Multi-department Engineering and Engineering Technology Scholars Program

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Abstract

This paper describes the objectives, strategies, assessment and evaluation, and special program features of the Rochester Institute of Technology's (RIT) Multi-department Engineering and Engineering Technology (MEET) Scholars Program. This program began in December, 2004 and is designed to recruit, retain and graduate additional transfer students in our selected engineering and engineering technology degree programs.

The MEET Scholars Program represents a collaborative effort of five academic departments across two colleges, and the Enrollment Management and Career Services Division at RIT. All of the programs in the five participating departments are ABET-accredited, and require students to obtain one year of industry co-op experience before graduation. The MEET Scholars program builds upon our excellent infrastructure for mentoring students, and involves our mandatory cooperative education program – both of which help students address their financial needs and facilitate placement in the high technology workforce. RIT has an exceptional record in engineering student placement in industry after graduation and an excellent record for both retaining and graduating upper-division transfer students.

Introduction

In September of 2004 the National Science Foundation (NSF) awarded RIT a four-year grant of $396,000 from its 2004 Computer Science, Engineering, and Mathematics Scholarships (CSEMS) program. The United States government is concerned about the shortage of qualified graduates from baccalaureate institutions with majors in computer science, engineering, and mathematics and provided funding from 1999 to 2004 to the NSF to increase substantially the number of high technology workers and to develop high-quality professionals in these fields. NSF used this funding to create the CSEMS program for scholarships for academically talented, financially needy students studying in these fields. There are currently over 400 active CSEMS projects and some of them such as the RIT MEET program will operate through 2008.

RIT is a private university with a modern 1,300 acre campus located in Rochester, New York, the third largest city in New York. RIT students can prepare for technical and professional careers in more than 200 different academic programs. Many of the academic offerings are unique or unusual: imaging science, microelectronic engineering, software engineering, printing management, and telecommunications engineering technology; the programs draw students from every state and more than 80 foreign countries. Many degree programs emphasize co-operative education where periods of formal instruction are combined with off-campus hands-on paid internships which enhance the university's "learn by doing" philosophy. RIT is respected internationally as a world leader in career-oriented and professional education and has one of the oldest and largest co-op programs in the world, with more than 1,300 employers and 2,600 students participating in the program each year. More than 450 companies visit RIT annually to

conduct 5,000 employment interviews. RIT is providing an additional $90,000 of scholarship funding to the MEET program. RIT received an earlier CSEMS NSF grant in 2002 that supported scholarships for freshman and sophomore students in Mechanical Engineering, Mathematics, Computer Engineering, and Computer Science (EMC^2). The MEET program builds on the successful elements of the EMC^2 program.

There are five undergraduate programs in engineering in the Kate Gleason College of Engineering (KGCOE) and seven undergraduate programs in engineering technology in the College of Applied Science and Technology (CAST) at RIT. The Multi-department Engineering and Engineering Technology (MEET) Scholars Program is a collaborative effort between the Enrollment Management and Career Services Division at RIT and the following five academic departments and nine academic programs:

- Electrical, Computer and Telecommunications Engineering Technology (ECTET) Programs from ECTET Department in CAST
- Manufacturing, Mechanical, and Electrical/Mechanical Engineering Technology Programs from the Manufacturing and Mechanical Engineering Technology/ Packaging Science Department in CAST
- Civil Engineering Technology (CET) Program from CET /Environment Management/Safety Technology Department in CAST
- Electrical Engineering Program from Electrical Engineering Department in KGCOE
- Mechanical Engineering Program from the Mechanical Engineering Department in KGCOE

The nine academic programs identified above attract the largest amount of transfer students in engineering and engineering technology to RIT and transfer students to these programs have declined over the past ten years. All of the RIT ET and engineering baccalaureate programs are five-year programs that require 50 weeks of mandatory paid co-operative educational experience. This experience usually begins in the third year of each of these programs and can be accomplished in five single blocks (10 weeks) or a combination of single and double blocks (20 week) over a three year period. Each student finds co-op employment with help from an assigned co-op coordinator from Enrollment Management and Career Services Division.

MEET Scholarship Structure and Selection

RIT awarded thirty MEET scholarships to transfer students for six quarters in December, 2004. RIT will award a minimum of fifteen additional MEET scholarships in the fall quarters of 2005, 2006, and 2007. MEET scholars will receive a scholarship of $1500 each quarter during their first two quarters at RIT that they are enrolled in a full load of academic courses.
The scholarship award will be reduced to $750/quarter for the remaining four quarters of on-campus study when the MEET scholar has completed one or more co-operative education blocks. It has been our experience that a student in a MEET program can save $1,000 or more from 10-week co-op earnings of approximately $5,400. Thus, after two such coops, a student's financial need decreases.

Awardees under the MEET Scholars Program meet the following criteria. Each scholar must:

- Be a transfer student that has submitted an application for one of the MEET programs at RIT by March 15 in the year that the student is applying to RIT and has been accepted by a MEET program and be eligible to transfer 84 quarter hours to RIT in the Fall quarter of the academic year of entry;

- Be a citizen, national, refugee alien or permanent resident alien of the United States of America;

- Be matriculated and enrolled full-time in a MEET discipline;

- Have demonstrated financial need as defined by the U.S. Department of Education and the RIT Office of Financial Aid upon receipt of results from the Free Application for Federal Student Aid (FAFSA);

The Selection Committee consists of the MEET Department faculty representatives and the Director of Financial Aid. The Director of Financial Aid identifies all full-time transfer students in the nine MEET programs that have demonstrated financial need as defined by the U.S. Department of Education rules for federal financial aid. The Selection Committee will review the eligible students and will chose a minimum of 15 additional students in the fall of 2005, 2006, and 2007. Transfer students do not need to apply for a MEET scholarship. All eligible students are considered for the scholarship.

MEET scholars must meet the current admissions criteria that include a variety of indicators of merit including GPA at their 2-year school. Each academic program has its own admissions criteria but recognizes that the admissions process must be flexible enough to accommodate applicants who come from diverse backgrounds and will consider additional indicators of merit that may become evident during the review of student application materials.

The scholarship will only be renewed if the MEET scholar:
- demonstrates financial need for each additional year,
- remains matriculated full time in any BS program of the five participating departments, and
- maintains a quarterly GPA $\geq$ 2.50

Any MEET scholar whose GPA falls below 2.5 will have one quarter of probation to improve their GPA if they participate in an appropriate intervention program to improve their academic performance. A MEET scholar whose GPA has not improved in the probation quarter will no longer be eligible for the MEET Scholarship Award in the next academic year.

Each academic department has a MEET faculty representative who is one of the authors of this paper. The faculty representatives mentor the scholars by meeting with each scholar at least once each quarter and developing intervention programs to improve the scholar's academic performance if the scholar's GPA falls below 2.5 in any academic quarter.

Recruitment Strategies

RIT enrolls more than 15,300 full and part-time undergraduate and graduate students in eight separate colleges: Applied Science & Technology, Business, Computing and Information Sciences, Engineering, Imaging Arts & Sciences, Liberal Arts, Science, and the federally funded National Technical Institute for the Deaf.

The Office of Undergraduate Admissions Department in the Enrollment Management Division at RIT leads the recruitment activities for RIT and the MEET program. This office is assisted by

faculty and staff from the MEET academic departments who personally visit community colleges in the Northeastern United States each year to recruit transfer students. RIT is successful recruiting transfer students as almost one-third of our undergraduate students have began their collegiate studies elsewhere before transferring to RIT and about 75 percent of our total transfer population come from two-year schools. RIT's success in recruiting transfer students to our engineering and engineering technology programs has declined in recent year.

Table 1 below shows freshman and upper-division fall quarter transfer enrollments for the seven colleges, and also the subset for MEET departments collaborating on this project. It shows that while RIT's enrollments have been stable (or mildly increasing), the transfer enrollments for engineering and technology programs have been 20% lower for the last four years.

Table 1: Freshman & Upper-Division Transfer Enrollments

Entry Quarter →		**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
All of RIT	Freshman	1949	2115	2318	2217	2295	2154
	Transfer	774	740	662	751	732	748
EE+ME+ET Depts only	Freshman	292	329	355	398	376	356
	Transfer	154	141	*111*	*113*	*112*	*115*

Staff from the Office of Undergraduate Admissions reviews initially the application from a student who wants to transfer to RIT, and forwards it to the appropriate faculty member in a department for evaluation. If the student is eligible for admission, the application is then evaluated for financial aid. Faculty and staff representatives from the five academic departments also personally visit community colleges in the northeast to recruit transfer students. The academic departments have databases of contacts at community colleges and information on the RIT MEET program will be provided to these schools to increase the number of transfer students in engineering and engineering technology in 2005, 2006, and 2007.

Transfer students often enter four-year institutions with greater levels of demonstrated financial need than freshmen. For example, sixty-five percent of the Engineering and Engineering Technology transfer students who applied for financial aid and enrolled at RIT in the fall of 2003 demonstrated some level of financial need in accordance with federal guidelines. Of those students who demonstrated financial need, 78% had expected family contributions of $9,000 or less. In contrast, 58% of the freshman Engineering and Engineering Technology students who demonstrated financial need and enrolled at RIT in the fall of 2003 had expected family contributions in the same range.

Academic Support Programs

The faculty department representatives have several academic support programs that they can use to develop individualized intervention programs for any MEET scholar whose grade point average drops to less than 2.50 in any academic quarter.

- Academic Support Center: This center offers courses in reading, writing, math and study skills as well as a math and writing lab that are open on a drop-in basis. It has an array of numerous programs and services that teach students how to improve their study techniques and how to assess and make the most of their individual learning abilities. A

partial list of these include: Academic Assessment Program, Academic Success in College Conference, College Program, College Restoration Program, Academic Accommodations Office, and the Higher Education Opportunity Program (funded by both NY State and RIT). The ASC conducts workshops on learning style evaluation, listening & note-taking skills, test taking and preparation, test anxiety reduction, time management, text marking & note-making, memory improvement, and development of effective study environments. More details are available on ASC's website at www.rit.edu/~369www.

- North Star Center: A central component of this center's missions is the recruitment, retention, and graduation of African-American, Latino American, and Native American (AALANA) students at RIT. The center's philosophy focuses on the importance of promoting a deeper understanding of what it takes to live in a rapidly changing and highly interdependent world where science and technology are transforming the globe. Students are supported and encouraged to excel academically and enhance their ethical/character development while simultaneously learning about their own and other cultures. Other goals of the center are community development and maintaining wellness. The center sponsors several different K-12 partnership programs in the Rochester community and encourages AALANA students to participate in these programs. Each AALANA student is assigned an advisor from the North Star Center.

- Women's Center and Society of Women Engineers (SWE): The Women's Center provides information, programming, support and advocacy to address a wide variety of issues affecting women, including academic, social, psychological, physical and spiritual needs of women. The center strives to provide a visible and accessible location and a supportive environment where students are encouraged to engage in dialogue, exchange viewpoints and find assistance. Each female MEET scholar will also receive special invitations to participate in the student chapter of the Society of Women Engineers.

- Counseling Center: The center offers a variety of services to students including Personal/Psychological Counseling, Career Counseling, Career Resource Center, DISCOVER (a computerized guidance system), Developmental Programs and Groups, Testing, and Consultation. Faculty leaders (co-PIs) of MEET scholars program will direct a student needing intervention to the appropriate person in the Counseling Center. This department-focused process helps the faculty in identifying students who need counseling, and in requesting the Office of Student Services to meet with such students and diagnose their counseling needs.

- Early Warning System: RIT maintains an early warning system that allows faculty members to send email messages to students who are having academic problems in their courses. This message is also sent to the student's department chair and academic advisors listed in the system.

Assessment and Evaluation Plan

The MEET Scholars Program will be assessed periodically using quantitative data such as grades, GPA and co-op salaries as well as data from surveys of participating scholars, faculty and administrators. Evaluation will be in form of an annual report based on the assessments, and will include recommendations for adding, deleting or modifying specific program elements to

enhance the program's success rate. The MEET Scholars Program plan for assessment and evaluation for each objective of the program includes both the assessment of student progress and the overall evaluation of the project. The assessment tools for each program objective are listed below with associated benchmark data. These tools complement the assessment structures already in place and functioning well in the five participating departments.

- Provide scholarship support for academically talented, financially needy students who transfer to engineering and engineering technology programs after graduating from a 2-year college.

  Plan: The Office of Financial Aid in the Enrollment Management Division will select MEET scholars from transfer student applications as described above in the MEET Scholarship Selection and Structure section above.

  Assessment: Collect data quarterly on the number of students supported through the MEET program and their academic performance (course grades and GPA) until they graduate or leave the MEET program. Collect data annually on the number of transfer students in mechanical and electrical engineering and engineer technology that enter RIT during each of the four academic years of the program.

  Evaluation: The data will be summarized annually in a report to the NSF that identifies programmatic commonalities and patterns.

- Provide the students with the skills, education, and work experience needed to enter the high technology workforce upon completion of their engineering or technology degree.

  Plan: Assign each student a program coordinator from the Office of Cooperative Education and Career Services in the Enrollment Management Division who provides assistance with career counseling and the job search from the beginning of the co-op process right through career entry upon graduation. During the first quarter at RIT, MEET Scholars will be required to take a course in which they learn to prepare resumes, cover letters, practice interviewing, and become familiar with the services of co-op office to conduct the job search for their first co-operative education experience.

  Assessment: Conduct a survey of each student scholar that provides a self-assessment of each cooperative work experience. Conduct a survey of each of their supervisors at the conclusion of each cooperative work experience to assess their progress toward career preparation and their ability to enter the high technology workforce.

  Evaluation: Summarize the data annually, and identify program elements that may need modifications, and what such modifications should be.

- Identify scholars in academic trouble, proactively intervene in their behalf on an individual basis, and arrange help for them to continue and graduate.

  Plan: Design an individualized intervention program for each scholar who receives a quarterly grade point average of 2.50 or less.

  Assessment: Collect data quarterly on any students placed on probation until the students graduate or leave the MEET program. Faculty department representatives can

proactively intervene using the data obtained from the Institute's early warning system and encourage students to use available resources in the colleges or the Institute to improve academic performance.

Evaluation: Summarize the data annually, identify specific problems, and identify interventions that were used by the students.

- Provide a thorough assessment of the MEET scholars program that will not only be used for contract reporting purposes, but will be an integral part of our standard program review process.

  Plan: Gather benchmark retention and graduation rate data from the previous four years. See tables 1, 2, and 3 below.

  Assessment: Calculate the retention and graduate rates of the MEET scholars and compare these rates to the retention and graduate rates of all RIT transfer students in past years.

  Evaluation: The summary and evaluation of the four assessment processes listed above will yield a comprehensive report on the success of the RIT MEET Scholar Program. It is our hope that we will retain at least 90% of the MEET scholars at RIT, and all of those retained at RIT will graduate with a degree in engineering or engineering technology.

RIT has an excellent record for both retaining and graduating upper-division transfer students. Table 2 below shows the retention data over past five years for entire RIT as well as for the five participating departments:

Table 2: % Transfer Students retained after 1-year of study at RIT

Entry: Fall Quarter of →	1998	1999	2000	2001	2002
All of RIT	91%	85%	91%	85%	87%
EE+ME+ET Only	91%	87%	91%	87%	84%

Table 3 below shows the graduation rate of upper-division transfer students within seven years of study at RIT:

Table 3: % Graduation Rate within 7 Years of Study at RIT

Entry: Fall Quarter of →		1994	1995	1996
Graduating in/before →		2001	2002	2003
Upper-division Transfers Only	All of RIT	87%	80%	75%
	EE+ME+ET Only	90%	88%	82%

Note: Table 3 data is shown in the format of the federal reporting guideline for graduation rates. Most transfer students in the MEET programs will graduate in three years with one year of cooperative educational experience. The MEET program is considering comparing graduation rates of the MEET scholars with a similar group of native RIT students beginning MEET programs in the fall quarter of 2004.

Special program features include: an Annual Kick-off Dinner, a Departmental Mid-quarter Pizza Party, Individualized Diagnosis and Intervention Program, and a Spring Feed-back Get-together for all MEET scholars. All activities except the Intervention program are of celebratory/social nature, and require minimal time commitment from scholars.

- Annual Kick-off Dinner: The first thirty MEET Scholars attended a dinner in the first quarter that they were awarded their scholarship. All of the RIT MEET scholars will be invited to this event each fall quarter. This event provided time to distribute materials about the scholarship program and activities, introduce scholars to one-another, and interface with the Faculty Departmental Representative as well as the participating administrators.

- Departmental Mid-quarter Pizza Party: In the middle of each quarter, the Faculty Departmental Representative in each department will host a pizza party inviting all new (and continuing) scholars from that department. It will offer an opportunity for informal conversations in a small group setting. We can determine how new scholars are acclimating to RIT, and ask continuing scholars to provide guidance in resolving such problems and concerns.

- Individualized Diagnosis and Intervention Program: At the end of each quarter, each Faculty Departmental Representative will evaluate the academic performance of each scholar in their department. They will identify scholars in academic trouble, and invite each of them for a personal meeting on the first day of the following quarter. In the meeting, the faculty will attempt to diagnose the cause for poor academic performance, identify an appropriate intervention program, and arrange with the particular support unit for the student to participate in the program. The instructors of the MEET scholars will contact the MEET scholar during the quarter through the Early Warning System if the MEET scholar is having any problems in any of the courses that they are enrolled and propose interventions. The MEET scholar's faculty department representative will review the interventions used during the quarter with the MEET scholar at the end of the quarter if the MEET scholar's quarterly grade point average is less than 2.50 and propose a new intervention program.

- Spring Feedback Get-together: A second group social function will be organized at the end of each academic year to formally survey all the scholars about the MEET program elements. We will also survey the faculty that have participated in the program, and seek their suggestions to improve the program for the subsequent academic year. This gathering will also provide an opportunity to hold informal conversations with the scholars and faculty because often such conversations provide feedback that cannot be collected easily from formal surveys.

Conclusions

RIT is not able to report on the success of the MEET program at this point in time since the program commenced in December, 2004. We hope to report in the future that the retention and graduation rates of MEET scholars that transferred to RIT from community colleges exceeded RIT averages so that the NSF is encouraged to develop additional scholarships programs for academically talented and financially needy students from community colleges.

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