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Rishi R Sriram, *Baylor University* Frank Shushok, Jr., *Virginia Polytechnic Institute and State University*





Exploring the Effect of a Residential Academic Affairs-Student Affairs Partnership: The First Year of an Engineering and Computer Science Living-Learning Center



FRANK SHUSHOK, JR.
Associate Vice President for Student
Affairs and Assistant Professor
of Higher Education
Virginia Tech
fshushok@vt.edu



RISHI SRIRAM
Visiting Instructor and Program Coordinator for the Higher Education and Student Affairs Graduate Program
Baylor University
Rishi_Sriram@baylor.edu

Baylor University, Waco, Texas

THIS STUDY EXPLORES whether living-learning communities for engineering and computer science students afford opportunities to engage faculty and peers differently than they do engineering and computer science students not participating in the living-learning community at the same institution. The results of this study reinforce the growing body of research indicating that residence hall programs, facilities, and organizations can be rearranged to offer experiences and interactions that have been found to enhance student learning and success. Since faculty-student interaction and peer academic interaction have been found to be especially important to student persistence, efforts such as this living-learning program may have substantial long-term benefits. This study helps to provide further justification for the allocation of institutional resources for living-learning programs, especially those that benefit science, technology, engineering, and math (STEM) students.

INTRODUCTION

In 2004, a private, sectarian, Carnegie-classification "Research University-Very High Research Activity (RU/VH)" opened its first living-learning community in conjunction with the construction of a new residential facility. Since this was the institution's first attempt to implement a living-learning approach, special efforts were made to study whether desired outcomes were achieved during the first year of operation, the 2004-2005 academic year. This research explores whether living-learning communities afford engineering and computer science students opportunities to engage faculty and peers differently than they do statistically similar students not participating in the living-learning community. The authors gratefully acknowledge that this study was made possible by research grants from ACUHO-I (Association of College and University Housing Officers-International) and NASPA Region III (National Association of Student Personnel Administrators).

The institution's strategic plan called for enhancing an environment where learning flourishes, and student access to faculty

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was viewed as a critical component for success (Scott & Shushok, 2007). Results from the National Survey of Student Engagement (2004) showed that the institution's first-year students scored only in the 40th percentile on "Faculty-Student Interaction" and "Active and Collaborative Learning" when compared to other universities in the same classification. For an institution that articulated a deep value for a student-centered and active learning environment, these results were unsatisfactory and revealed a gap between the institution's espoused and enacted mission (Kuh, Kinzie, Schuh, & Whitt, 2005). To address this gap, the institution sought to create an intentional intersection between student intellectual life and residential living by piloting a living-learning program. Since living-learning communities can take a variety of forms from campus to campus, this institution outlined several assumptions used to guide program development. In order to be considered a living-learning community, the program must be guided by significant leadership from the academic school or college, which includes (a) the funding and supervision of a full-time program director, (b) making admission decisions about which students can participate in the program, (c) teaching discipline-specific courses on site, and (d) assigning faculty to offices in the residential community. The program director, hired and supervised by the School of Engineering and Computer Science, coordinated the admissions process with faculty, planned events for the faculty and participating students, collaborated with student life personnel, and chaired a faculty, staff, and student advisory board for the community. While some faculty lived on site or maintained an office in the residential facility, other faculty simply participated in programmatic events. Faculty also served as advocates of the program to internal and external constituents.

At the time that the institution was in the process of planning a new residential facility, the dean for the School of Engineering and Computer Science shared nationwide concern for the recruitment, retention, and success of engineering and computer science students (B.S. Kelley, personal communication, September 2002). The most frequent student complaints presented to the dean reflected concerns about the learning environment in the residence halls, the lack of community among engineering and computer science students, and the need for additional facultystudent interaction outside of the classroom. Therefore, a partnership with the School of Engineering and Computer Science was initiated, representing the institution's first effort at living-learning communities. Included in the facility design were three faculty offices, a faculty member-in-residence apartment, a classroom, a community center, multiple study centers, and three seminar rooms. Programmatic efforts included cohort courses with other members of the living-learning community, social activities, and common meals.

Since this was the institution's first attempt to implement a living-learning approach, special efforts were made to determine whether desired outcomes were achieved during the first year of operation, the 2004-2005 academic year. Specifically, the research questions guiding this study were as follows:

(a) Do engineering and computer science students in this living-learning community experience increased student-faculty interac-

tion when compared to other students? (b) Do students in this living-learning community have more academic peer-to-peer interaction than do other students? (c) Do students in this living-learning community have higher satisfaction for the overall living environment than do other students?

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BACKGROUND

As research continues to show how students develop both inside and outside the classroom, colleges and universities search for best practices to create improved conditions for learning (Keeling, 2004, 2006; Kuh et al., 2005; U.S. Department of Education, 2002, 2006).

In response, efforts to establish learning communities have been widespread in American higher education because they appear to be particularly effective in enhancing curricular coherence, nurturing deeper student learning, and creating a sense of community among teachers and students (Cook & Lewis, 2007; Kuh, Douglas, Lund, & Ramin-Gyurnek, 1994; Kuh et al., 2005; Laufgraben & Shapiro, 2004; Pascarella & Terenzini, 2005; Smith, MacGregor, Matthews, & Gabelnick, 2004). Learning communities take a variety of forms among higher education institutions, such as clustering courses, first-year interest groups, team-taught courses, and residence-based programs (Inkelas & Weisman, 2003; Shapiro & Levine, 1999). While learning communities vary in format, most seek to develop group identity, integrate student academic and social experiences, offer connections between disciplines, foster critical thinking skills, and regularly assess learning outcomes (Brower & Dettinger, 1998).

Studies suggest that residence-based programs consistently enhance student-faculty interactions on both formal and informal levels and are more effective than other learning communities in harvesting desired student outcomes (Garrett & Zabriskie, 2004; Shapiro & Levine, 1999; Stassen, 2003). In one of the most thorough studies on student-faculty engagement, Kuh and Hu (1999, 2001) divided student-faculty interaction into three categories: substantive interaction, out-of-class contact, and writing improvement. Their study found that only substantive interaction (interaction more intellectual in focus) had a consistently significant effect on self-reported gains during college.

In addition to strengthening faculty engagement, studies suggest that living-learning communities also enhance peer-to-peer academic engagement. Inkelas and Weisman (2003), for example, found that living-learning community participants studied more often in groups of peers and felt greater support in their living environments. Their study supported the findings of previous research (Pike, 1999). An out-of-class environment where students can see professors as mentors in the learning process, as well as engage with peers in academic matters, is one positive benefit of a learning community (Smith et al., 2004; Zhao & Kuh, 2004). But creating such a community is a commitment, and the level of commitment furthers the need for assessment. While prior research findings are promising, these findings do not relate specifically to engineering and computer science students.

ENGINEERING AND COMPUTER SCIENCE STUDENTS

With less than 1% of the typical undergraduate student population enrolling in engineering and the physical sciences (U.S. Department of Education, 2002) and more than 50% of these students no longer enrolled in this course of study a year later (Chang, 2002; Daempfle, 2003; Light, 2001; Seymour & Hewitt, 1997), researchers have called for special efforts to retain engineering and computer science students (Light, 2005; Wadhwa, Gereffi, Rissing, & Ong, 2007). Research suggests that livinglearning communities may be effective in enhancing the learning experience for engineering students by increasing student-faculty personal interaction and fostering collaborative learning (Daempfle, 2003; Light, 2005;

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Wankat & Oreovicz, 2005). However, a recent national study of living-learning programs found that programs with an emphasis on engineering and computer science were among those with the lowest student-faculty interaction (Inkelas et al., 2004).

METHODS

For the purpose of this study, two groups of similarly credentialed engineering and computer science students were selected in August 2004 and surveyed in May 2005. Half of these students (76) applied to and were selected to be in the first cohort of Engineering and Computer Science Living-Learning Center (ECS-LLC) participants. These students lived in a new residential community with facilities and programs designed to integrate academic and social activities, such as meals with faculty, group discussions, guest lectures, and social gatherings with faculty present. The other half

(76) were equally qualified engineering and computer science students who did not apply to or participate in the LLC.

To ensure that students in both groups were as similar as possible, caliper matching (Anderson et al., 1980) was utilized to match each of the ECS-LLC students with a non-ECS-LLC student. Students were matched on variables that included race, gender, classification, major, and the academic index score assigned to each student in the university admissions process. Academic index is calculated by converting the SAT score to a 100-point scale and adding the class rank percentile, for a maximum score of 200.

At the conclusion of the matching process, a match was achieved between ECS-LLC and non-ECS-LLC students in the categories of race, gender, and major. Since finding an identical match in an academic index score was unlikely, differences within .15 of a standard deviation were considered acceptable. To verify that the matching process had been successful, the sample of non-LLC student academic indexes was compared to the population of non-LLC student academic indexes. No differences were found (t = 1.639, p-value = 0.1054). This suggested that students selected from the non-LLC pool were a representative sample based on these variables. Next, a paired t-test was performed and revealed no differences in the averages between LLC and non-LLC academic index scores (t = 0.22, p-value = 0.8297). Of the 152 students in the population used for comparison, 63.8% returned usable data from the survey, resulting in a sample of 97 students for this study. Table I displays the gender breakdown of the sample by community.

Table 1

Characteristics of Survey Participants

LLC	GENDER		
Frequency Row Pct Col Pct	Female	Male	Total
LLC	10 17.54 58.82	47 82.46 58.75	57
non-LLC	7 17.50 41.18	33 82.50 41.25	40
Total	17	80	97

^{*} Correlation is significant at the .05 level (2-tail).

INSTRUMENTATION

Ordinal data were collected using the *LLC Experiences Questionnaire*, a self-designed 34-item survey adapted from Pace and Kuh (1998) and created to measure the type and frequency of student interaction with faculty members (6 questions); the type and frequency of participation in specified activities (15 questions); the level of student satisfaction with specified components of the learning environment (7 questions); and, finally, student estimates of gains in specified areas (6 questions). The ordinal responses represented opinions on a scale of 1-2-3-4.

The LLC Experiences Questionnaire was reviewed and modified numerous times by a steering committee composed of staff, faculty, and students on the researchers' campus. Based on the focus group administration of the instrument, test-retest correlation coefficients range between .72 and .89 while internal con-

sistency (Cronbach's alpha) ranges between .79 and .90. As noted in Gall, Borg, and Gall (1996), reliability of .80 or higher suggests that results are generally suitable for most research purposes.

DATA ANALYSIS

The sample size of 97 students resulted in sparse data in many of the categories of the ordinal responses. Thus, the levels were collapsed to binary responses (positive response versus negative response), allowing the researchers to make more valid conclusions.

For each question of the survey, a hypothesis test was performed:

- H_O: There is no association between LLC participation and response.
- H_A: There is an association between LLC participation and response.

The usual method for testing these hypotheses is Pearson's chi-square statistic. This statistic essentially compares the counts that were observed in each cell to the counts that would be *expected* if the null hypothesis were true (that is, if there was no association). If the observed counts are very different from the expected counts, then the null hypothesis is rejected.

For each question in the survey, the responses were analyzed using Pearson's chi-square test for association. As a measure of the strength of the relationship between LLC participation and survey response, odds ratios were computed with 95% confidence intervals.

RESULTS

In analyzing comparisons between LLC and non-LLC students, statistically significant results were found in four instances. Significant results (alpha < .05) and associated odds ratios are as follows:

Met informally or socially with a faculty member outside of class or faculty office.

There was a statistically significant association ($\chi 2 = 10.3836$, p-value = 0.0013). The odds of a favorable response are estimated to be 7.4164 times higher for LLC students than for non-LLC students. A 95% confidence interval for this odds ratio is (1.5978, 34.4068).

Discussed academic issues with a faculty member outside of class or faculty office.

There was a statistically significant association ($\chi 2 = 6.2414$, p-value = 0.0125). The odds of a favorable response are estimated to be 4.1538 times higher for LLC students than for non-LLC students. A 95% confidence interval for this odds ratio is (1.2837, 13.4414).

Met in an organized study group or informally with other students to prepare for an academic assignment.

There was a statistically significant association ($\chi 2 = 4.6335$, p-value = 0.0314). The odds of a favorable response are estimated to be 2.5333 times higher for LLC students than for non-LLC students. A 95% confidence interval for this odds ratio is (1.0763, 5.9625).

Satisfaction with your overall experiences where you currently live.

There was a statistically significant association ($\chi 2 = 9.2960$, *p*-value = .0023). The odds of a favorable response are estimated to be 14 times higher for LLC stu-

dents than for non-LLC students. A 95% confidence interval for this odds ratio is (1.6742, 117.0733). Since there is only one observation in the cell for LLC unfavorable responses, the chi-square test may not be valid for this question because 25% of the cells have expected counts less than 5. Fisher's exact test (which is used for small samples) gives p-value = 0.0031. The 95% confidence interval using the exact method is (1.7041, 631.9743).

DISCUSSION

The extent to which this engineering and computer science living-learning program encourages student-faculty interaction is positive. It seems important that administrators nurture informal student encounters with faculty in order to facilitate more substantive contacts. Informal interactions could have been the precursor to the more substantive interactions that students experienced in this living-learning center. In addition, it appears that the living-learning center creates an environment where students work in groups to study or focus on academically related endeavors, creating the peer academic interaction that Light (2001) found vital to the student experience. Students in the living-learning center also reported higher levels of satisfaction with their overall living experiences. Since engineering and computer science is considered a rigorous and demanding program on campus, it makes sense that an environment conducive to these academic needs would create a level of satisfaction that other similar students might not find in traditional residence halls. The findings show increased academic peer interaction, increased student interaction with faculty, and increased satisfaction with the living environment, all of which are desired outcomes from academic administrators in science, technology, engineering, and math (STEM).

Since engineering and computer science is considered a rigorous and demanding program on campus, it makes sense that an environment conducive to these academic needs would create a level of satisfaction that other similar students might not find in traditional residence halls.

LIMITATIONS

While this study provides evidence that this living-learning initiative may be facilitating statistically significant gains in faculty-student interaction, peer academic interaction, and satisfaction with overall living experiences, generalizing the result to other campuses may not be appropriate. Living-learning programs are structured and organized differently from campus to campus, and it is not clear what constructs of this effort are facilitating the gains. Moreover, this study is limited by a sample of only 97 students who were studied on a single campus for one year. Since this study's gender distribution is consistent with enrollment in engineering and computer science and since only 17% of respondents were female, the application of the results should be viewed with caution. The results of this study would also be enhanced by qualitative interviews with participants to understand what practices or components of this living-learning center increased engagement and satisfaction. Although this study attempts to control for selection bias through matched-pair samples, the fact remains that students in the living-learning community self-selected to the environment. Efforts to minimize the impact of motivation and other selection bias concerns are critical to better understanding the influence of programmatic efforts on student outcomes.

IMPLICATIONS FOR PRACTICE

The results of this study reinforce the growing body of research indicating that residence hall programs, facilities, and organizations can be rearranged to offer different experiences for students. Partnering with academic affairs can allow the residential experience of college and university students to be characterized by a seamless integration of what occurs inside and outside of class (Cook & Lewis, 2007; Kuh et al., 2005). It appears that the positive effects of living-learning communities occur regardless of major. Since faculty-student interaction and peer academic interaction have been found to be especially important to student persistence, efforts such as this campus living-learning program may have substantial long-term benefits (Milem & Berger, 1997). Perhaps more than ever before, external constituents such as professional associations and accreditation committees require evidence of the work of student affairs: student learning and development. Living-learning programs can and should be a critical part of this work because of the results they provide. This study helps to provide further justification for the allocation of institutional resources for living-learning programs, especially programs that benefit STEM students. Further, the results reveal the powerful impact of an academic and student affairs partnership in student development.

As two separate divisions of most institutions, student and academic affairs have the choice to either work in isolation or in collaboration. Unfortunately, through the history of higher education in America, the roles of student affairs staff and faculty have grown farther apart (Cook & Lewis, 2007). The cause for the gap between these two important areas can be attributed to a number of things, such as hindering structures, embedded values, organizational norms, financial competition, increased specialization, alienating jargon, lack of knowledge of each others' jobs, and incorrect perceptions (Cook & Lewis).

Much can and should be done to overcome the divide between student and academic affairs. When this gap is bridged and the two areas work collaboratively, the satisfaction, persistence, learning, and personal development of students increase. Partnerships between student and academic affairs best align the mission of the institution with the personal mission of the student, thus leading to a stronger bond between the two and the promotion of student success. While living-learning communities are not the only option for such a partnership, studies such as this one suggest that higher education administrators should give these programs serious consideration.

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Appendix A

Living-Learning Experiences Questionnaire (adapted from Pace & Kuh, 1998)

In thinking about the past year as a student, please indicate the frequency with which you engaged in the following activities with faculty:

- 1. Discussed career plans and vocational aspirations with a faculty member
- 2. Met with a faculty member during office hours
- 3. Met informally or socially with a faculty member outside of class or faculty office
- 4. Discussed academic issues with a faculty member outside of class or faculty office
- 5. Discussed spiritual issues with a faculty member outside of the classroom environment
- 6. Discussed a social issue or world event with a faculty member outside of the class or faculty office

In thinking about the past year as a student, please indicate the frequency with which you engaged in the following activities with other students:

- 7. Discussed your career plans and vocational aspirations with another student
- 8. Met in an organized study group or informally with other students to prepare for an academic assignment
- 9. Discussed academic issues with another student outside of class
- 10. Discussed spiritual issues with another student outside of class
- 11. Discussed a social concern, political issue, or world event with another student outside of class
- 12. Developed a friendship with a student of a different background (culture, ethnicity, religion, etc.)
- 13. Discussed cultural differences or issues related to diversity or prejudice with another student

In thinking about your participation in a variety of activities during the past year, indicate how involved you have been in the following:

- 14. In attending campus events, lectures, or other university-sponsored activities
- 15. In activities with an academic emphasis (outside of class)
- 16. In activities with a spiritual emphasis
- 17. In activities with a multicultural emphasis
- 18. In activities with a social emphasis
- 19. In activities that allow you to meet new people and cultivate friendships
- 20. In campus student organizations
- 21. In a campus where you were fulfilling a leadership role

In thinking about the past year as a student, how satisfied would you say you are with the following:

- 22. The friendships you have developed
- 23. The level of support and interaction you have with faculty members
- 24. The level of support and interaction you have with staff members
- 25. The level of academic growth you have experienced
- 26. The level of spiritual growth you have experienced
- 27. Your overall experiences where you currently live
- 28. Your overall experience at Baylor University

In thinking about your university experience up to now, to what extent do you feel you have gained or made progress in the following areas?

- 29. Gained a range of information that may be relevant to a career
- 30. Presented ideas and information effectively with writing or speaking to others
- 31. Became more aware of different philosophies, cultures, and ways of life
- 32. Developed an ability to function effectively as a member of a team
- 33. Developed the ability to learn on your own, pursue ideas, and find information you need
- 34. Have learned to adapt to change (new technologies, different personal circumstances, etc.)

Discussion Questions

- Cocurricular collaboration between academic and nonacademic units has been described as necessary to enhance student learning. Identify examples of integrated learning opportunities at your institution.
- Learning Reconsidered (2004) made 16 recommendations which frame institutional structure, resources, and priorities towards effective student learning outcomes.
 How does the LLP described in this article fit within this framework? How can these 16 recommendations be applied to your campus?
- 3. Given the existing research on the benefits of LLCs, why might it be important for a campus to conduct its own assessment?
- 4. The authors state that living-learning programs "are structured and organized differently from campus to campus, and it is not clear what constructs of this effort are facilitating the gains." Discuss this in terms of the challenges associated with clearly identifying those aspects of an LLC that yield retention and higher satisfaction. How do you know how to design an LLC to meet the specific needs you are trying to meet?
- 5. Researchers went to great lengths to establish an accurate comparison between the groups that were surveyed. Discuss this methodology as a way of determining the impact of participating in an LLC. What other methodologies could be used in this type of study?