2006-80: APPLYING LEARNING COMMUNITY PEDAGOGY TO FIRST YEAR COMPUTER ENGINEERING TECHNOLOGY STUDENTS: A PILOT PROGRAM

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Applying Learning Community Pedagogy to First-Year Computer Engineering Technology Students: A Pilot Program

Abstract
Student attrition and student learning are of major interest to colleges and universities. Collaborative learning or more specifically learning communities with its associated pedagogy is offered as an approach to enhance both. This paper describes a pilot approach at Rochester Institute of Technology (RIT). The purpose of this program was to integrate learning community concepts and methodologies into the instruction protocol of Computer Engineering Technology (CpET) first-year students. The creation of an interdisciplinary collaboration would be used to enable the continual integration of liberal arts course work and "soft skill" training into technical course instruction over a three quarter academic year. The organizational and classroom structures were used to effectively support the introduction of learning communities. Implementation results of the pilot program are also presented.

Introduction
 "Student attrition in the first year of college is an issue of concern for all post secondary institutions." [4] Discussions across academia indicate student learning is also of major interest to these same institutions. Common causes of student departure include; difficulties making the transition from high school to college, social isolation, and external pressures.[10] "Although some aspects of students' lives are not within the university's sphere of influence, colleges utilize a variety of programs to address some of the factors critical to student success, such as adjustment to college, academic skill building, and interactions among students and between students and faculty".[8] Learning communities, which are becoming a staple in higher education, address these factors and are designed to increase student retention and academic achievement.[4]

According to the National Learning Communities Project, learning communities have arrived as a national movement and are now part of the vocabulary of higher education. Learning communities are defined as "purposeful restructuring of the curriculum by linking courses that enroll a common cohort of students. Learning communities for incoming first-year students have taken hold as a method of reducing attrition and enhancing learning. This represents an intentional structuring of the students' time, credit, and learning experiences to build community, and foster more explicit connections among students, faculty, and disciplines".[2]

Background
To support its retention initiative RIT, beginning with the 2004-2005 academic year, implemented an institute wide pilot program to introduce learning communities to incoming first-year students. The purpose of the pilot program was to evaluate whether the claimed benefits of learning communities could be substantially achieved within the RIT setting and ultimately become the basis for a campus wide implementation encompassing all future incoming first-year students.

The pilot program was strictly voluntary. All colleges, departments, programs, and faculty were encouraged to participate. The result was the formation of 14 learning communities

encompassing 293 first-year students. The Computer Engineering Technology (CpET) program was one of the first to recognize the potential value in the pilot program and readily agreed to participate. Student participants were identified by their respective programs, but had the option of not choosing to participate once the learning community environment and expectations were described.

The program was launched during the summer of 2004 with a three-day workshop to introduce the volunteer faculty to the learning community pedagogy. The workshop was sponsored by the Office of Academic Affairs which spearheaded the effort and was facilitated by two nationally recognized leaders in learning community pedagogies; Dr. Catherine Engstrom of Syracuse University and Dr. P.K. Imbrie of Purdue University.

Student Selection

The basis for selecting students for the CpET learning community was their SAT scores. The average SAT score (math and verbal combined) for all incoming CpET first-year students for the 2004-2005 academic year was determined. The student SAT scores were then sorted identifying all students that had scores within plus or minus 1 Sigma of the overall average. This criterion was chosen to establish a somewhat homogeneous group by preserving the integrity of the learning community relative to retention.

Based on historical data, the criterion eliminated students with relatively low SAT scores which placed them in the high risk category. This also eliminated high risk program retention students by eliminating those assigned to CpET because of overflow in the computer engineering program. This process reduced the number of candidates to approximately 30. To further reduce the number of students to the required 25, the magnitude of the difference between the Math and Verbal scores was reviewed. The students with the largest difference were eliminated bringing the number to 25. This process provided the desired balance between the potential writing capability and analytical capability to support the CpET learning community objectives.

Organization and Structure

The size of the CpET learning community was arbitrarily set at twenty five students. This was deemed an appropriate size for classroom management considering that learning community methodology was new to the faculty who had volunteered to take on the responsibility of incorporating this methodology into the classroom.

"Learning communities for first-year students are based on the premise that the greater the student's academic and social involvement the greater the likelihood of academic success".[4] To more effectively promote involvement, the learning community was sub-divided into five, five-person groups. This structure not only provided a manageable group size to initiate social involvement but also allowed for an optimum team size to foster academic involvement by encouraging each member of the group to help their peers learn. These identified groups were then used across the linked courses to accommodate in class learning activities. In addition, to further support and encourage academic group activities, team building and the discussion of basic team skills were incorporated into the curriculum for First Year Experience (FYE). The social engagement dimension was promoted by scheduling several out-of- class social events. Student's suggestions and input were used to select and structure these social activities.

Learning Community Model
The learning community model used by the CpET program linked three courses, First Year Experience, Writing and Literature, and Circuit Theory. The rationale was the FYE would not only provide support for easing the intellectual and social transition to college life, but also provide the support necessary for easing the students into the learning community environment. Writing and Literature was included to promote and demonstrate the relationship between liberal arts and technology. In a broader sense this was viewed as a platform to create the beginning of student appreciation for the "soft skills". Circuit Theory was chosen because it is the first technical course that all of the students have in common. The three courses are shared in common by all of the students allowing for extension of the model. Each of the courses was taught by a different instructor. Close instructor team-like interaction allowed for integration of course content allowing for elements of each course to be mutually supportive.

Experience indicates that students typically understand and have an appreciation for mathematics as it relates to engineering technology studies. However, that same appreciation and understanding is minimal, and in some cases non-existent, when it comes to the relationship of the "soft skills" (e.g. written/verbal communication skills) and engineering technology studies. For this reason Writing and Literature was chosen to be included in the learning community course agenda.

Faculty Interaction
Research suggests students relate an effective learning community to instructors who are caring and respectful, excited about the material, and able to motivate them. Students also prefer a learning environment where they feel safe and connected to other students, strong curriculum linkages between the courses, and consistency and visibility of the connection between learning community faculty.

The instructors for the various courses supporting the learning community pilot program were identified prior to the summer launch. The identification of the instructor team and initial interaction began at the workshop (referred to in the Background section) with focused organization and planning activities for the respective learning communities. This interaction for the CpET learning community continued on an ad hoc basis as needs arose throughout the academic year and on a formal basis with a weekly scheduled luncheon meeting. These meetings were instrumental to the success of the learning community. Consistent faculty interchange regarding student performance in each of the courses identified individual student strengths and weaknesses with specific needs surfacing. It also identified opportunities for mutual reinforcements.

The FYE instructor provided a gauge of the progress of the students' acclimation to college life. This allowed each instructor the opportunity, where possible, to respond to specific student needs as well as to be supportive and helpful in the college life adjustment process. Ongoing discussions of specific events in each of the learning community classrooms provided each instructor with the opportunity to reference these shared activities across the linked courses. This collaborative effort demonstrated to the students' that the learning community was embraced by a team of instructors with a broader interest and commitment to student success.

Outcomes

The success of the learning community application was assessed by comparing academic performance and attrition rate of the learning community students with that of the remaining CpET students which acted as a control group. The academic performance was monitored by examining the average cumulative GPA for the two groups and the attrition was measured by comparing the attrition rates. These comparisons indicated that the average cumulative GPA of the learning community students was 16.6% higher than that of the control group and attrition rate of these same students was 10.4% less than the control group. The CpET results were consistent with the aggregate results of learning communities across the Institute.

The social interaction and camaraderie of the learning community students reached notable heights. Both learning community and non-learning community faculty observed the increase in this behavior. This increase alone represents achievement however; some faculty felt an "elite" group was created, perhaps even a clique. Non-learning community students began feeling excluded as it became increasingly more difficult to interact with the learning community. In some cases faculty indicated that this high degree of interaction and camaraderie led to on-going classroom disruption which led to challenges with their classroom management.

Observation of the group indicated that the learning community students did in deed bond. At the end of the academic year the CpET learning community students requested that the department make course scheduling provisions so that they could register together for their second year common courses. As a support measure for sustainability, the students' request was accommodated.

As was discussed earlier, each of the linked courses was taught by a single instructor. Interaction with the CpET learning community students in their second year appears to indicate a weakness in the applied model. Recent observations indicate perceived class, course, and delivery expectations are established by those instructors, and as a result, there may be some difficulty adjusting to different personalities and course management when instructors change.

Conclusion

The National Learning Communities Project reports learning communities have taken hold because they are flexible. Yet all learning community models contain a common element, intentionally rearranging the curricular time and space of both students and their instructors in order to foster community, coherence, and connections among courses and more sustained intellectual interactions among students and instructors. [7]

Research shows students who participate in learning communities have higher retention rates, grade point averages, and lower risk of academic withdrawal than those non-learning community students. In addition, compared to non-learning community students, learning community students reported increased cognitive skills and abilities, especially reading and writing. [5, 11, 12] Additional benefits of learning communities include; the facilitation of academic and social integration, helping students form social groups outside of class, and fostering a sense of community. Learning community students are more likely to engage in learning both in and out of the classroom, engage in experiential activities in class, develop personal relationships with faculty, and contribute to higher levels of campus engagement. [4] Finally, students participating in

learning communities reported higher overall satisfaction with college. [12]   The results of the CpET pilot program at RIT were consistent with this data.

Sustainable learning communities require a larger vision on which an institution's learning community initiative rests. "Learning communities move campuses from an emphasis on teaching to an emphasis on teaching and learning" [9]   and "from providing instruction to promoting learning". [1]   Learning community sustainability can only be achieved through continual rethinking and reinvention. In addition, successful learning communities invest in faculty and staff development and encourage educators be willing to change as they ask students to change (National Learning Communities Project). Rochester Institute of Technology and the CpET program have yet to wrestle with this dimension.

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