

AC 2007-37: RETENTION OF STEM STUDENTS WITH THE EMC² SCHOLARS' PROGRAM AT RIT

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Abstract

This paper details our highly successful scholarship and academic support program to retain and graduate students in four academic departments: Mechanical Engineering, Mathematics, Computer Engineering, and Computer Science (EMC²). The EMC² Scholars' program is supported by a 4-year grant from the National Science Foundation's CSEMS (Computer Science, Engineering and Mathematics Scholarships) program and matching funds from the Rochester Institute of Technology (RIT). The project, to expire in August 2006, was recently granted a one-year no-cost extension. The paper describes the processes for selection of scholars and renewal of scholarship, and includes data on department distribution, student demographics and retention. It describes programmatic elements that worked or did not work in retaining students in CSEMS degree programs. The program's retention rates exceed RIT's averages – at each year level and within each of the four academic programs. The program has been successful in developing a partnership among the four academic departments, and has strengthened the coordination mechanisms with the supporting units. Successful EMC² elements are being deployed elsewhere at RIT to retain female and minority students.

Introduction

In Fall 2002-3, the National Science Foundation (NSF) awarded a 4-year grant of \$392,000 from its 2002 CSEMS program^{1,2}. Rochester Institute of Technology (RIT) is providing \$526,500 in matching funds to support the scholarships. The EMC² Scholars Program is a collaborative effort of four academic programs: Mechanical Engineering, Mathematics, Computer Engineering, and Computer Science. The goal of this scholarship program is to retain and graduate academically talented students in the four participating units. The scholars receive \$1,000 per quarter until they complete their first co-op experience. The pre-co-op support does not exceed seven quarters. NSF and RIT are each contributing \$500 per quarter per scholar. After their first co-op experience, the scholars retain the \$500 per quarter scholarship from RIT until they graduate at the end of 12 academic quarters. The project, which was to expire in August 2006, was recently granted a one-year no-cost extension by NSF.

We have been successful in developing a partnership among the four academic departments, and strengthening the coordination mechanisms with supporting units that include the Undergraduate Admissions, Financial Aid, Registrar's Office, Academic Support Center, and Career Services^{3,4}. This paper describes the relationships and mechanisms we have developed with these supporting units to administer the EMC² program.

Selection of Scholars and Scholarship Renewal

Each Spring/Summer, the Senior Associate Director of Financial Aid identifies all eligible 1st year applicants offered admission to RIT, and selects ~33 (50% more than scholarships available) for EMC² scholarships based on financial need and academic potential. From this

group, approximately 21 1st year students choose RIT and accept the EMC² scholarship. She also provides the Program Administrator a list of all eligible 2nd and 3rd students sorted by financial need and cumulative GPA. Together, they select appropriate number of students for a total of 62 EMC² scholarship awards. Since 2006-7 is the last year of the grant, no new awards have been made.

Of the 62 EMC² scholars supported each year with \$1,000/quarter scholarships, approximately 50% are matriculated in mechanical engineering, 30% in computer engineering, 15% in computer science, and 5% in the mathematics program. If a scholar transfers out of the four participating academic departments, his/her scholarship is not renewed in the following academic year. If a scholar's quarterly GPA falls below 2.50 for two sequential quarters, again the scholarship is not renewed in the following academic year. In either case, a new scholarship recipient is selected at the same year-level within the same department based on financial need and academic performance. Table I summarizes the departmental distribution for each of the academic years (AY):

TABLE I
DISTRIBUTION OF SCHOLARS

Academic Year (AY)	Departments				Total #
	Mechanical Engineering	Computer Engineering	Computer Science	Mathematics	
2002-3	31	19	9	3	62
2003-4	46	28	13	4	91
2004-5	62	39	16	8	125
2005-6	74	45	15	5	139
2006-7	53	32	10	2	97

The data in the table above shows clearly that the EMC² program approximately maintained its 50-30-15-5 departmental distribution target in the first four years of the project. Please note that the figures above include 62 scholars receiving \$1000/quarter as well as scholars receiving \$500/quarter only during the post co-op period.

Student Demographics and Retention

In selecting students for scholarship awards, for comparable financial need and academic performance, preference is given to female and minority students (under-represented groups such as African Americans, Native Americans and Latin Americans)⁵. Table II below summarizes the student demographics:

TABLE II
DEMOGRAPHIC DISTRIBUTION OF SCHOLARS

Academic Year	Total #	Gender		Ethnicity*					
		Male	Female	WC	AA	LA	NA	AP	UR
2002-3	62	43	19	39	7	7	0	6	3
2003-4	91	76	15	69	8	3	2	6	3
2004-5	125	103	22	86	10	13	3	10	3
2005-6	139	113	26	101	12	13	2	9	2
2006-7	97	78	19	71	7	7	2	8	2

*Ethnicity Key

WC = Caucasian; AA = African American; LA = Latin American; NA = Native American;
AP = Asian American or Pacific Islander; UR = Not Reported

The data in the table above shows that the proportion of female students among the EMC² scholars is significantly higher than that within the four participating departments. Similarly, the proportion of African Americans, Latin Americans and Native Americans (AALANA population) among the EMC² scholars is also significantly higher than that within the four participating departments.

Each quarter, the Registrar's Office provides the Program Administrator a customized report containing personal and academic information on each EMC² scholar. The report helps in identifying students that

1. need academic intervention,
2. have left the participating academic programs, or
3. are on Deans' Lists for superior academic performance.

The report is also useful in quarterly updates of NSF-CSEMS database and preparation of the annual report to NSF as required by the conditions of the grant.

Students needing academic intervention are asked to meet with their departmental EMC² faculty advisor to identify and enroll in an appropriate program of the Academic Support Center. Students that have transferred out of the EMC² programs are sent an email informing them of the discontinuance of scholarship at the end of the academic year. Students on the Deans' Lists are sent a congratulatory email in addition to normal recognitions.

At the end of each academic year, the EMC² program's retention figures exceed the institution's averages — at each year level and within each program. In table III below, EMC² represents scholars retained in the four participating departments, CSEMS represents scholars who transferred to other CSEMS disciplines at RIT, Other represents scholars who transferred to non-CSEMS disciplines at RIT, and Left shows scholars who left RIT.

TABLE III
RETENTION AND GRADUATION DATA ON EMC² SCHOLARS

AY	Total	EMC² Programs at RIT	CSEMS Programs at RIT	Other Programs at RIT	Left RIT	Gradu- ated
2002-3	62	48	6	5	3	NA
2003-4	91	89	1	1	0	NA
2004-5	125	124	0	0	1	9
2005-6	139	125	11	1	2	27
2006-7	97	97				

The data above shows clearly that the EMC² program has been very successful in retaining students within the CSEMS disciplines (including the EMC² disciplines) at RIT.

Program Elements and Their Assessment

In Spring 2002-3, 1st year scholars met bi-weekly in groups of five with a faculty moderator to improve their learning skills and study strategies⁶. The program was designed by the Director of Learning Development Center (now known as the Academic Support Center). These scholars were simultaneously enrolled in the institute-wide non-credit First Year Experience (FYE) course as well as the mandatory departmental Freshman Seminar course. The scholars reported that there was much overlap in the three activities. Based on the feedback from the scholars, in subsequent years these activities were streamlined and better integrated in the two-quarter Freshmen Seminar course now taken by all incoming 1st year students. During AY2004-05, the FYE course and departmental freshman seminars were integrated as part of an institute-wide pilot program. In AY2005-6, the lessons learned were incorporated across the entire campus and the FYE course was assigned one academic credit.

Early each Fall quarter, all EMC² scholars, participating staff and faculty are invited to a reception and dinner at the RIT Inn. The Program Administrator makes welcoming remarks followed by an elegant sit-down dinner. During desserts and coffee, participants are asked to introduce themselves. The event provides an opportunity to collect information from each scholar that is required by NSF to update their CSEMS database. This Fall, scholars were asked to provide feedback and concrete suggestions to enhance their experience at RIT. An overwhelming majority of issues were non-academic. Many of the suggestions and concerns have been echoed in other student surveys at RIT, and are being addressed by the RIT administration. EMC² faculty assessed the dinners to be a highly successful event promoting camaraderie and pride.

Each quarter, the Program Administrator reviews the academic performance of each scholar. If a scholar's quarterly GPA falls below 2.50, he/she is asked to meet with the departmental EMC² faculty advisor to identify and enroll in an appropriate academic support program⁷. RIT has an excellent support infrastructure to meet students' academic and non-academic needs. The retention data in the previous section shows that this quarterly review process has been effective.

Last three Spring quarters, we wanted to hold a year-end get-together. However, we were unable to find an appropriate evening during the last four weeks of the quarter because of conflicts with already scheduled major institute or college events. The Spring get-together would have been an excellent opportunity to collect formal feedback from the scholars about the EMC² program elements.

Encouraged by the success of EMC² program, a group of faculty in engineering and engineering technology wrote another proposal to NSF two years ago and were successful in obtaining another 4-year grant⁷. They hope to recruit additional transfer students from 2-year colleges, retain and graduate them⁸. They are using many of the elements of the EMC² program⁹.

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