Learning Communities Improve Retention in Engineering and Computer Science

Raman Menon Unnikrishnan and Ricardo V. Lopez
College of Engineering and Computer Science
California State University, Fullerton

Abstract

As a comprehensive university, California State University, Fullerton (CSUF) serves approximately 37,000 students from a variety of cultures and backgrounds, with the recent increases tied to the immigrant population from Mexico as well as Central and South American countries. The majority of this surge has been from first-generation college students. The college, in an attempt to reverse its historical legacy for high student attrition, provides support and services that will help its diverse student population succeed academically and socially. The overall retention effort centers on a number of initiatives but this paper focuses on one such program, *The Engineering and Computer Science (ECS) Scholars Program* that is intended to create learning communities during the freshmen years. The *ECS Scholars* program is a learning community established in collaboration with Title V Retention Programs, the University Learning Center (ULC), the Center for Academic Support in Engineering and Computer Science (CASECS) and Freshmen Programs. The *ECS Scholars* program launched in the fall 2006 semester focuses on the academic success of *first-time freshman* (FTF) in engineering and computer science. While the ECS Scholars program is an at large initiative not aimed at any single community, its impact on underrepresented groups is found to be significant.

Introduction

It is evident that the demographics of FTF entering four-year institutions of higher education in the United States is more diverse and multicultural than in previous decades.[1] While undergraduate enrollment has increased 21% from 1995 to 2005, the percentage of female enrollment has increased 27% in the same period. In addition, the percentage of minority college students has also increased. Minorities constituted 15% of the college population in 1976 but by 2005 that rose to 31%. In 2003 the Supreme Court of the Unites States recognized that sex and race, if used only as a subjective basis in acceptance decisions, bestows educational benefits that impact all members of an institution's student population.[2] Research shows that a diverse student population produces graduates capable of having complex points of views as well as enhanced capacity to take multiple perspectives into account.[3] Moreover, exposure to diversity allows greater cognitive insight and openness to enlist creative ideas from foreign cultures.[4] Modern engineers and computer scientists are expected to possess such skills in order to be successful in an increasingly globalized work force. Even though the need for diversity is well understood, statistics show a decreased enrollment of Women, Hispanics, and African-Americans in undergraduate engineering and computer science programs.[5,6]

Even when enrollment increases within these groups of FTF, thanks to aggressive recruitment efforts, retention and graduation rates remain relatively low.[7] Tinto argues that there

is no unilateral solution for this "revolving door" at institutions of higher education, but the adaptation of *learning communities (LC)* is a well corroborated educational solution.

Learning Communities

In the simplest model of an LC a certain group of FTF participates in *block scheduling* i.e., register for the same classes that also meet at the same time.[8] In another form, students take classes with a larger groups of students unaffiliated to the LC, and then convene together in smaller discussion sections (Freshmen Interest Groups) facilitated by upperclassmen. More structured programs will congregate all students in one class that meets several times a week and conduct all instruction in one setting. Other settings combine facets of the aforementioned, and link students via a *first year seminar* (FYS) course. Joe Cuseo purports that FYS is "an integral part to success of all students, regardless of their level of academic preparedness."[9] Some LCs also have a service-learning component, a pedagogical approach that interweaves faculty and student intellectual ingenuity to solve social problems.[8] Furthermore, LCs have three integral components: shared knowledge, shared knowing, and shared responsibility. Connecting courses so that they appear to be related promotes the networking of ideas and elevates thinking to a higher level (shared knowledge). Enrolling participants in the same classes induces social interaction and enhances intellectual interface, and allows students to care for the development of each other's learning (shared knowing). Lastly, students who participate in LCs learn to become responsible for one another and become "mutually dependent" so that advancement is done as a cohesive unit with each member making contributions to the group (shared responsibility).

Learning communities have some key parts of the successful Treisman's Model.[10] In the early 1980's Uri Treisman created programs that enlisted African-American students to excel in mathematics rather than a program created solely to help them evade failure. Like LCs, Treisman's emphasis is on collaborative learning among the students through the use of "small group teaching methods." Students are not just expected to be remediated, but expectations are raised based on what Treiman observed to be the strength of some groups of students on his campus: *their ability to merge academic and social lives*. Treisman argued that it was also important to have faculty sponsorship in order to "nourish" the program and enable it to survive. The same requirement applies to LCs. In addition to faculty, Tinto also states that successful LCs must recruit the services of student affairs professionals since they are usually trained to teach linked courses.[8] Participation by both parties increases mutual appreciation between faculty and student affairs professional and enhances the services rendered to students in a coordinated manner.

In order to further corroborate the efficacy of LCs, Zhao and Kuh conducted a cross sectional study with the National Survey of Student Engagement (NSSE).[11] The validity of assessment of student participation in the NSSE is well established. The NSSEE specifically assesses: (a) possible link between student success and a particular learning community, (b) self-reported gains in the college experience and (c) overall satisfaction with the college experience. After sampling over 80,000 students across 365 four-year universities they found that participation in LCs is "uniformly and positively linked" with (a) academic performance, (b) engagement in worthwhile academic activities (faculty interaction, collaborative learning), (c)

increase college attendance and (d) general satisfaction with the college experience (personal and social development). Overall, they argue that learning communities significantly impact the educational and personal experience of FTF to a degree that persists throughout the undergraduate experience of that student.

The concept of learning communities as presented by the current literature is consistent with the needs of diverse undergraduate engineering and computer science students. Students in science majors are often stuck in a void while learning science and engineering.[12] This may occur because they are not meeting the cognitive levels expected by faculty, are not able to interpret mathematical models adequately, have English language literacy problems or simply were not exposed to the necessary prerequisite science knowledge in high school. The problem is augmented by the general lack of a refined pedagogical approach to science teaching in higher education as teaching is often centered on lecture style teacher-dominated approach. This approach lessens as students advance towards core content, but is pervasive in introductory courses for first year students. The same trend is true in engineering programs in higher education; students do not experience emphasis on cooperative teamwork (a key pedagogical approach in engineering education) until they reach higher level courses. Coll and Eames[12] support key factors that positively influence the efficacy of learning in engineering students, the influence of social interaction on a student's academic choices (student-to-student relationships), quality and nature of teacher-student relationship, quality of science instruction, quality of student-centered teaching, and incorporation of best teaching practices based on research.

Additionally, pedagogical solutions that seek to meet the needs of diverse engineering students should implement strategies that complement the typical steps they take when seeking help: first they reach out to fellow students for advice and then to their instructors, subsequently informal study groups and then finally formal learning services (tutoring centers, etc).[13,14,15] These approaches should also accommodate their preference for interactive approaches to learning, more interaction with instructors and tutors, practical classes and emphasis on cooperative teamwork. Cronje and Coll assert that interactive approaches to learning enhances better comprehension of basic engineering skills, the appreciation for science, and an appreciation for the type of work conducted by a professional engineering or scientist. Similarly, successful computer science programs must provide a three dimensional perspective of potential careers in computer science.[6] Fisher and Margolis assert that an environment must be created where these perspectives are "valued and respected." Four year institutions can apply a social context to computer science education by: interconnecting other disciplines to computer science, an emphasis on the interaction between humans and computers and a component that encourages the application of computer science skills to community issues. They recommend that the program should also address the self confidence issues of students.

Current Situation

The overall fall 2006 ECS FTF class had a 1-year retention rate of 49% whereas overall fall 2007 ECS FTF class had a 1-year retention rate of 53% showing a slight improvement. The overall fall 2006 ECS cohort had a 2-year retention rate of only 31%. These are appalling statistics.

Description of the ECS Scholars Learning Community

The ECS scholars LC has been in existence since 2006. Students participate in this program only during the fall and spring semesters of their first year; they are not provided intervention after their first year at CSUF. The program is currently sponsoring its third cohort. The ECS Scholars LC is designed for FTF majoring in engineering or computer science aimed at reversing the unacceptably large attrition during the first year. ECS Scholars experience a smooth transition to college life by maximizing campus resources, opportunities for individual and community development, and on-going interaction with faculty, student affairs professionals, and peers from the College of ECS.

The ECS Scholars LC offers rewarding and unique benefits centered on the following aspects:

- Develop friendships and connections with students and faculty within the College of ECS. Students are block scheduled and placed in a FYS course each semester of their first year (1 unit in the fall and 2 in the spring semester) with an instructor with a PhD in Engineering or Computer Science.
- Receive specialized academic advisement for general education and major coursework under the guidance of CASECS and a graduate-student academic advisor.
- Learn how to study for core math, science, engineering and computer science courses in specialized Freshmen Interest Groups lead by upperclassmen.
- Receive intensive tutoring and academic assistance in core classes on a one-on-one basis
- Opportunities for service-learning experience related to their field of interest; students must complete 20 hours at government or non-profit organizations.
- Receive counseling on transitional issues from a student affairs professional, a co-instructor in both sections of the FYS courses.

The ECS Scholars Program started in 2006 with the following program goals and objectives (the same goals persist each year):

Goal: The first academic year fall-to-fall persistence of 75 first-time-freshman students in the College of Engineering and Computer Science will be 80% as well as 80% of the cohort will maintain adequate academic standing at the end of their first academic year.

Objective 1.1 The 75 students who participate will attend a block of classes in fall 2006 and spring 2007.

Objective 1.2 Participants will attend study groups that cover study techniques and strategies, as well as course content that support the blocked classes.

Objective 1.3 Participants will have access to at least three hours each week of individual tutoring.

Objective 1.4 Participants will be assigned a peer advisor in the College of Engineering and Computer Science.

Objective 1.5 Participants will be required to meet with the CASECS academic counselor at least once each semester.

As mentioned before, the ECS scholars program is supported by CASECS. This center provides a learning environment for all students in ECS regardless of their year in school. Upon

entering the ECS scholars program students are automatically CASECS members. CASECS students receive priority registration for courses, space for student-to-student collaborative learning among all grade levels, and academic counseling; these features aid members of the ECS Scholars program. Another key partner is Freshmen Programs of CSUF. Freshmen programs joined the ECS Scholar support team after the first year of the program (2007 cohort). Freshmen programs facilitates the following for the ECS scholars program: (1) one unit (UNIV 100A) FYS course for ECS Scholar students in the Fall semester, a class that is vital to academic planning, orientation, and transition to Cal State Fullerton, (2) a two unit (UNIV 100B) course in the Spring semester that offers further integration into areas of Engineering and Computer Science via the Service Learning component, (3) maintenance of registration planners that direct students into blocked-scheduled sections linked to their UNIV 100 LC (they work with departments to select appropriate courses, coordinate scheduling for the FYS courses), (4) a graduate-student academic advisor to help ECS Scholars understand the university registration system, coordinate major and general education requirements, and resolve other problems that may prevent successful registration, (5) assistance with implementation of mid semester grade check (early intervention) and connect students academically at-risk with resources to help them succeed in their classes, (6) professional development for instructors and student affairs professionals, and (7) assessment of all professional development programs as well as peer evaluations for all instructional team members.

A third partner in the ECS Scholars program (a partner since the inception of the program) is the ULC. The mission of ULC is to provide all CSUF students with academic support in an inviting and contemporary environment. The staff members of the ULC are carefully selected and trained to assist students with their academic assignments, general study skills, and computer user needs. The ULC provides the ECS Scholars with: Freshmen Interest Groups (provide collaborative learning groups across disciplines) led by trained upperclassmen, one-to-one tutoring, academic workshops, and online writing tutoring. Through the ULC's continual training of Study Group Leaders and a deeper partnership with ECS, a solid foundation of success has been laid for all ECS students served. ULC tutors have a positive impact on the ESC scholars they served in 2006 (n=19) as indicated by the 88.6% overall satisfaction rating indicated in Figure 1.

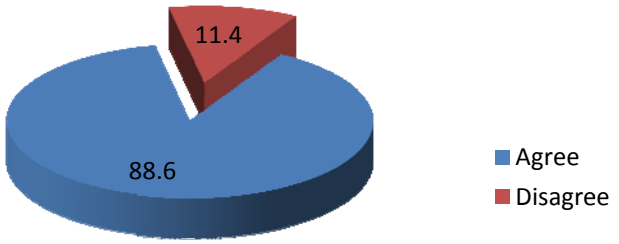

Figure 1: 88.6% of all ECS Scholars were satisfied with the knowledge they received, courteousness of the tutors, and the tutors ability to create group discussion.

ULC tutors participate in training throughout their employment. Issues of cultural sensitivity, conflict resolution, and cutting edge tutoring techniques are taught through the Peer Tutoring Certification process. These results can be immediately seen in the evaluation responses of the students that receive the ULC's services. As shown in Figure 2, great pride is taken in meeting the needs of CSUF's students in a friendly and courteous manner.

In the collaborative process of tutoring, it is important for ULC group leaders to create a dialogue with students that enable them to actively participate in their individual education. As part of the Peer Tutoring Certification, tutors learn to ask engaging questions that challenge and stimulate independent thinking. Figure 3 shows that 83.3% of ECS scholars surveyed, felt their Study Group Leader successfully facilitated group discussion.

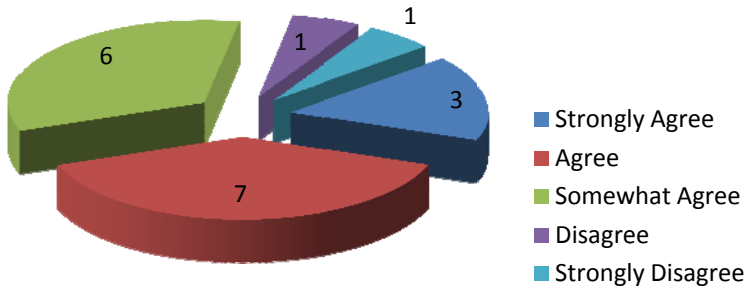

Figure 2: Of the 18 ECS Students surveyed 88.9% agreed their Study Group Leader was helpful and friendly.

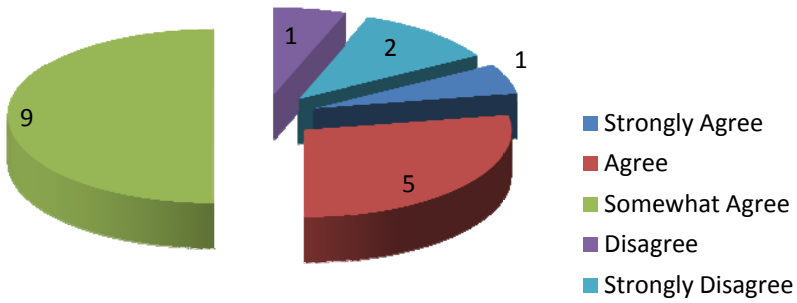

Figure 3: 83.3% of ECS students surveyed somewhat agreed, agreed, strongly agreed that their study group leader successfully facilitated group discussion.

The ULC's Study Group Leaders are very knowledgeable about the subjects tutored. Only students that demonstrate excellent writing skills and have an exemplary academic track record are hired as learning assistants. Tutors are also personable and able to explain complex concepts in simple terms. This results in 94.4% of the students served reporting an increase in knowledge of the subject area they studied, as shown in Figure 4.

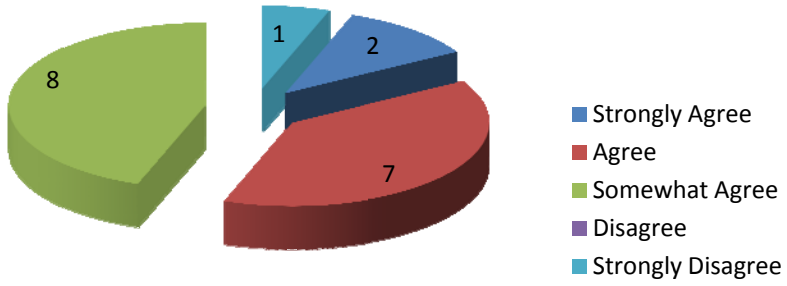

Figure 4: 94.4% of students surveyed somewhat agreed, agreed or strongly agreed that their study group leader aided in personal increase of knowledge in the subject area.

Attendance and Perceived Preparedness for Study Groups

The ULC hopes to strengthen collaboration with ECS to increase student participation in study groups. The results displayed above clearly indicate that the ULC provides an invaluable resource that supports academic participation and success. As Figure 5 illustrates, 55.5% of students surveyed did not regularly attend study groups. In order to make the most of this resource, future goals to improve regular attendance to study groups have been established. As the partnership between ECS and the ULC progresses, greater regular participation in study groups will result in a richer academic experience for ECS students.

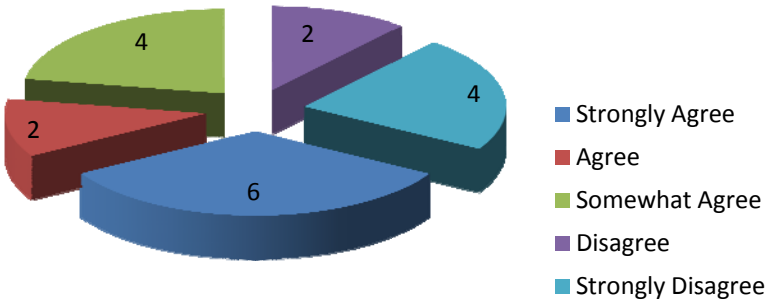

Figure 5: Fifty-five percent (55.5%) of students stated that they had not attended study groups regularly when asked if they attended study groups.

Future efforts will focus on encouraging proper study skills. Figure 6 indicates that only 50% of students come prepared for study group. To rectify this, Study Group Leaders will not only give an overview of the subject area, but will help students learn what types of questions to ask as they are reading and engaging the study material. This approach will encourage individual participation in study outside of the classroom and study group atmosphere.

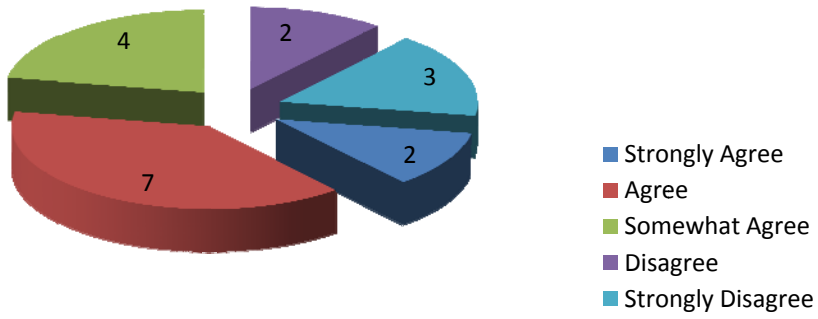

Figure 6: Fifty (50%) of students admitted that they did not come to study group prepared on a regular basis when asked if they prepared for the study groups.

The distribution of ECS students in the fall semesters of 2006 and 2007 are given in Table 1. This table shows the different categories of the overall student population as well as those who were part of the ECS scholars program. Note that the overall enrollment in the college as well as participation in the ECS Scholars program increased from 2006 to 2007.

Table 1: Student categories in Fall 2006 and Fall 2007

ECS Fall 2006 FTF

	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	3	77	35	131	87	17	21	371
Women	0	28	8	25	26	1	5	93
Total	3	105	43	156	113	18	26	464

Fall 2006 ECS LC

	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	0	0	1	12	0	3	0	16
Women	0	1	0	2	0	0	0	3
Total	0	1	1	14	0	3	0	19

ECS Fall 2007 FTF

	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	4	82	28	142	82	33	21	392
Women	1	17	9	26	27	3	4	87
Total	5	99	37	168	109	36	25	479

Fall 2007 ECS LC

	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	1	8	2	16	5	2	4	38
Women	0	1	1	2	4	0	0	8
Total	1	9	3	18	9	2	4	46

Note: "Nonresident" implies non-citizen

Academic Impact of ECS Scholars Program

The pass rate in various freshmen courses for ECS Scholars is significantly higher than the general pass rate for ECS students. Table 2 demonstrates the passing rates of ECS relevant courses taken by the 2006 LC in Fall 2006 and Spring 2007. Pass rates are compared with pass rates of all FTF in 2006. Table 3 demonstrates the passing rates of ECS relevant courses taken by the 2007 LC in Fall 2007 and Spring 2008. Pass rates of those the 2007 cohort were compared between those that attended the study groups and those that did not attend the study group.

ECS Scholar's Retention in the College of ECS

The 2006 Fall LC of the ECS Scholars program had a one year retention rate of 79% as opposed to 49% for the overall ECS FTF the same year. The Fall 2007 LC had higher one-year

Table 2: Pass rate of the 2006 ECS Scholars LC in important courses

Fall 2006		
Course Name	**% Passed in LC**	**% Passed of FTF**
Math 125 Pre Calculus	90.00 (n=10)	48.65 (n=37)
Math 150A Calculus I	90.00 (n=10)	50.00 (n=8)
Math 150B Calculus 2	100.00 (n=0)	0.00 (n=3)
Math 270A Mathematical Structures I	100.00 (n=1)	100.00(n=2)
Fall 2006-All Mathematics Combined	*90.48*	*48.00*
Spring 2007		
Math 125 Pre Calculus	50.00 (n=2)	52.17 (n=23)
Math 150A Calculus I	75.00 (n=8)	56.25 (n=16)
Math 150B Calculus 2	33.30 (n=6)	83.33 (n=6)
Math 270A Mathematical Structures I	100.00 (n=1)	75.00 (n=4)
Math 270B Mathematical Structures II	100.00 (n=1)	100.00 (n=1)
Spring 2007-*All Mathematics combined*	*61.00*	*60.00*

retention rate of 80% (slightly higher than the first cohort) whereas the overall Fall 2007 FTF had a one-year retention rate of only 53% the same year. The fall 2006 LC had a two-year retention rate of 42%, whereas the overall fall 2006 ECS FTF had a two-year retention rate of

only 31%. The 2007 LC has not reached their second year in ECS and one-year retention data of the 2008 LC will be assessed at the end of the Spring 2009 semester. The term "Retention" is defined as in "ECS retention", including only those who still major in ECS and excluding those who moved to other programs at CSUF.

Table 3: Pass rate of the 2006 ECS Scholars LC in important courses

Fall 2007		
Course Name	**% Passed that attended study groups**	**% Passed that did not attend study groups**
Math 125 Pre Calculus	65.38 (n=26)	28.57 (n=14)
Math 150A Calculus I	100.00 (n=13)	50.00 (n=2)
EGCE Engineering Surveying	75.00 (n=8)	50.00 (n=8)
EGME 102 Graphical Communications	100.00 (n=4)	66.67 (n=3)
Spring 2008		
Math 150A Calculus I	100.00 (n=9)	80.00 (n=5)
Math 270A Mathematical Structures I	75.00 (n=4)	80.00 (n=5)
CPSC 120 Intro. to Programming	100.00 (n=2)	00.00 (n=0)
CPSC 121 Programming Concepts	77.78 (n=9)	33.33 (n=3)
EGCE 206 Computer Aided Drafting	100.00 (n=4)	100.00 (n=9)
EGEE 245 Com. Logic and Architecture	100.00 (n=2)	00.00 (n=0)
EGME 245 Laboratory	100.00 (n=2)	00.00 (n=0)

Conclusion

The ECS Scholars program contains the integral parts of a structured LC: 1) block scheduling, 2) incorporation of Freshmen Seminar Groups, 3) Service Learning Component and 4) collaboration between faculty and student affairs professionals.[8] The program allows students to take advantage of interpersonal interactions that usually take place in upper level courses or may otherwise not occur without such a program. ECS Scholars participate in shared knowledge and the FYS course covers a wide range of topics that spark the interest of students in different areas of Engineering and Computer Science.[9] The program fulfills the Triesman's model: the merging of student's academic and social lives (as facilitated by Freshmen Interest Groups and CASECS).[8,10] By the end of the first semester students form formal friendships and depend on one another for academic support (shared responsibility) and thereby fortify the student-to-student relationship that enhances the educational experience of engineering students.[8,12]

The ECS Scholars Program also caters to the needs of Computer Science students.[6] The FYS courses' curriculum emphasizes the interdisciplinary application of Computer Science with career presentations by career specialist and alumni of the college. The service learning component allows the application of computer science skills to community issues. Students are given a three dimensional perspective on multiple careers in computer science via exposure to computer science oriented student clubs, access to computer science faculty, and invitation to

multiple career fairs. In addition, the one-on-one advisement sessions with the student affairs professional enhances the self confidence of the student.

Above all, the first two cohorts of the ECS Scholars program have closely achieved the projected a one year retention rate of 80% (79% for the 2006 cohort and 80% for the 2007 cohort). Participation in study groups needs to improve, but students who attend are benefiting both academically and socially. In addition to the Freshmen Interest groups, the students also had access to over three hours of one-on-one tutoring. Participants met regularly with a CASECS academic counselor and the graduate-student academic advisor provided by Freshmen Programs. Overall, students in the LC had better passing rates compared to those that were not in the LC. Although no statistically significant inferences can be made, the effectiveness of Freshmen Seminar Sessions is seen when comparing pass rates of LC students who consistently attended the sessions versus those that did not. The 2006 and 2007 cohorts had access to peer mentors in the FYS courses and the 2008 cohort had access to them outside of class. The ULC continually provides the leaders of the Freshmen Interest Groups with training and supplemental instruction will be incorporated to increase efficiency and attendance. Students are taught how to efficiently prepare for study group sessions in the FYS courses and by the Freshmen Interest Group Leaders. The services rendered by the student affairs professional were also critical in helping students deal with transitional issues.

Overall, the ECS Scholars program has been an unqualified success in retaining student in the College of Engineering and Computer Science. The Title V grant that funds this successful initiative is ending in the middle of CY 2009. While it is hoped that the funding will continue, some aspects of the program such as block scheduling will continue regardless of funding.

Acknowledgments

This paper is dedicated to the memory of Dr. Donald Castro for his enlightened vision on the educational mission of the university and his unwavering support to the issues of retention of underrepresented students. His untimely passing has created a void for all those who knew him. The authors would also like to thank Dr. Hye Sun Moon, Senior Research Analyst at the Institutional Research and Analytical Studies Department, Fran Zareh-Smith, Director, University Learning Center and Dr. Nancy Page-Fernandez, Director, Freshmen Programs (all at CSUF) for their contributions and support.

References

1. U.S. Department of Education, National Center for Education Statistics. (2008). *Digest of Education Statistics, 2007* (NCES 2008-022). Retrieved February 6, 2008 from http://nces.ed.gov/fastfacts/display.asp?id=98
2. Grutter v. Bollinger (2003). Supreme Court of the United States.
3. Gottfredson, N., Panter, A., Daye, C., Allen, W., Wightman, L., & Meera, D. (2008). Does diversity at higher education institutions influence student outcomes? *Journal of Diversity in Higher Education, 1 (2),* 80-94.
4. Leung, A., Maddux, W., Galinsky, A., & Chiu, E. (2008). Multicultural experience enhances creativity, *American Psychologists Association, 63 (3),* 169-181.

5. Watson, K., & Froyd, K. (2007) Diversifying the U.S. engineering workforce: A new model, *Journal of Engineering Education, 96*, 19-32.
6. Fisher, A., & Margolis, A. (2002). Unlocking the clubhouse: the Carnegie Mellon experience, *SIGCSE Bulletin*, 34 (2), 79-83.
7. Tinto, V. (2008, August). When access is not enough, Carnegie Perspectives. Message posted to http://www.carnegiefoundation.org/perspectives/sub.asp?key=245&subkey=2626
8. Tinto, V. (2003) Learning better together: The impact of learning communities on student success in higher education (White Paper). Retrieved from http://www.maine.edu/system/asa/vincenttinto.php
9. Cuseo, J. (2008) Academic credit (White Paper). Retrieved from http://www.uwc.edu/administration/academic-affairs/esfy/cuseo/
10. McNeilly, J. (2007). Merit workshop: Treisman's Model (White Paper) Retrieve from http://www.math.uiuc.edu/MeritWorkshop/uriModel.html
11. Zhao, C., & Kuh, G. (2004). Adding value: Learning communities and student engagement, *Research in Higher Education, 45 (2)*, 115-138.
12. Coll, R., & Eames, C. (2008). Developing an understanding of higher education science and engineering learning communities, *Research in Science & Technological Education, 26 (3)*, 245-257.
13. Cronje, T., & Coll, R. (2008). Student perceptions of higher education science and engineering leaning communities, *Research in Science & Technological Education 26 (3)*, 295-309
14. Shapiro, S., & Levine, H. (1999). Creating learning communities: A practical guide to winning support, organizing for change, and implementing programs. San Francisco: Jossey-Bass.
15. Unnikrishnan, R., & Garcia, G. (Eds). (2007) Proceedings from the Fifth International Latin American and Caribbean Conference for Engineering and Technology'07 (*LACCEI): Enhancing Engineering and Computer Science Education for a Diverse Community*. Tampico, México.

Biographical Information

Raman Menon Unnikrishnan is the Dean of the College of Engineering and Computer Science at California State University, Fullerton. He is active in teaching and research in the areas of Control Systems, Power Electronics and Signal Processing. He has been a consultant to several industries and governmental agencies, and has been involved in technical and professional education for industries. He is active nationally and internationally in the field of engineering education and engineering accreditation.

Prior to joining CSUF in 2001, Dr. Unnikrishnan was on the faculty of the Rochester Institute of Technology in Rochester, NY where he also served as Associate Dean for Graduate Studies and Research from 1989 to 1991 and as the Head of the Electrical Engineering Department from 1991 to 2001. He received his BSEE degree from the University of Kerala in India, MSEE degree from South Dakota State University and the Ph.D. degree in electrical engineering from the University of Missouri-Columbia. He is the recipient of the *Eisenhart Award for Excellence in Teaching* at RIT, a special professionalism award from the Xerox Corporation and an IEEE Region 1 *Award for Leadership* on advancing the continuing education needs of the engineering community. In 2000, he received the IEEE *Third Millennium Award* for Outstanding Achievements and Contributions. In 2006 he received the *Missouri Honor Award* for being an outstanding alumnus. Since 2008 he has been a Commissioner of the Engineering Accreditation Commission of ABET. Dr. Unnikrishnan is a Fellow of IEEE.

Ricardo V. Lopez is the Retention Coordinator for the College of Engineering and Computer Science at CSUF. He helps coordinate the collaborative management of the ECS scholars program as well as directs several retention efforts aimed at helping ECS first-time freshmen. He has worked in the field of education for over 5 years with various non-profit organizations and several Southern California school districts. He is also actively involved in the field of Public Health research and advocacy. In 2006 he was accepted into the Minority Training Program in Cancer Control Research (MTPCCR) at UCLA where he conducted research at the Jonson Comprehensive Cancer Center. He earned his undergraduate degree at UCLA in Molecular, Cell and Developmental Biology and his Master of Public Health at CSUF. He is the lead author of published manuscripts on the knowledge and perception of Human Papilloma virus and Cervical Cancer among college-age students.