CIRC/METS: A Scholarship Program To Assist Engineering Transfer Students To Graduate And To Attain A Graduate Degree

Mary R. Anderson-Rowland1, Donna M. Zerby2, and Paul C. Johnson3

Abstract – The CIRC/METS project – Collaborative Interdisciplinary Research Community/Maricopa Engineering Transition Scholars is an academic scholarship program funded by the National Science Foundation to retain students in engineering degree programs and to create interest in pursuing an advanced degree in engineering. This pilot program targets women and underrepresented students who transferred from community colleges to four-year engineering degree programs to address their unique needs as transfer students.

Many engineering schools have developed retention programs to assist entering engineering freshmen adjust to college life. However, little attention has been given to the community college transfer student entering a four-year engineering school. The goal of CIRC/METS is to provide students encouragement and support to complete an undergraduate degree in engineering with the goal that the students will aspire to attain an advanced degree in engineering. The paper reports on the recruiting process for the program and on the CIRC/METS workshops (five per semester). The workshops concentrated on connecting students with ASU faculty to get research experience and on strategies for how to best present themselves when applying to graduate programs. The paper also reports on student feedback and what we have learned about strategies to motivate CIRC/METS students to pursue an advanced degree in engineering.

Index Terms – Community College, Graduate School, Retention, Transfer Students

INTRODUCTION

Arizona State University has the most transfers each year in the nation among public universities. In the Ira A. Fulton School of Engineering, approximately 400 new transfer students enter each fall, over half of them are from the local community college district, itself one of the two largest such districts in the nation. The Maricopa County Community College District (MCCCD) is composed of 10 independent schools with a total enrollment of over 200,000 students. For example, in Fall 2003, 388 (31.5%) of the 1,231 new students to the Fulton School of Engineering were transfer students. Most transfer students are sophomores (33.2%) and juniors (47.9%). [1]

Many engineering schools, including Fulton, have developed retention programs to assist entering freshmen with the increased academic load in college, with living away from home, with making them aware of resources available to them, and with adjusting from being a well-known high school senior to a little-known freshman again. [2]– [5] However, little attention has been given to the entering transfer student, especially the community college transfer student. These students describe the transfer to a larger four-year school as “being a freshman all over again.” The transfer student, especially a community college transfer, often faces many challenges: increased academic load, larger class size, not knowing anyone nor where resources are, and difficulty in joining study groups with students who have already been working together for a year or more. [6] As part of a larger program, “Maricopa Engineering Transition Scholars,” (METS) funded by the National Science Foundation (NSF) to support transfer students, a proposal was submitted and funded by the National Science Foundation “Computer Science, Engineering, and Mathematics Scholars” (CSEMS) program. [7] The program is an academic scholarship program for transfer students in the Fulton School of Engineering. Five workshops a semester are held for the CIRC/METS students. CIRC/METS workshops assist transfer students by connecting them with available resources to meet the many challenges. With mentoring from ASU faculty, staff, and
students, who have previously transferred to ASU, new transfer students report that the transition was much easier.

RECRUITMENT

The CIRC/METS scholarship program application was posted on the Fulton School of Engineering website. The application close date was originally set for March 15, but there were not very many applications by that time. An email was sent in early summer to all women and underrepresented minority students who qualified for this scholarship and two other scholarships. The CIRC/METS qualifications included: U.S. citizen or permanent resident, engineering or computer science major, a GPA of at least 3.0, new transfer student, and financial need as shown by the submission of a FAFSA form. The application required two letters of recommendation and a personal statement. The email resulted in over 100 additional applications. All of the students who applied for and met the qualifications of the CIRC/METS scholarship were accepted into the CIRC/METS program and awarded a scholarship of $3,125 for the academic year, half payable each semester. The initial CIRC/METS class was made up of 24 students, including: 9 women and 10 underrepresented minority students (6 Hispanic, 3 Native American, and 1 African American). Only 9 of the students were neither female nor an underrepresented minority student. Six continuing transfer students who had been in the CSEM CIRC program the year before were transferred to the CIRC/METS program and 18 were new to the program.

The scholarship applications were processed by the Student Academic Services (SAS) Office in the Fulton School. The students were required to write a letter of acceptance to the SAS office before the scholarship was awarded. The semester scholarships were awarded after day 21 to ensure that a student was in the Fulton School on that day when University enrollment is taken. Students may reapply to continue in the program.

GETTING STARTED

The METS co-Director took ownership of the CIRC/METS program, working with the CIRC/METS PI, the Associate Dean of Student Affairs in the Fulton School. Emails were sent to the students to determine the best time to meet. This is a difficult task since the students range from sophomores to seniors and their schedules are also very different from department to department. We determined that Tuesday and Thursday afternoons were the best times and by holding each CIRC/METS meeting twice (Thursday and Friday from 3:40-4:30), we could accommodate all of the students’ schedules. Some students attend the workshop at a different time on CIRC/METS weeks. A schedule was determined for the students with five meetings each semester. The students were allowed one excused absence each semester. The completion of the assignments each semester is a prerequisite for continuation of the scholarship.

We try to treat the CIRC/METS Scholars as special students. In addition to a relaxed atmosphere in a conference room, refreshments varying from muffins and fruit to pizza plus a beverage are served at each meeting.

CIRC/METS PROGRAM

The program was designed not only to graduate the engineering students, but to also introduce the students to research and possibilities for obtaining a research position or internship and to get them thinking about graduate school. The homework schedule was purposely more demanding in the fall semester than the spring semester. See Figures 1 and 2. We first made sure that each student knew who their advisor was. Some students did not. The students were required to meet with their advisor and talk to them about three research projects in the department. If their advisor was a staff member and was not familiar with the research projects, the CIRC/METS student was required to obtain that information from a faculty member in the department. By having the students look up an engineering thesis or dissertation in the library, the students gained some understanding of what a thesis or dissertation looked like. Fortunately, a Graduate Symposium was held at the time of the first assignment and the CIRC/METS scholar was required to go to at least one of the presentations and to journal about their impression of the event.

For the second assignment, the students were required to update their resume for an application to graduate school. The students were also encouraged to change the objective and to register with the Fulton School Engineering Internship Program, which included submitting their resume. Students were asked in the second meeting to talk briefly about an area of research that sounded interesting to them. Their assignment was then to go to a journal, find and read an article related to their research area of interest. The student was then to critique the article and give three technical reasons to support their conclusions. The third part of the assignment from the second meeting was to talk to a professor about the possibility of obtaining a research position either as a volunteer or as a paid researcher. The student was then asked to journal a summary of the research area and the possibility of obtaining a position in the project.

At the third meeting of the fall semester, the students heard a faculty and a staff member with PhD’s talk about research. The students were asked to summarize the talks and add the summary to their portfolio. During the fourth fall meeting, the students were given additional information on writing a resume, about funding graduate school, and about ABET, as well as an ABET shirt, since an ABET visit was to occur the next week. The CIRC/METS students were
also invited to be a Mentor to incoming transfer students through the METS program.

During the fifth meeting graduate students shared experiences and the METS mentoring program was discussed in more detail with a discussion on what it is like to be a new transfer student. We also spent some time addressing questions and concerns. We answered questions at each of the meetings, especially if there were questions identified on the evaluation form from the previous meeting.

The portfolios were due two weeks after the fifth meeting. The students were also invited to attend a METS open house being held for the opening of the METS Center, a place for studying, networking, and using computers. The CIRC/METS students were invited to mingle with the community college students who attended the open house as potential transfer students.

The Spring schedule and assignments have been more focused, but with less homework. During the first spring meeting the students were given letters detailing omissions from their portfolios and a speaker from Career Services gave helpful information on resumes, cover letters, thank you letters, and interviewing. The students were asked to update their resumes and submit them to the Fulton Engineering Internship Program and encouraged to register with Career Services for more opportunities for interviews.

<table>
<thead>
<tr>
<th>Workshop No.</th>
<th>MEETING DATE/TIME</th>
<th>TASK</th>
<th>ASSIGNMENT/DUE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>August 25, 29</td>
<td>3:40pm - 4:40pm</td>
<td>1) Find out the name of your advisor. Do you have a faculty or staff? 2) Meet with advisor and/or faculty, ask about research opportunities available. 3) Give a brief summary of the thesis or dissertation by a previous ASU Engineering graduate student. 4) Attend 1 talk at the Graduate Symposium.</td>
</tr>
<tr>
<td>2</td>
<td>September 16, 19</td>
<td>3:40pm - 4:40pm</td>
<td>1) Write a resume targeted for a graduate school that you are interested in attending. 2) Review a recent article on the topic you studied about in the CIRC/METS session today. 3) Write a summary about working with them to gain research experience (e.g., techniques, paid job...).</td>
</tr>
<tr>
<td>3</td>
<td>October 3, 10</td>
<td>3:40pm - 4:40pm</td>
<td>1) Take notes on talks by: Dr. Paul Solich, Arizona Dean of Research &amp; Development, ASU; Dr. Elizabeth Chien, METS Missionary.</td>
</tr>
<tr>
<td>4</td>
<td>October 20, 21</td>
<td>3:40pm - 4:40pm</td>
<td>10 A.M. 12 p.m. How to find funding for Graduate School BE A MENTOR AETF's mentorship program.</td>
</tr>
<tr>
<td>5</td>
<td>November 22, 21</td>
<td>3:40pm - 4:40pm</td>
<td>1) Graduate Students Share Experiences. 2) Monetizing Opportunities in METS Program discussions - What do new engineering transfers look for in a program? 3) Review previous content material - add more questions to discussion.</td>
</tr>
<tr>
<td></td>
<td>December 5, 2003</td>
<td>2:00p - 5:00p (optional meeting)</td>
<td>METS Student Welcome - EG136 Enjoy getting to know your dissertation advisor. Be a mentor. Need a mentor.</td>
</tr>
</tbody>
</table>
The second spring meeting focused on graduate school. The Associate Dean of Research and one of his graduate students talked about the ins and outs of graduate school including the MS versus MSE degree, when to go for the PhD degree, and how to determine a good graduate school for you.

The third meeting featured a panel of graduate students who each spoke a little about themselves and then answered questions from the audience. The fourth meeting was devoted to an industry speaker on the value of an advanced degree. The fifth meeting was a wrap-up for the year and a celebration time for completing the year. A speaker from industry with a PhD spoke in one of the last meetings. The completed portfolios were due at the last meeting.

The spring semester required two major assignments each to be tailored to the individual student. In the first assignment the students gave a summary of their search for admission to graduate school during Fall 2003. Please include: What were the results of your effort? What more do you need to do in your search for information? What have you learned and what are your conclusions?

Choice A. Same as A searching for an internship during Fall 2003.

Choice B. Same as A searching for a research experience during Fall 2003.

Choice C. Same as A searching for a graduate school.

Assignment 2. Choose D, E, or F

Choice D. Interview a graduate student in your field of engineering. Write a summary of this interview. Please answer the following based on the graduate student interview: What was their goal when they applied to graduate school? What steps did they have to complete to pursue a graduate degree? What steps are needed to complete their graduate degree? What do the feel they have accomplished during their graduate experience? Now, imagine yourself as a graduate student. Please answer these questions for yourself as if you were a graduate student.

Choice E. Same as D. Interview an engineering professional about their search for their job during Fall 2003/Spring 2004.

Choice F. Same as D. Interview a graduate student about their research experience during Fall 2003/Spring 2004.

### Figure 2

**SPRING PROGRAM SCHEDULE FOR CIRC/METS**

<table>
<thead>
<tr>
<th>Workshop No.</th>
<th>DATE/LOCATION/TIME</th>
<th>TASK</th>
<th>ASSIGNMENT/DUE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>January 29, 30 ECGL 115</td>
<td>1) Discuss incomplete portfolio 2) Parent calls Career Services will speak on resumes, thank you letters, interviewing</td>
<td>1) Submit any incomplete assignments 2) Update your resume, submit to intern office Due February 19</td>
</tr>
<tr>
<td>7</td>
<td>February 13, 20 ECGL 115</td>
<td>1) Dr. Paul Johnson and graduate student talk about graduate school, MS vs. MSE, the PhD, and answer your questions</td>
<td>Choose A, B, or C from Assignment 1 2) Assignment 2</td>
</tr>
<tr>
<td>8</td>
<td>March 11, 12 ECGL 115</td>
<td>1) Graduate student panel</td>
<td>Due March 11 or 12, 2004 2) Assignment 2</td>
</tr>
<tr>
<td>9</td>
<td>April 1, 2 ECGL 115</td>
<td>1) Speaker on advanced degree</td>
<td>Due April 1 or 2, 2004 Complete your Portfolio include: 1) Your updated resume 2) Assignment 1 3) Assignment 2 Portfolio due date: 12 noon April 30, 2004 Portfolio due date: 12 noon April 30, 2004</td>
</tr>
<tr>
<td>10</td>
<td>April 28, 30 ECGL 115</td>
<td>End of year</td>
<td>End of year</td>
</tr>
</tbody>
</table>

Assignment 1. Choose A, B, or C

Choice A. Write a one-page summary of what you learned in searching for admission to graduate school during Fall 2003.

Choice B. Same as A searching for a graduate school.

Choice C. Same as A searching for an internship during Fall 2003.

Assignment 2. Choose D, E, or F

Choice D. Interview a graduate student in your field of engineering. Write a summary of this interview. Please answer the following based on the graduate student interview: What was their goal when they applied to graduate school? What steps did they have to complete to pursue a graduate degree? What steps are needed to complete their graduate degree? What do the feel they have accomplished during their graduate experience? Now, imagine yourself as a graduate student. Please answer these questions for yourself as if you were a graduate student.

Choice E. Same as D. Interview an engineering professional about their search for their job during Fall 2003/Spring 2004.

Choice F. Same as D. Interview a graduate student about their research experience during Fall 2003/Spring 2004.
following questions: 1) What did you like most about this meeting? 2) What was the most important item that you learned today? 3) What do you need to know more about? 4) Suggestions for future meetings (topics, food), and 5) Overall, how would you rate this session? 1. Strongly dislike, 2. Dislike, 3. Good, 4. Very Good, and 5. Excellent. The students were further invited to give comments.

The students were very pleased with the meetings in general. The highest percentage for the students’ responses to the survey questions are summarized for Workshops 1-9 in Table I. The student responses gave insight on the information that new students need in the transition from a community college to a university program. Selected student responses are provided here for Workshops 1-9. These questions and comments were then used to help determine future workshops for the students.

For Workshop 1:
- I got some important information on studying techniques.
- I learned to plan early for the future.
- I’d like to know more about getting to know the seniors, to learn from them, and to listen to what they have been through.
- I’d like to know who to go to as a faculty advisor.
- I’d like to know about research funding toward graduate school, scholarships, and how does the FAFSA help graduate students.

For Workshop 2:
- I learned about the interaction we will have with professors in applying for research.
- I’d like to know more about what work is actually done by undergraduate researchers.
- I like interaction with other people, it’s nice, to get to know new people.
- I’d like to know how to obtain a research position and what is the best way to approach a professor?

For Workshop 3:
- I learned ways to talk to faculty and what to expect.
- I learned how to get letters of recommendation when graduate school is years after college.

For Workshop 4:
- I learned tips on writing a resume and writing a resume for graduate school.
- I liked the discussion on resumes tips and what to ask in interviews.
- I’d like more information on the graduate application process, GRE, etc.
- I’d like more information about Master Degree differences.

For Workshop 5:
- I learned tips for transferring students.
- The most important item I learned was how to print for free.
- I learned about mentoring opportunities.
- I’d like more information on interviews.

For Workshop 6:
- I learned about the importance of cover letters.
- The most important thing I learned is about resume Dos and Don’ts.
- I’d like more information about internships.
- I’d like to know how to prepare for an interview.

For Workshop 7:
- I learned valuable information about graduate school.
- The most important think I learned is the importance/advantages of MS vs. MSE.
- I’d like more information on getting a job after school.
- I’d like more information on funding graduate school.

For Workshop 8:
- I enjoyed hearing personal stories from the good student panel.
- I learned there are many options regarding grad school.
- I’d like what employers think about MS vs. Ph.D.

For Workshop 9:
- Today’s meeting was very wonderful. It lifted my hope to go to graduate school.
- I learned there that higher education opens personal doors as well as occupational.
- I’d like more information on exchange programs.

**ANALYSIS**

The assignments worked well for both the new students and the continuing students. The students were very committed to the program. The students were allowed one excused absence each semester, but most of the students attended all of the meetings. Some of the students needed to be prodded to complete all of their assignments. As the students raised questions and asked for information through the meeting surveys, their questions and requests were answered in future meetings. As can be seen in Table I toward the end of the semester there were less questions and requests for information from the students. The sequence on graduate school with a session on the mechanics of graduate school, followed by a panel of graduate students who talked about their experiences in graduate school, and then followed by an engineer from industry with a higher degree worked well for the students.
### Table I

<table>
<thead>
<tr>
<th>No.</th>
<th>n</th>
<th>Students Interested</th>
<th>Students Interested</th>
<th>Students interested</th>
<th>Students interested</th>
<th>Overall rating overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>How to get higher grade</td>
<td>66%</td>
<td>86%</td>
<td>How to get an A</td>
<td>28%</td>
</tr>
<tr>
<td>2</td>
<td>27</td>
<td>Information on research opportunities</td>
<td>26%</td>
<td>39%</td>
<td>Tips for writing a research paper in graduate school</td>
<td>39%</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>Tips on maintaining healthy habits in school</td>
<td>25%</td>
<td>42%</td>
<td>Strategies on winning with facility</td>
<td>42%</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>Resume building, networking</td>
<td>20%</td>
<td>79%</td>
<td>Resume tips</td>
<td>80%</td>
</tr>
<tr>
<td>5</td>
<td>26</td>
<td>Strategies on transfer course and majoring</td>
<td>79%</td>
<td>How to approach and majoring</td>
<td>80%</td>
<td>How to approach and majoring</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
<td>Writing cover letters</td>
<td>20%</td>
<td>How to write a cover letter</td>
<td>42%</td>
<td>How to respond</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>Understanding different grades and GPA in school</td>
<td>79%</td>
<td>15%</td>
<td>Information on different graduate degree GPA</td>
<td>15%</td>
</tr>
<tr>
<td>8</td>
<td>30</td>
<td>Understand research</td>
<td>10%</td>
<td>New experience of an graduate school</td>
<td>42%</td>
<td>How to respond</td>
</tr>
<tr>
<td>9</td>
<td>19</td>
<td>Street questions</td>
<td>25%</td>
<td>39%</td>
<td>Opportunities to study abroad</td>
<td>39%</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>Year-end meeting with Industry Vice-President, National Survey of the program for the year, and status of transfers and job offers</td>
<td>80%</td>
<td>60%</td>
<td>National Survey of the program</td>
<td>60%</td>
</tr>
</tbody>
</table>

* = Overall rating overall for workshops

### Conclusion and Future Plans

The CIRC/METS program went well this year as reflected in the student evaluations submitted by the CIRC/METS students. Several CIRC/METS students have received internships or research positions with ASU faculty. Most of the CIRC/METS students are considering the idea of attending graduate school. Some of the CIRC/METS students want to work in industry first and have their company pay for graduate school. Two of the CIRC/METS students graduated this spring. One is continuing in graduate school next fall and the other student plans to work and attend graduate school later.

The program will continue the next academic year supported by the second year of funding. Programming will be a challenge since some of the students will be in their third year in a similar program, some in their second year, and others in their first year. The continuing students will be given opportunities to help mentor new transfer students.

### Acknowledgments

The National Science Foundation is recognized for providing support for the ASU CIRC/METS program through sponsor award number 0324212, “Collaborative Interdisciplinary Research Community Maricopa Engineering Transition Scholars (CIRC/METS).”

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### References


