

## Transfer Student Pipeline to Engineering & Engineering Technology Programs

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## Abstract

This paper provides an introduction to the Transfer Pipeline (TiPi) Scholars' program recently funded by the National Science Foundation (NSF) that focuses on students who transfer at the 3<sup>rd</sup> year level from 2-year schools to our university. With scholarship support from NSF, we aim to recruit, retain and graduate a total of 75 transfer scholars in our engineering and engineering technology BS degree programs. The NSF scholarship is in addition to grants and aid awarded by our university. In support of this project, the university will contribute \$50,000 to ensure that TiPi scholars have continuing 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 engineering and engineering technology students, and an endorsement of the goals and objectives of the TiPi program.

In Fall 2012, we awarded 25 scholarships to transfer students in the TiPi program. In Fall 2013, we awarded another set of 25 scholarships to new transfer students in our engineering and technology programs. This paper describes the characteristics of these 50 scholars, compares their academic performance relative to their peers, and their placement in paid cooperative employment positions.

## Introduction

In March 2012, the National Science Foundation (NSF) awarded our university a four-year grant of \$599,984 with the grant period beginning in June 2012 for a project titled **TiPi: Engineering & Engineering Technology Pipeline**. The TiPi project focuses on students who wish to transfer at the 3<sup>rd</sup> year level from 2-year schools to a sub-set of the five-year engineering & engineering technology programs at our university, and provides scholarship support of \$8,000 per student for a total of 75 students. In support of this grant, our university is contributing \$50,000 to ensure that the TiPi transfer students have continuing financial support after the grant expires and help them graduate on time. The TiPi project is a collaborative effort of five academic departments from two colleges, the Enrollment Management & Career Services Division, and the Office of Financial Aid & Scholarships. Table 1 lists the departments and their offerings.

<b>Table 1: Participating Colleges, Academic Departments, and Programs</b>		
<b>College*</b>	<b>Academic Department</b>	<b>BS Program in</b>
CAST	Civil Engineering Technology and Environmental Management & Safety (CET-EMS)	Civil Engineering Technology
		Environmental Management & Safety
CAST	Electrical, Computer, and Telecommunication Engineering Technology (ECTET)	Electrical Engineering Technology
		Computer Engineering Technology
		Telecommunication Eng. Technology

CAST	Manufacturing/Mechanical Engineering Technology, and Packaging Science (MMET-PS)	Manufacturing Eng. Technology
		Mechanical Engineering Technology
		Packaging Science
COE	Electrical & Microelectronic Engineering (EME)	Electrical Engineering
		Microelectronic Engineering
COE	Mechanical Engineering (ME)	Mechanical Engineering

\*CAST ≡ College of Applied Science & Technology; \*COE ≡ College of Engineering

The objectives of the TiPi project are to: (i) recruit and graduate a total of 75 transfer students from our engineering/technology BS programs, (ii) identify scholars in academic trouble and help them through proactive intervention, (iii) prepare students with the skills, education and work experience to enter the high technology workforce, and (iv) perform regular and thorough assessment of the program. More details about the TiPi project can be found in a recent paper<sup>1</sup>.

Every transfer student who is offered admission to a program listed in Table 1, and has submitted FAFSA (Free Application for Federal Student Aid) is considered for a TiPi scholarship. The Office of Financial Aid & Scholarships calculates student’s financial need and determines the eligibility for TiPi scholarship. Each eligible student is ranked on the basis of financial need first followed by academic achievement. The TiPi scholarship is in addition to the grants and aid awarded by the university.

In each of the first three years of the project, we wanted to recruit five transfer students in *each* of the five participating academic departments for a total of 25 scholars. We did recruit 25 transfer scholars in each of the first two years but were unable to achieve uniform distribution across the five departments. Table 2 lists the distribution of TiPi scholars among the five participating academic departments.

<b>Table 2: Distribution of AY 2012-14 TiPi Scholars</b>			
<b>Academic Department</b>	<b>Code</b>	<b>AY 12-13</b>	<b>AY 13-14</b>
Civil Engineering Technology, Environmental Management & Safety	CET-EMS	7	7
Electrical, Computer & Telecommunications Engineering Technology	ECTET	2	1
Manufacturing & Mechanical Engineering Technology & Packaging Science	MMET-PS	3	7
Mechanical Engineering	ME	7	6
Electrical & Microelectronic Engineering	EME	6	4
<b>Total Number of TiPi Scholars</b>		<b>25</b>	<b>25</b>

This paper compares the academic performance of the AY 2012-13 TiPi scholars listed in Table 2 relative to their peers, and their placement in cooperative employment. These scholars have finished one full year composed of four quarters at our university. Beginning Fall 2013, our university switched from quarters to semesters. AY 2013-14 TiPi scholars have completed only recently the Fall 2013 semester, and comparative data on their peers is not available at this time.

### **Department of Civil Engineering Technology and Environmental Management & Safety**

Table 3 lists the average quarterly GPA of the seven TiPi scholars in the CET-EMS department as well as their placement in cooperative employment.

<b>Quarter ⇒</b>	<b>Fall 2012-13</b>	<b>Winter 2012-13</b>	<b>Spring 2012-13</b>	<b>Summer 2012-13</b>
<b># in School</b>	7	7	7	0
<b>Mean QGPA</b>	3.45	3.44	3.60	NA
<b># on Coop</b>	0	0	0	6

During the Summer quarter of 2013, six of the seven scholars were in paid cooperative employment at The Pike Company (1), NY State Department of Transportation (3), and the Atlantic Testing Labs (2). At the end of the summer quarter, the mean, median, and standard deviation of cumulative GPAs of these seven scholars were 3.52, 3.53 and 0.37 respectively. In comparison, mean, median, and standard deviation of CGPAs of their 65 peers at the same year level were 3.15, 3.16, and 0.50 respectively. Six of the seven TiPi scholars had CGPA greater than the 3.16 median of the cohort.

### **Department of Electrical, Computer & Telecommunications Engineering Technology**

Table 4 lists the average quarterly GPA of the two TiPi scholars in the ECTET department as well as their placement in cooperative employment.

<b>Quarter ⇒</b>	<b>Fall 2012-13</b>	<b>Winter 2012-13</b>	<b>Spring 2012-13</b>	<b>Summer 2012-13</b>
<b># in School</b>	2	1	0	0
<b>Mean QGPA</b>	3.77	4.00	NA	NA
<b># on Coop</b>	0	1	2	1

The two scholars were in paid cooperative employment at Welch Allyn and Alstom Transport. At the end of the summer quarter, the mean, median, and standard deviation of cumulative GPAs of the two scholars were 3.77, 3.77 and 0.33 respectively. In comparison, mean, median, and standard deviation of CGPAs of their 23 peers at the same year level were 3.12, 3.00, and 0.43 respectively. Both TiPi scholars had CGPA greater than the 3.00 median of the cohort.

### **Department of Manufacturing & Mechanical Engineering Technology, and Packaging Science**

Table 5 lists the average quarterly GPA of the three TiPi scholars in the MMET-PS department as well as their placement in cooperative employment.

<b>Quarter ⇒</b>	<b>Fall 2012-13</b>	<b>Winter 2012-13</b>	<b>Spring 2012-13</b>	<b>Summer 2012-13</b>
<b># in School</b>	3	3	3	0
<b>Mean QGPA</b>	2.81	3.13	3.03	NA
<b># on Coop</b>	0	0	0	0

The three scholars were unable to obtain paid cooperative employment in the summer quarter. At the end of the summer quarter, the mean, median, and standard deviation of cumulative GPAs of the three scholars were 3.01, 2.96 and 0.12 respectively. In comparison, mean, median, and standard deviation of CGPAs of their 78 peers at the same year level were 3.04, 2.99, and 0.45 respectively. Only one of the three TiPi scholars had CGPA greater than the 2.99 median of the cohort.

### Department of Mechanical Engineering

Table 6 lists the average quarterly GPA of the seven TiPi scholars in the ME department as well as their placement in cooperative employment.

<b>Quarter ⇒</b>	<b>Fall 2012-13</b>	<b>Winter 2012-13</b>	<b>Spring 2012-13</b>	<b>Summer 2012-13</b>
<b># in School</b>	7	7	4	0
<b>Mean QGPA</b>	3.41	3.12	3.30	NA
<b># on Coop</b>	0	0	3	7

The seven scholars were in paid cooperative employment at the UTC Aerospace Systems, MIT Lincoln Labs, Liberty Pumps, LaBella Associates, Barilla America, Caldwell Manufacturing, and Gleason Works. At the end of the summer quarter, the mean, median, and standard deviation of cumulative GPAs of these seven scholars were 3.33, 3.32 and 0.52 respectively. In comparison, mean, median, and standard deviation of CGPAs of their 197 peers at the same year level were 3.25, 3.24, and 0.39 respectively. Four of the seven TiPi scholars had CGPA greater than the 3.24 median of the cohort.

### Department of Electrical and Microelectronic Engineering

Table 7 lists the average quarterly GPA of the six TiPi scholars in the EME department as well as their placement in cooperative employment.

<b>Quarter ⇒</b>	<b>Fall 2012-13</b>	<b>Winter 2012-13</b>	<b>Spring 2012-13</b>	<b>Summer 2012-13</b>
<b># in School</b>	6	6	5	0
<b>Mean QGPA</b>	3.14	3.38	2.97	NA
<b># on Coop</b>	0	0	1	3

Three scholars were in paid cooperative employment at the Techwell Consulting, L-3 Communications Cincinnati Electronics, and Global Foundries. At the end of the summer quarter, the mean, median, and standard deviation of cumulative GPAs of these six scholars were 3.21, 3.34 and 0.63 respectively. In comparison, mean, median, and standard deviation of CGPAs of their 90 peers at the same year level were 3.06, 3.13, and 0.40 respectively. Four of the six TiPi scholars had CGPA greater than the 3.13 median of the cohort.

## **Student Intervention and Support Programs**

Our university has a well-established infrastructure of student intervention and support programs. Each of the five participating academic departments has one or more designated faculty members involved in the transfer application evaluation process. The designated faculty member reviews transcripts of all students who apply for transfer from a 2-year school, evaluates program-specific transfer credits and sends his/her recommendation to the Office of Undergraduate Admissions. Upon admission to our university, each transfer student is assigned a specific faculty advisor.

Our university has an Early Alert System (EAS). EAS identifies students who may be struggling with a particular class or area of study. It ensures that struggling students receive timely intervention, direction and additional tutoring needed to get them back on track. All instructors are asked to notify each student online as to how he or she is performing in a class by the 3<sup>rd</sup> and 6<sup>th</sup> week of a quarter. The evaluation and “alert” notice is automatically copied to the student’s academic advisor and department head. If appropriate, the academic advisor puts the student in contact with the Academic Support Center (ASC). In ASC, the student receives training in study skills and time management, and is tutored to strengthen weak academic foundations. In a few cases, students have been accurately diagnosed with learning disabilities for the first time as a direct result of EAS and intervention by ASC. These students are then able to receive appropriate help and support such as in-class note-takers and extended time for quizzes and exams.

ASC 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 including evening hours. It has an array of 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. Faculty and staff of ASC work closely with university faculty members to determine how they can best provide support for academic courses. This collaboration has led to team-teaching, specialized labs, and effective referral systems. ASC also maintains liaisons with other support programs on campus such as Women in Engineering (WE) / Technology (WIT), Multicultural Center for Academic Success (MCAS) to provide a comprehensive network of services.

All academic programs participating in this proposed project require students to complete 5 quarters (or  $\geq 50$  weeks) of co-op employment before graduation. The Office of Cooperative Employment & Career Services (OCE) in the Enrollment Management and Career Services Division supports the university’s special emphasis on learning through experience. OCE assigns each student a program coordinator who provides assistance with career counseling and the job search process from the beginning of the co-op process right through career entry upon graduation. OCE services remain available to alumni for a lifetime. OCE staff spends considerable time developing opportunities with employers nationwide, as well as monitoring and fostering current relationships. These linkages with business and industry enhance our university’s ability to provide an education that meets the needs of the job market, and aids students in their pursuit of successful careers. During their first academic term, all TiPi scholars are required to take an existing non-credit course in which they learn to prepare resumes, cover

letters, practice interviewing, and become familiar with the services of OCE to conduct the job search for their first co-operative employment experience.

A brochure on the TiPi Scholarship Program was designed and produced in-house describing the program, scholar selection process and criteria, S-STEM articulation with regional 2-year schools, and a brief frequently-asked-questions (FAQ) section. The brochure is mailed to all constituents in the regional 2-year schools as well as distributed during recruiting visits and at regional conferences to publicize the program. The Office of Financial Aid and Scholarships also sends the brochure along with the letter of scholarship award to each TiPi Scholar.

Each quarter, we hold a social event such as a pizza party to help build a sense of community among the TiPi scholars and their faculty advisors. The five departments take turns in hosting this event. It is an opportunity for informal conversations in a small group setting. During this event, we can determine how the new scholars are acclimatizing to our university, and ask continuing scholars to provide guidance in resolving any problems or concerns. It is also a good opportunity to have a recent coop returnee or graduate share his/her experiences.

### **Concluding Remarks**

1. The data in Table 2 indicates that we have met the goal of recruiting 25 transfer scholars per year in the first two years of the TiPi project for a total of 50 scholars.
2. The data in Tables 3 through 7 indicates that we have been able to retain all 50 scholars thus far in our engineering & engineering technology programs.
3. The data in Tables 3 through 7 indicates that the academic performance of the AY 2012-13 cohort of TiPi scholars is comparable or better than their peers at the same year level in the five participating academic departments.
4. The data in Tables 3 through 7 indicates that most of the AY 2012-13 cohort of TiPi scholars were able to obtain paid cooperative employment. The five participating departments require each student to complete 50 weeks or more of cooperative employment before graduation.
5. Review of student reports and employer evaluations of coops indicates that the TiPi scholars had meaningful and relevant technical assignments, and performed well in these assignments.
6. Informal conversations with the TiPi scholars during the quarterly social get-togethers indicate that they have acclimatized well to our academic and living environments.

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## References

1. S. K. Gupta, V. J. Amuso, D. P. Johnson, M. G. Eastman, and J. Morelli, *TiPi Scholars' Program for Transfer Students from Two-Year Colleges*. Proceedings of the ASEE St. Lawrence Section Conference in Buffalo, NY (April 2013).