AC 2010-1334: ACADEMIC PERFORMANCE AND COOPERATIVE EMPLOYMENT OF TRANSFER SCHOLARS IN ENGINEERING & ENGINEERING TECHNOLOGY PROGRAMS

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Academic Performance and Cooperative Employment of Transfer Scholars in Engineering & Engineering Technology Programs

Introduction

Transfer students from two-year schools, both full-time and part-time, are important stakeholders in academic programs at our university, and form an extremely attractive pool to *both* expand and diversify the engineering and technology workforce of the future. Transfer students are especially important to the *five* engineering and engineering technology (EET) departments identified in Table 1 that also lists the number of BS degree programs offered in each department.

Table 1: Participating Academic Departments, Abbreviations, and Programs

Academic Department	Code	# of Programs
Civil Engineering Technology, Environmental Management & Safety	CETEMS	1
Electrical, Computer & Telecommunications Engineering Technology	ECTET	3
Manufacturing & Mechanical Engineering Technology /Packaging Science	MMET/PS	4
Mechanical Engineering	ME	1
Electrical and Microelectronics Engineering	EE	2

All eleven of the BS degree programs in these five departments are ABET-accredited. Our academic calendar is based on four quarters of 11-week duration in a year. *All* BS degree programs except Packaging Science listed in Table 1 are *five-year* programs with a *mandatory* cooperative education component wherein students attend classes in Fall, Winter and Spring quarters in their first two years. In the third, fourth and fifth years, students *alternate* each quarter between on-campus study and off-campus co-op employment in industry. Thus, each student who enters as a first-term freshman has 12 quarters of on-campus study, and four (or five) quarters of paid co-op employment thus spending a total of five years before graduation. A student transferring from a two-year school at 3rd year-level may spend only six quarters for on-campus study but still needs at least four quarters of co-op employment to graduate with a BS degree. Therefore, a transfer student typically spends a total of three years at the university before graduating.

In AY 2007-8, we submitted a proposal to NSF focusing on students who wish to *transfer* at the 3rd year level from two-year schools to departments listed in Table 1, and requesting a total scholarship support of $8,000/student. Our goals were to:

1. Recruit, retain and graduate 75 *additional* transfer students from our engineering and engineering technology BS programs;

2. Identify women and minority students whenever possible but allow the scholarship to be provided to all students meeting the financial and academic eligibility conditions;

3. Identify scholars in academic trouble, proactively intervene on their behalf, and arrange help for them to continue and graduate;

4. Prepare scholars with the necessary skills, education, and work experience to enter the high technology workforce upon completion of BS degree; and

5. Perform a regular and thorough assessment of the ET^2 program that will be used for the contract reporting purposes and also will be an integral part of our standard program review process.

In August 2008, NSF awarded us a four-year grant from its S-STEM program to support the ET^2 Transfer Scholars[1]. In support of this project, the university will contribute $50,000 to ensure that continuing ET^2 scholars have financial support after the grant expires and help them graduate on time. This support indicates the university's enthusiasm, a firm commitment of service to our EET students, and an endorsement of the goals and objectives of the ET^2 program.

For AY 2008-9, the award did not allow us enough time to intensely recruit 5 transfer students in *each* of the five participating departments for a total of 25 scholars. However, we were able to award scholarships to 22 transfer students who met the financial aid eligibility and U.S. residency criteria. Table 2 lists the distribution of ET^2 scholars among the participating departments:

Table 2: Distribution of AY 2008-9 ET^2 Scholars

Academic Department	Code	# of Scholars
Mechanical Engineering	ME	6
Civil Engineering Technology, Environmental Management & Safety	CET-EMS	6
Manufacturing & Mechanical Engineering Technology/Packaging Science	MMET/PS	8
Electrical and Microelectronics Engineering	EME	1
Electrical, Computer & Telecommunications Engineering Technology	ECTET	1

The one scholar from the EME department took a leave of absence for one year for personal reasons, and came back to the university in Fall'2009. This paper compares the academic performance of the 20 scholars in the first three departments listed in Table 2 relative to their peers, and their placement in cooperative employment positions during their first year at our university.

Department of Mechanical Engineering

Table 3 provides data about the ET^2 scholars and their 3rd year cohorts in the department of mechanical engineering during AY 2008-9. Please note that the Summer numbers appear significantly smaller than those for the rest of the year because the status of 3rd year students is elevated to 4th year at the end of the spring quarter and thus they are not counted in this 3rd year compilation and additionally, 2nd year students are not counted during the summer because they are on vacation during the summer after their second year.

Table 3: ME Department Transfer Scholars and Their Cohorts Program Codes: EMEM, EMEA, EMEV, EMEE,EMED					
Cohort	**Quarter ⇒**	**Fall 20081**	**Winter 20082**	**Spring 20083**	**Summer 20084**
ET^2 Scholars	# in School	6	6	2	1
	Mean QGPA	3.29	1.93	2.84	3.5
	# on Coop	0	0	4	5
All 3rd Year Students	# in School	87	79	93	18
	Mean QGPA	2.90	2.91	2.90	2.76
	# on Coop	26	11	6	18

Of the ET^2 six scholars in the department, three were placed on probation due to poor academic performance after the Winter quarter. Two of these three scholars improved their academic performance in the Spring quarter, and in fact, one scholar went on the Dean's List after the Summer quarter. Of the remaining three scholars, two were named to the Dean's List. Table 3 shows that except for the Winter quarter, the current group of ET^2 scholars in the department has comparable or better performance than its peer group of students during AY 2008-9.

Four and five ET^2 scholars completed required cooperative education assignments during the Spring and Summer quarters respectively. Employers included RIT Mechanical Engineering Department, Advance Testing, Retrotech, Precise Tool & Manufacturing, and Marquardt Switches. Coop assignments ranged from creating AutoCAD drawing of parts and assemblies to research and development activities in areas of fuel cells and switches.

Department of Civil Engineering Technology (CETEMS)

Table 4 provides data about the ET^2 scholars and their 3rd year cohorts in the department of civil engineering technology during AY 2008-9. Please note that the Summer numbers appear significantly smaller than those for the rest of the year because the status of 3rd year students is elevated to 4th year at the end of the spring quarter and thus they are not counted in this 3rd year compilation and additionally, 2nd year students are not counted during the summer because they are on vacation during the summer after their second year.

Table 4: CET-EMS Department Transfer Scholars and Their Cohorts Program Codes: ITFC, IEME, IEMS					
Cohort	**Quarter ⇒**	**Fall 20081**	**Winter 20082**	**Spring 20083**	**Summer 20084**
ET^2 Scholars	# in School	6	6	1	0
	Mean QGPA	3.13	3.06	3.25	NA
	# on Coop	0	0	5	6
All 3rd Year Students	# in School	48	47	34	3
	Mean QGPA	2.98	2.76	2.95	2.64
	# on Coop	0	0	5	14

Table 4 shows that the average quarterly grade point averages of the ET^2 scholars in CETEMS were higher in every quarter in AY 2008-9 than those of their peer group. Half of the CETEMS ET^2 scholars made the Dean's list for at least one quarter during AY 2008-9. None were placed on probation or suspended. After summer, one student decided to accept a permanent job offer from his coop employer, and not pursue degree completion at this time.

CETEMS ET^2 scholars completed 11 quarters of required cooperative education during the 2008/9 academic year. Employers included Jeffords Steel, Atlantic Testing Laboratories, Magde Land Surveying, City of Rochester Water and Lighting, Bernier Car and Associates, Pike Company and Bernier Carr & Associates PC. Job titles included Water Engineering Intern, Structural Detailer, Field Surveyor, Lab/Field Construction Technician, Civil Engineering Intern, Construction Project Management Assistant, Engineering Intern, and Construction Materials Testing Technician.

Department of Manufacturing & Mechanical Engineering Technology & Packaging Science (MMET/PS)

Table 5 provides data about the ET^2 scholars and their 3rd year cohorts in the department of manufacturing and mechanical engineering technology & packaging science during AY 2008-9. Please note that the Summer numbers appear significantly smaller than those for the rest of the year because the status of 3rd year students is elevated to 4th year at the end of the spring quarter and thus they are not counted in this 3rd year compilation and additionally, 2nd year students are not counted during the summer because they are on vacation during the summer after their second year.

Table 5: MMET/PS Department Transfer Scholars and Their Cohorts Program Codes: ITFM, IPKT, ITFF, ITFS, ITFL

Cohort	Quarter ⇒	Fall 20081	Winter 20082	Spring 20083	Summer 20084
ET^2 Scholars	# in School	8	8	4	2
	Mean QGPA	3.41	3.35	3.29	4.00
	# on Coop	0	0	4	6
All 3rd Year Students	# in School	131	121	87	9
	Mean QGPA	2.85	2.86	3.00	2.58
	# on Coop	15	16	25	28

Table 5 shows that the current group of ET^2 scholars in MMET/PS recorded consistently higher quarterly grade point averages (QGPA) than their peer group of students during AY 2008-9. Also, no ET^2 scholars in the department were reported to have been placed on academic probation, suspension or any other form of negative academic action. During this period four ET^2 scholars were placed on the Dean's List for their strong academic performance.

Four ET^2 scholars completed required cooperative education assignments during AY 2008-9. Employers included the Center for Integrated Manufacturing Studies, Fulton Group, Arch

Chemicals and H.J. Heinz. Coop assignment job titles included Mechanical Engineer, Engineer–Coop, Intern and Packaging Intern. Pay rates ranged from $12 to $20 dollars per hour and duties included packaging research, research testing and modeling for alternative fuel projects and boiler system, pump and gear design. Employers rated the student's performance very well with an average overall performance rating of 4.29 on a scale of 1-5.

Concluding Remarks

1. The data in tables 3 through 5 indicates that the retention statistics of ET^2 scholars is excellent.

2. The data also indicates that the academic performance of ET^2 scholars is comparable or better than their peer group of students at the university.

3. Review of student reports and employer evaluations of coops indicates that ET^2 scholars had meaning and relevant technical assignments, and performed well in these assignments.

4. Informal conversations with the ET^2 scholars during the quarterly social get-togethers indicate that they have acclimatized well to our academic and living environments.

5. The above four findings are consistent with those reported in a similar program that was supported previously by NSF at our university.[2,3]

6. The lone scholar from ECTET department (see table 1) was on coop at the MIT Lincoln Laboratories for the Spring and Summer quarters.

7. In Fall of 2009, we recruited an additional 22 students in the ET^2 program. We are hoping that these scholars will benefit from the peer mentoring opportunities available through the 2008 cohort of scholars.

Acknowledgements

This work was supported in part by the National Science Foundation under award number #DUE-0806757. Help from Ms. Deann Pettinelli in administering the financial aid is gratefully acknowledged. Ms. Joan Graham, Director of Institutional Research and Policy Studies provided the data in tables 3-5.

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