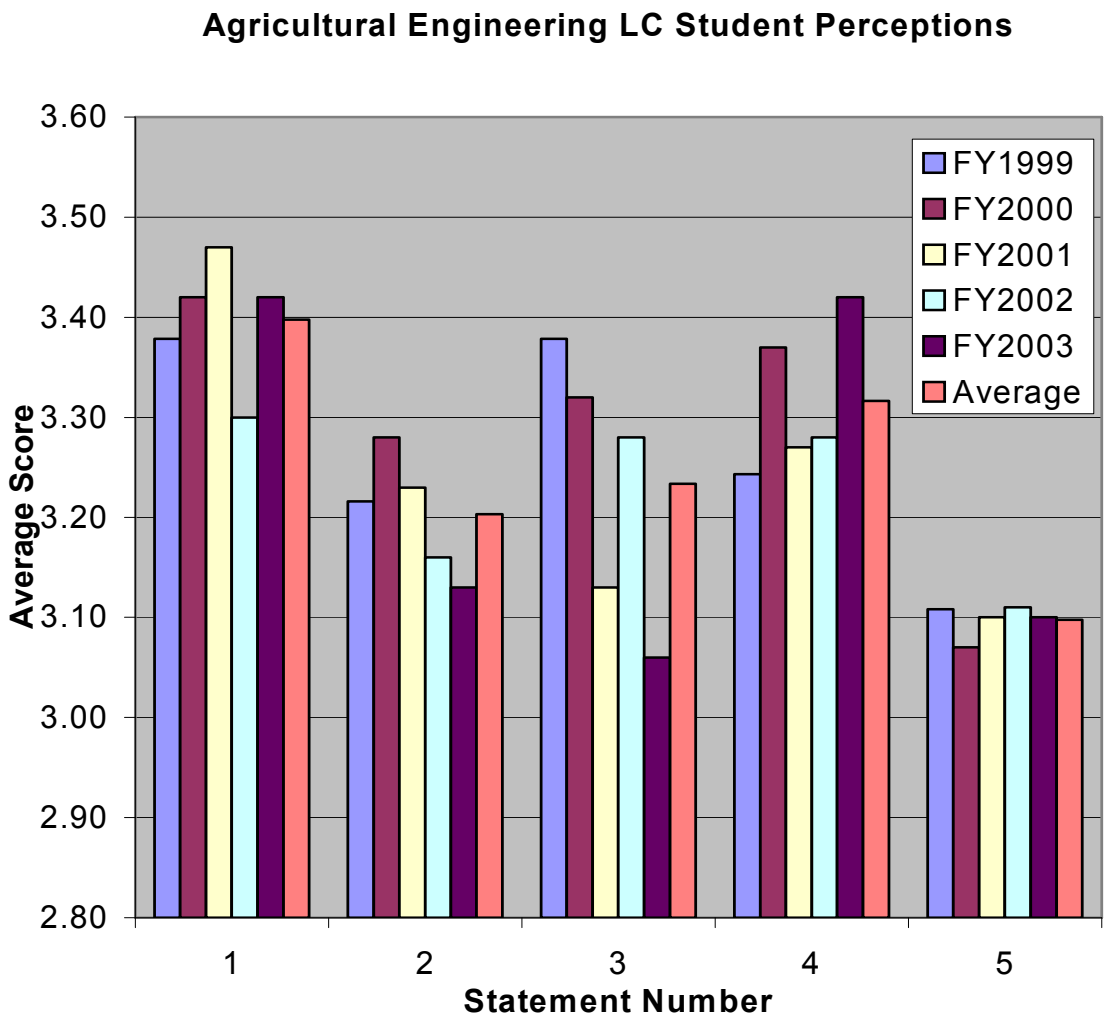

Figure 1. Average response to the following ABE learning community statements (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree):

1. I am excited to be a part of the field of engineering and technology.
2. I have been involved with the ABE Department this year.
3. I have interacted with the ABE faculty this year.
4. I have interacted with upper-class ABE students this year.
5. I have become involved in a professional society or a student organization.

One way we have measured students' levels of comfort in the department is to ask them the following survey question: "About how many faculty members in ABE do you know well enough to engage in a conversation?" As Figure 2 shows below, by the end of their first year, seventy-four percent of AE students felt they knew four or more ABE faculty members well enough to engage in a conversation. This was asked only during the first three years of the study.

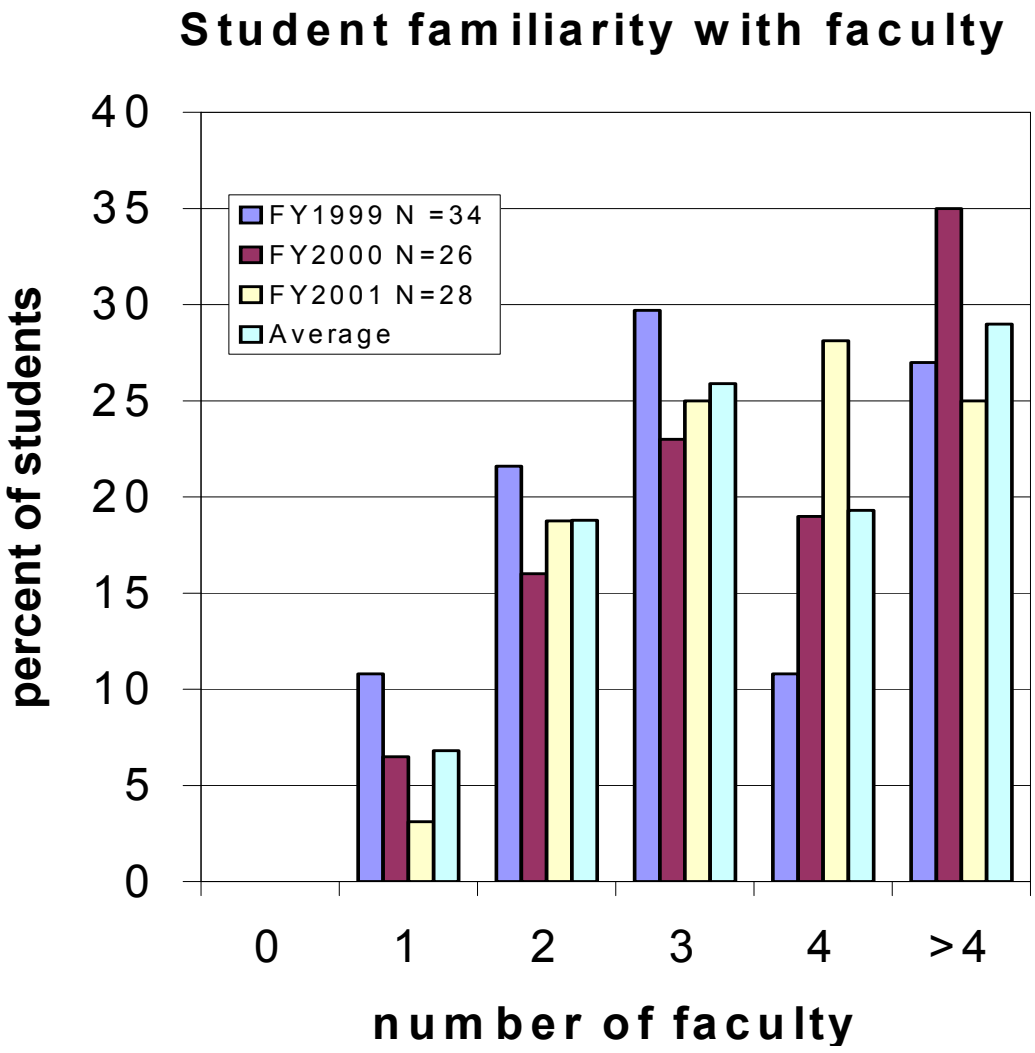

Figure 2. Student familiarity with faculty after one year in the AE LC.

Increased retention. Retention rates for the agricultural engineering program are shown in Figure 3 for the school years 1997-2003. The AE LC started in the spring of 1998 by creating AE 110 with in-class mentors. The first full year of the AE freshmen LC was in 1999. The sophomore AE LC began in 2000. The one-year retention rate increased dramatically the year that the AE LC was implemented. The jump from the non-LC year to the LC year was 12.3 percent. The retention rate for the six years following the implementation of the AE LC remained above 70 percent. In 2001, retention jumped to 82.1 percent. Free tutoring for calculus, chemistry, and physics and a service learning project was offered since 2001, along with the normal learning community activities. With the addition of a sophomore LC, we have seen the two-year retention rate grow from 39 percent to 71 percent from 1997 to 2001. Although, some students transfer out of Agricultural Engineering, a majority transfer within our department to our Agricultural Systems Technology program as is seen in Figure 4. This figure shows that we are still retaining approximately 90% of our first-year, first-time freshmen after the first year in our department (ABE) compared to 78% in the year prior to the start of our LLC.

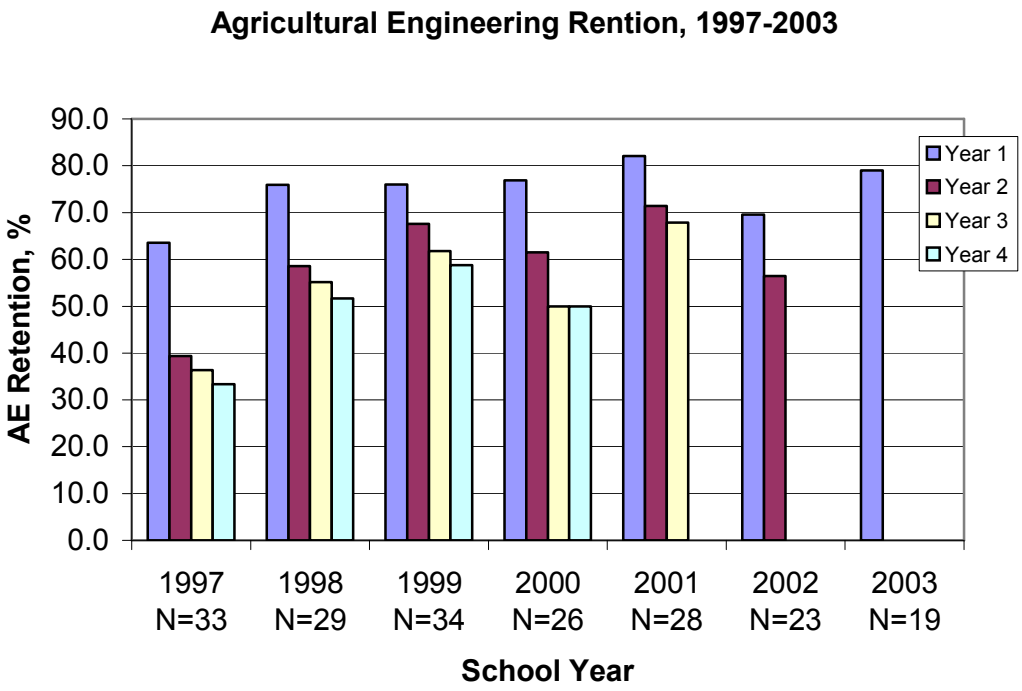

Figure 3. Agricultural engineering retention rates for FY1997-FY2003

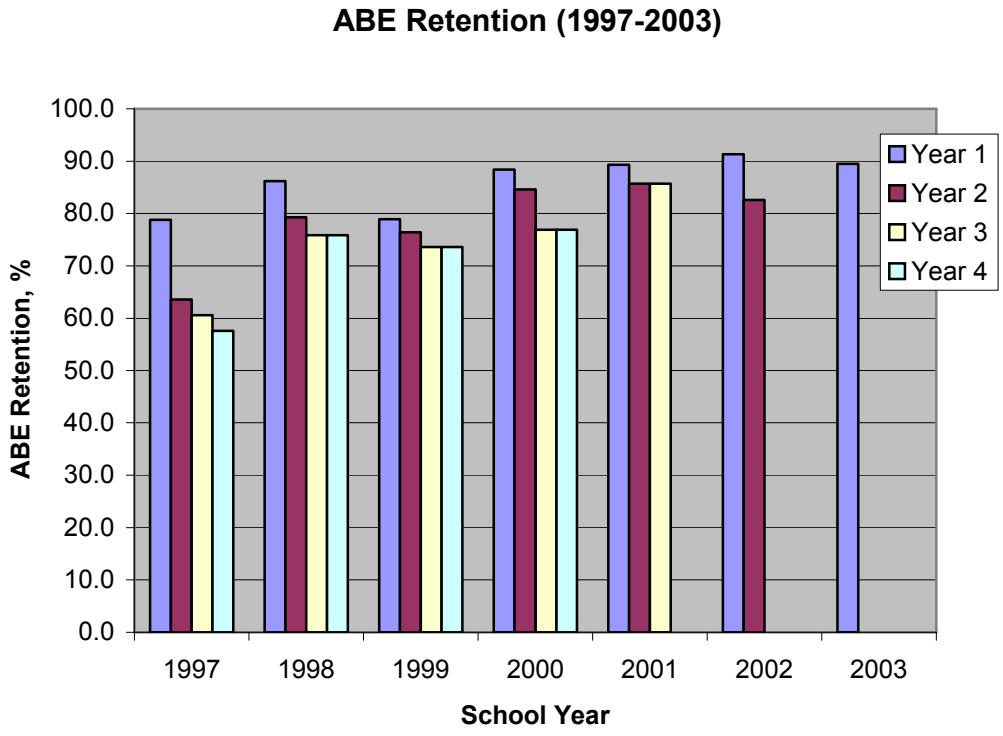

Figure 4. ABE retention rates for FY1997-FY2003

Enhanced academic success and experience. At this time, we have looked to the students' perceptions as a method of assessing students' academic success and experience. Overwhelmingly, the students' comments suggest that they believe the learning community has enhanced their academic experience positively. Many of the students have reported that the opportunity to work with other members of the LC has enhanced their academic performance.

Many learning community students have reported that they frequently form out-of-class study groups with other students in the learning community. Anecdotally, we have also noticed an increase in the number of students who are studying together in our building during out of class time. The increase may be partially due to increased access to study areas; however, the students' placement into common sections of courses has also increased the feasibility of peer study groups. Notably, prior to the LC only upper-level students were seen with any frequency in the building studying after hours; presently students representing all levels are seen regularly in our building.

In addition to perceptions of enhanced academic performance and participation in peer study groups, LC participants have also indicated that having introductory courses that were linked and had an ABE theme motivated them to learn and to participate in class.

Despite most students' general expression of satisfaction, a few of the students who were involved in both the LC and the LLC have reported they were tired of spending so much time together.

In addition to the theme relating to spending possibly too much time together, an additional theme of constructive criticism we have received relates to the instructors who have been selected or who have volunteered to teach in the learning community.

While we certainly don't attempt to place instructors based on our perceptions of their rigor in the classroom, we do attempt to place instructors who take teaching seriously and who are recognized as good teachers. Of relevance to this particular theme is the comment from a first-year student who suggested that he worked harder in his linked learning community first-year composition course (English 104) than he did in a non-linked section of first-year composition (English 105) during his second semester because the material and the instructor motivated him:

"I kind of miss the part about it being ag related, major and stuff. I thought that helped out a lot, but on the other hand I kind of like [105] because it's just a lot easier…It's just your regular English class. You just read a paper, write about it and I don't know. I'm maybe learning in it, but it's not quite as intense…I got an A- in 104 compared to a B in 105. I can say I'm a lot less involved in 105. I mean, 104 involved 170 and different classes, and so, I kind to had to spend a little more time on it. I kind of just work to get by in 105, because it seems like that's all she really expected. She didn't get quite as in-depth to it, so I just worked to get by in that class." (first-year participant, Spring 2001 interview).

Enhanced understanding of communication. A particularly exciting finding in our research is the effect the learning community appears to be having on our students' communication skills. On average, first-year learning community agreed or strongly agreed that they had learned technical writing skills during their first year in college (Figure 5). A ranking of 3 or greater indicates agreement. Prior to the learning community, technical writing was not addressed specifically until the students reached their junior or senior year and they took a technical writing English course.

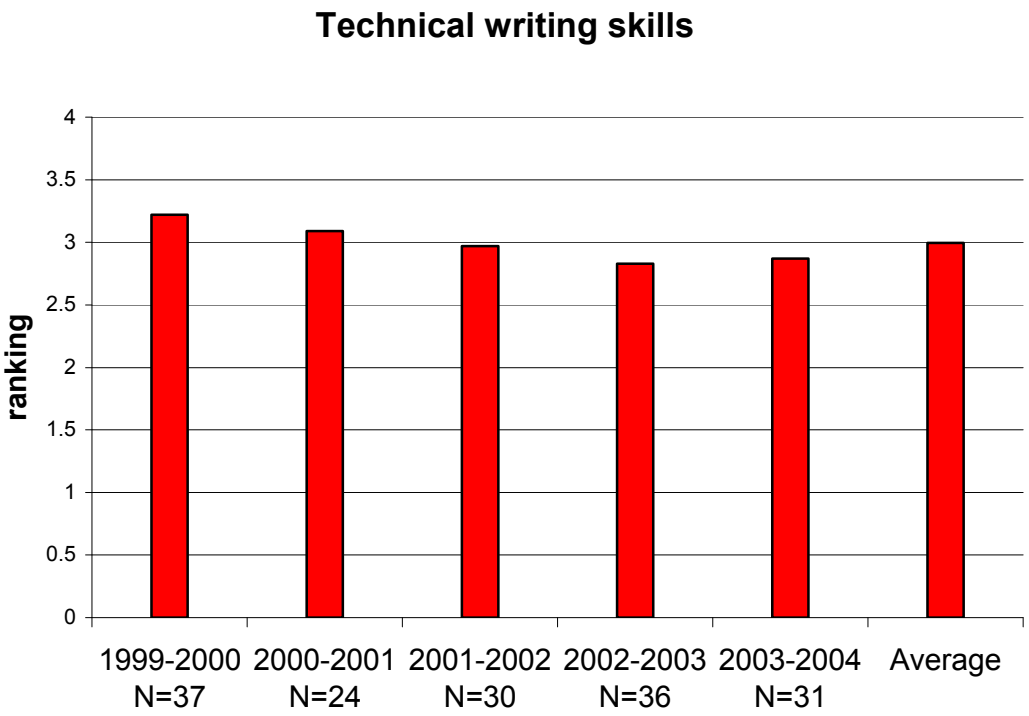

Figure 4. On average, the first year students in the AE learning community agreed or strongly agreed that they had learned technical writing skills during their first year in college. A ranking of 3 or greater indicates agreement.

Additionally, students have reported that the writing they have done in their linked English and engineering courses has been beneficial to them.

During a focus group held during the second semester of their first year (Spring 2001), several students revealed that writing they had done in their first-semester linked courses (Fall 2000—English 104 and Engineering 170) was helping them to also be successful in Engineering 160 (the course they were taking 2001). The student comment below is representative of this theme.

"[W]e did a lot of stuff in 170 that went along with 104 and was useful…I'm still using the stuff I learned last semester in [Engineering 160] (first-year participant, focus group, February 2001).

While most comments regarding their communication experience in the learning community were positive, a few students expressed frustration when they perceived that their engineering instructor and their English instructor had different expectations.

Particularly, the students were frustrated to discover that their engineering professor placed more emphasis on correctness than did their English instructor:

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 has 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.

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