

AC 2010-1843: AN EVALUATION OF ACADEMIC SCHOLARSHIP PROGRAMS BY PROGRAM AND ETHNICITY

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An Evaluation of Academic Scholarship Programs by Program and Ethnicity

Abstract

Since 2002, Academic Scholarship Programs, supported by the National Science Foundation, have been held in the Ira A. Fulton Schools of Engineering at Arizona State University. The purpose of these programs is to graduate the students in good academic standing, to broaden their understanding of engineering, and to have the students go right on to graduate school full-time after obtaining their Bachelor's degree, with an emphasis on women and minority students. The scholarship students all have unmet financial need. These programs include both transfer and non-transfer students. Since women and minority students are overrepresented in community colleges (CCs), working with CCs and their transfer students can help increase diversity among engineering and computer science students.

The paper includes a brief description of these successful programs and how they encourage and support the students to do well academically as well as broaden their general knowledge about engineering, including resumes, internships, research, networking, portfolios, career planning, graduate school, industry (through industry speakers with graduate degrees), and academia.

This paper details the Fall 09 semester program and the end of the semester evaluation. This study includes 79 current students in the programs. The evaluation completed by these students measures how well the program covered the topics of graduate school, research, networking, engineering careers, portfolios, engineering contributions, communication skills, and study skills.

The analysis for this study will include differentiation between three programs and minority and non-minority students in a new study. To date over 90% of the students in these programs have been retained through graduation in engineering or computer science. Over 30% of the CC transfers and 40% of the non-transfer students have gone on to graduate school.

I. Introduction

Arizona State University (ASU) is a large Research I university, the largest public university in the United States with over 68,000 students on four campuses. The ASU Tempe campus is the largest single campus in the nation with over 53,000 students. The Ira A. Fulton Schools of Engineering is located on the Tempe campus with close to 4,000 undergraduate students and 2,300 graduate students in engineering and computer science. Additional students in the Fulton Schools major in construction. Additionally, located in the ASU/Maricopa County area is one of the largest community college districts in the nation, the Maricopa County Community College District, serving over 250,000 students each year in ten independent colleges. Over 300 transfer students enter the Fulton Schools of Engineering each year. Many ASU students have need of financial need. In 2007-08 more than 70 percent of all ASU students received some form of financial aid. In 2008-09, ASU awarded over \$500,000 in all types of financial aid to more than 46,000 students.¹ In spite of this, traditionally, 80% of ASU students work.

Since many ASU students have unmet financial need and ASU is a large place where students can easily get lost, the author saw the need for a scholarship program that would help students financially, but also to network and gain skills to make graduation easier and also to encourage students to go on to graduate school. In Fall 2002, the author received a four-year \$400,000 National Science Foundation (NSF) C-SEMS grant (#0123146) to support an Academic Scholarship Program for upper division students, with an emphasis on women and underrepresented minority students. It is well-known that women are extremely underrepresented in engineering, as are underrepresented minority students. The students received a \$3,125 academic year scholarship, attended six workshops per semester, and did assignments which helped them as students to improve their study skills, communication skills, rate of graduation, and encouraged them to go right on to graduate school full-time. The first year this program was composed of half transfer students and half non-transfer students and was called the Collaborative Interdisciplinary Research Collaborative (CIRC). In Fall 2003 two additional programs were begun. The author received a second four-year \$400,000 NSF C-SEMS grant (#0324212) for a program identical to the first C-SEMS grant, however, dedicated to transfer students. Although transfer students have usually already made it through two years of classes, the transition from a school with small classes, with professors knowing all of their students by name, and free parking to ASU is quite a culture shock. This transition can be quite frightening and overwhelming. This second NSF program called CIRC/METS (Maricopa Engineering Transfer Students) then aspired to encourage transfer students and help them to learn about resources at ASU in addition to the goals of the CIRC Program. As we have begun to work with transfer students in Arizona outside of Maricopa County, "METS" now stands for Motivated Engineering Transfer Student. This second C-SEMS program also had an emphasis on women and underrepresented minority students.

At this same time, two other programs began. An NSF grant supported a joint effort between five of the MCCC community colleges and ASU that funded a METS Center at ASU and joint information sessions on engineering at the community colleges. This Center has continued in the Fulton Schools of Engineering since 2003, being supported by NSF, the Fulton Schools of Engineering, and local industry. This Center is used for Transfer Information Days each semester, workshops, study, networking, socializing, relaxing, and formal and informal mentoring for transfer students. It also serves as the place where the CIRC and CIRC/METS Academic Scholarship Program students meet for their workshops. Also, in Fall 2003, the National Action Council for Minorities in Engineering (NACME) selected ASU as one of their schools to begin an Academic Scholarship Program for lower division minority students.

The funding for the first CIRC program lasted for five years and a total of 67 students participated, 40.3% women and 25.8% underrepresented minority students. The program had 97% retention to graduation and over 40% of the students went on to graduate school.² A \$500,000 S-STEM NSF grant (#0728695) has allowed the CIRC program to continue with academic scholarships at \$4,000. The first CIRC/METS program ran from 2003-2008 and supported 76 students with over a 92% retention and graduation rate. Diversity was an emphasis and 65% of the students in the program were either female (38.2%) or underrepresented minority (39.5%).³

The CIRC/METS program continues with a \$600,000 NSF S-STEM grant (#0836050), so the continuing students, from the first CIRC/METS program, when it ended are now being supported

in a second CIRC/METS program with \$4,000 scholarships per year. When a CIRC/METS student graduates and continues full-time in graduate school in engineering or computer science at ASU, the student is supported by the second CIRC program. For more information on these programs see references 4-13.

The requirements for the CIRC and CIRC/METS scholarship include: U.S. citizenship or permanent residency, full-time student status in engineering or computer science, at least a cumulative 3.0 GPA, and unmet financial need according to FAFSA. The requirements for the NACME scholarships are similar, however a slightly lower GPA is required for continuation of the scholarship. The NACME scholarship is \$2,500, so NACME students who meet the criteria for the CIRC scholarship, receive an additional \$1,500 from the CIRC Scholarship program. At this time the NACME program is only being funded for continuation of the current students. We do have an NSF S-STEM program for lower division engineering and mathematics students housed in the Fulton Schools of Engineering.

In addition to CIRC, CIRC/METS, and NACME students, there are additional students taking advantage of the academic workshops. Students can enroll in FSE 294, Academic Success Workshops, for one credit hour. CIRC, CIRC/METS, and NACME students are encouraged to enroll, but are not required to enroll. Students who do not have one of these scholarships are able to take the course and attend the workshops. These students may once have had a scholarship, but have lost it because they are now longer eligible for the scholarship through unmet financial aid or their GPA. In Fall 2008, the author became the PI of an NSF STEP grant (# 0856834) which supports the METS Center and collaboration with three Arizona non-metropolitan community colleges. As a part of that grant, an experimental program was begun in Fall 2008 to have transfer students who were not eligible for a CIRC/METS scholarship to be able to get the encouragement and help available through the workshops by taking the FSE 294 course and doing the assignments. As an incentive for completing the course, the transfer student receives a \$300 scholarship. The NACME students without a CIRC Scholarship and those taking FSE 294 without a scholarship form an “Other” group. This Fall 09 semester, there were 40 CIRC students, 29 CIRC/METS students, and 13 other students

II. The Academic Scholarship Program

Each semester six workshops are held with multiple meeting times for each in order to accommodate the students’ schedules. The topics include the “Guaranteed 4.0 Plan”¹⁴, resumes, interviews, how to use computer data bases for research papers, graduate school presented by a graduate student panel, and engineers with advanced degrees from industry. The purpose of the workshops is to help round out the student with engineering information that they do not receive in the classroom, to help them graduate, and to encourage them to go right on to graduate school full-time, if possible. Assignments to help the students are given through the semester including researching graduate schools and planning their life for 10 years after they graduate with their bachelor’s degree. For students to continue to receive the scholarship, they must attend the workshops and complete the assignments. The scholars are served refreshments at each meeting to help make them feel special (and to encourage attendance).

The FSE 294 course workshops vary each semester. Each of the six meetings is held five times on a Thursday or Friday in the METS Center conference room in order to accommodate all of the students’ schedules. This means that each meeting is attended by 10 – 30 students. The

meetings usually open with an ice breaker question which each student asked to answer along with their name, major, and graduation date. This exercise is very important to networking and encouragement. Students report that they “liked the introduction we each had to give and listening to good things that happened to my peers.” A common report is “It helped me to know that I am not the only student having trouble in my class.” Sometimes study groups are formed after students in the meeting realize that they are in the same class.

The first meeting of each semester is dedicated to talking about the Guaranteed 4.0 Plan.¹⁴ In the fall of each year there are new students who are not aware of the plan. The author, director of the academic scholarship meetings, goes over the plan using a handout from the 4.0 Plan book by permission of the author, Donna O. Johnson. The students who have used the plan enhance the presentation by sharing parts of the Plan that have been particularly helpful to them. This presentation is usually followed by a short presentation in the next meeting on “How to Catch Up When You Fall Behind”, also from Donna O’s 4.0 Plan. Although the 4.0 Plan is covered in approximately 45 minutes, the students do not gain the real value of the Plan until they follow through with exercises related to the Plan. The following assignment is given to the students at the beginning of each semester:

- 1) Email a copy of your official fall class schedule
- 2) Email a copy of your full weekly time management schedule including BPR, BPN, BPC, POH, and HW time for each class.
- 3) The completed Check List must accompany the schedule.
- 4) Complete a Time Estimate Chart that matches your time management schedule by category (Sleep, Eat, Class, etc.). Example is on back side of first page of the 4.0 Handout. Email.
- 5) Complete a chart showing how much time you have scheduled for BPR, BPN, BPC, HW, and POH for each of your classes.

A couple of weeks later, the following assignment is added:

- 1) Answer the 7 questions to check if you are “On Plan” shown on p. 92 of the 4.0 Handout. Answer more than just yes or no. Give an explanation if the answer is not “yes.”

These exercises are very important for the students at the beginning of each semester. By obtaining a copy of the fall semester schedule, the director can check on students who are attempting 18 or 19 hours, a common mistake of first semester transfer students. Some of the transfer students were used to working half to full-time and taking over 16 hours. They are advised that if they are working even half-time, they should not attempt over 12 semester hours of credit their first semester. There are so many adjustments to be made the first semester is a large university, the new transfer student is encouraged to take a lighter load their first semester so they can begin with a strong GPA.⁵

A fundamental piece of the 4.0 Plan is its detailed time management schedule. It usually takes students a couple of tries to really understand the Plan and the schedule. However, after the student masters the time schedule, they are well on their way to using their study skills efficiently. It is especially difficult to be able to plan at the beginning of each semester exactly how much time each course will take in Bullet Point Reading, Bullet Point Notes, and Bullet Point Concepts. The idea of scheduling and of going to visit each professor once a week is usually a new concept to students. Students using the 4.0 Plan will testify later that getting to know their professors is one of most important parts of the Plan.

Usually early in the fall semester representatives from the Fulton Career Services come and talk to the students about their resumes and other related topics. In Fall 09, Career Services reps spoke at the second meeting which was a week before a large career fair was to be held on campus. The reps talked about preparing for a career fair, proper career fair dress, and proper career fair etiquette. All students were encouraged to go to the fair and to begin practicing “30 second elevator speeches” for internships and jobs. The students were also advised to not go to their first choice company first, but to warm up with other companies. The reps also gave pointers on resumes and cover letters, instructed the students on how to enroll in Career Link in order to get notices of companies interviewing on campus, and presented each student with a new version of their “Career Guide” which includes information on resumes, interviewing, cover letters, and other such job-related topics. In addition, the author has co-developed a “Resume Check List” that is given to the students to help them design their resume.¹⁵ For this meeting their assignment was to:

- 1) Write a short summary of the meeting, listing 4 new things that you learned.
- 2) Turn in an updated resume with the resume Check List.
- 3) Be looking for a research seminar to attend.

At the end of each meeting, the students are asked to evaluate the meeting with a short evaluation form which asks five questions:

- 1) What was the most important thing that you have learned?
- 2) What did you like most about the meeting today?
- 3) Suggestions for future meetings?
- 4) What do you need to know more about?
- 5) Comments, food suggestions?

Student comments on their second meeting included:

- The format on your resume can have a great impact on your chances of getting a job.
- At career fairs the dress should be professional, not business casual, very important
- Met two staff members from career services who can help me out in the future
- This is my first class but I enjoyed it very much and thought it was very informative

Meeting three was included the director of FURI (Fulton Undergraduate Research Institute) who talked to the students about the program and deadlines. The Academic Scholarship Students are encouraged to do research to understand what research is and to get them interested in doing research in graduate school. A new topic for these workshops was presented by the Director of the METS Center on “How Does Industry Work and What Do Program Managers Do?” This topic was well received by the students, most of whom knew nothing about corporate structure.

Student comments on this meeting included:

- Learned about how structures work inside major companies
- Learned about pay grades and how to negotiate a salary
- Learned about career ladders, also how to do a portfolio for a job interview
- Look at job description and include key words in your resume

- This meeting was different and informative. This meeting also reinforced the importance of getting a Master's or PhD.
- I learned about the travel grant (FURI) which pays up to \$900 to attend a conference & present research.

The assignment after this meeting was:

- 1) Write a short summary of today's meeting including 5 new things that you learned.
- 2) Write a summary of a research seminar that you attended and include the date, the time, the speaker, the location and five new things that you learned
- 3) Give 3 reasons for going to graduate school right after your Bachelor's degree and 3 reasons to wait for graduate school until later.
- 4) Start thinking about 10 Year Plan
- 5) Work on the 4.0 Plan and straight A's

The fourth Fall 2009 meeting was the Graduate Student Panel. This presentation is usually the favorite of the year for the scholarship students. There are enough FULTON graduate students in CIRC or graduate students who were formally in CIRC or CIRC/METS, that three or four of them form a panel for each of the five meetings for the graduate panel. Occasionally, additional graduate students are included. A list of questions is given to the panel before the meeting and questions are encouraged from the audience.

Comments from the students included:

- I got excellent insight on grad school from real people
- An important thing was I learned about grad school from a minority perspective (hadn't thought of it)
- Talk to advisor's students to find out about advisor
- Everything was very, very important
- I'm excited for grad school!
- I definitely want to go to grad school
- Graduate school is a must and one of the most important things I will ever do in my life

The assignments due before the next meeting were:

- 1) Write a summary of today's presentation including five new things that you have learned.
- 2) Watch for and select one assignment that you have done either this semester or last semester which displays some of your best work that you would want to show to a perspective employer or graduate school admissions committee.
- 3) Start writing 10 Year Career Plan¹⁷

The fifth Fall 2009 programs were presented by the director on her recent trip to Egypt and Uganda, where the director's son and family now live. This program was a departure from the usual engineering topics. The experiment was a success. One student reported: "Everything we do in this class is different and interesting." The presentation including engineering as it relates to pyramids and irrigation in Egypt. The presentation also included pictures from a safari. The students were very interested and many had never travelled out of the U.S.

Student comments included:

- I learned a lot about Egypt and Uganda
- I learned about some new places I would like to visit
- I need to travel more
- I really want to travel
- Travelling is important!
- Egypt has much more to offer than pyramids
- The Sphinx was used as target practice by an invading army
- I most liked the urban series of pictures of architecture and culture
- The stories and pictures of the trip
- It was a relaxing twist on the usual meetings

The assignment was:

- 1) Write a summary of today's presentation including five new things that you learned.
- 2) Finish writing 10 Year Career Plan
- 3) Turn in completed portfolio/notebook for the semester including all assignments

The sixth and last meeting of Fall 2009 was an end of the semester celebration (different food) with speakers from industry: CH2M-Hill and INTEL. Speakers from industry are the second most favorite program for the scholarship students. These speakers were well received whether they talked about their journey to becoming the engineer they are today or if they talked more about their company and the types of engineers that they are seeking. CH2M-Hill opened the students' eyes to a city of the future being built under their management. The city will be built with no carbon dioxide and no cars within its boundaries. The industry speakers also serve as a company contact for the students and sometimes are able to make sure that their resume gets to the right place for an internship or job placement.

At the end of the sixth meeting each semester, the portfolios are due and the students are asked to complete an evaluation survey for the program's semester. Those unable to attend one of those meetings were emailed a survey and asked to complete it and to return it to the author. Seventy – nine students completed the evaluations. Of the 40 students in the CIRC program, 38 students completed the survey; 28 of the 29 CIRC/METS students completed the survey; and 13 of the 13 students in the "Other" category completed the survey.

In the next section we look at the results of the evaluation section of the survey.

III. The Survey Results and Analysis

The students were first asked six questions to which they were to answer "Yes" or "No". All of the students answered "Yes" to the first two questions: 1) Did you find the CIRC Scholars program beneficial to you? And 2) Would you recommend the program to others? Only a few students answered "Yes" to 3) Have you ever participated in a program similar to CIRC? Some of the students had participated in a similar lower division scholarship program either at ASU or in a community college. Most student also answered "Yes" to questions 4) Have you made

contacts with engineering students in other majors through CIRC? and 5) Has the CIRC program helped you feel more confident about attending graduate school? A sixth question asked if the student intended to reapply. The word “CIRC” in the survey was meant to cover whatever program a particular student was in when they participated in the Academic Workshops: the CIRC, CIRC/METS, NACME, FSE 294, or the \$300 Scholarship Program.

The students were then asked 13 more questions of evaluation on the program. The results are shown in Tables I- IV. Table I shows the results of the surveys by program: CIRC, CIRC/METS, or Other. Table II shows the results of the surveys by CIRC (non-transfer) program minority and non-minority students. Table III shows the results of the surveys by CIRC/METS (transfer) program minority and non-minority students. Table IV shows the results of the surveys by the “Other” category students by minority and non-minority students. The “Other” category included all students who participated in the academic workshops, but who did not have either a CIRC or a CIRC/METS Scholarship.

In Table I below we see that in general the highest percentage of Strongly Agree or Agree is given by the CIRC students. These students, in general, have been in the program longer since it includes 9 graduate students who came up through the program and therefore the program may have had more influence on them. Those in the Others group are all going through the program for the first or second semester and therefore may not have been as influenced by the program as those who have been in the program for more semesters in areas such as networking, self-awareness revealed by a portfolio, increased knowledge of engineering careers, and a career in research. All of the groups rate knowledge of engineering contributions, communication skills, and thinking about a career in research rather low. In talking to one student about his strong disagreement about the program encouraging students to think about a topic, the student said he had already decided that he was not interested in that topic, and had chosen to continue to not even consider the topic. A result that is not surprising is on question 12 where the CIRC students (who are not transfers) judge that the program has helped them to network much better than the transfer students and the other group. This difference may be that the newer transfer students haven't been able to network that much yet.

Table II looks at the minority CIRC students versus the non-minority CIRC students. The percentage of minority students who strongly agreed or agreed on each question was very similar to the percentage of non-minority students on most questions. The questions in which there were the greatest disparities were numbers 13 (become good at exploring options), 14 (increased knowledge of engineering careers), 15 (thinking about a career in research), 17 (understanding engineers' contribution), and 19 (increased study skills), with 15 and 17 showing the most difference. For each of these questions the percentage was actually higher for the minority students except the increased study skills of 19, where the minority students reported that the program did not help them as much with their study skills as non-minority students. There does not seem to be an obvious answer as to why this is true. The area that had the lowest percentage agreement for both groups was question 16 on the portfolio contributing to their self-awareness.

This category could be improved by bringing in another speaker on portfolios which we have not done in some time.

For the following statements, shade the area that corresponds to how strongly you disagree or agree with each item.		Group	1* SD	2* D	3* N	4* A	5* SA	% Agree/ Strongly Agree
7.	Participating in the CIRC program has made me think about attending graduate school.	CIRC C/METS OTHER		1	1 8	8 29	29 21 10	97.4% 96.4% 100.0%
8.	Participating in the CIRC program has helped or made me decide to attend graduate school.	CIRC C/METS OTHER		1	5 4 3	5 8 3	28 15 7	86.8% 82.1% 76.9%
9.	I learned about graduate school options.	CIRC C/METS OTHER		1		9 14 4	28 14 9	97.4% 100.0% 100.0%
10.	Participating in the CIRC program has made me think about research	CIRC C/METS OTHER	1		2 2 2	12 16 7	24 9 4	94.7% 89.3% 84.6%
11.	Being a CIRC Scholar helped me learn about research.	CIRC C/METS OTHER		1	4 3	16 14	18 10	89.5% 85.7% 100.0%
12.	Being a CIRC Scholar has helped me network better.	CIRC C/METS OTHER		1 2	3 7 2	16 14 2	19 6 7	92.1% 71.4% 69.2%
13.	Being a CIRC Scholar has helped me become good at exploring options.	CIRC C/METS OTHER		1	3 7 2	13 9 6	21 11 5	91.9% 71.4% 84.6%
14.	Being involved in the CIRC program has increased my knowledge of engineering careers.	CIRC C/METS OTHER		1 1		17 16 3	20 11 6	97.4% 96.4% 69.2%
15.	Participating in the CIRC program has made me think about a career in Research.	CIRC C/METS OTHER	1	1 1 1	6 6 4	13 12 5	18 8 3	81.6% 71.4% 61.6%
16.	Designing my portfolio has contributed to my self- awareness.	CIRC C/METS OTHER		3	8 4 7	13 14 3	16 7 3	78.4% 75.0% 46.2%
15.	Participating in the CIRC program has helped me understand how Engineers have contributed to solving problems in the world.	CIRC C/METS OTHER		1 2 1	6 3 2	14 16 6	16 7 4	81.1% 82.1% 76.9%
18.	I am confident in my overall communications skills.	CIRC C/METS OTHER		1 1	6 5 1	14 13 7	17 10 4	81.6% 82.1% 84.6%
19.	Participation in CIRC has helped me with my study skills	CIRC C/METS OTHER			4 5 1	13 13 4	21 10 8	89.5% 82.1% 92.3%

Table I. Program Evaluation of Fall 09 by the CIRC, CIRC/METS, and OTHER students.

*1SD=Strongly Disagree, 2D=Disagree, 3N=Neutral, 4A=Agree, 5SA=Strongly Agree.

For the following statements, shade the area that corresponds to how strongly you disagree or agree with each item.		CIRC Group n= 19,19	1* SD	2* D	3* N	4* A	5* SA	%Agree/ Strongly Agree
7.	Participating in the CIRC program has made me think about attending graduate school.	Minority Non-Min			1	4 4	15 14	100.0% 94.7%
8.	Participating in the CIRC program has helped or made me decide to attend graduate school.	Minority Non-Min			2 3	3 2	14 14	89.5% 84.2%
9.	I learned about graduate school options.	Minority Non-Min				4 6	15 13	100.0% 100.0%
10.	Participating in the CIRC program has made me think about research	Minority Non-Min		1	1	6 5	12 12	94.7% 89.5%
11.	Being a CIRC Scholar helped me learn about research.	Minority Non-Min			2 2	5 9	12 8	89.5% 89.5%
12.	Being a CIRC Scholar has helped me network better.	Minority Non-Min			1 1	7 9	11 9	94.7% 94.7%
13.	Being a CIRC Scholar has helped me become good at exploring options.	Minority Non-Min			1 3	7 6	11 10	94.7% 84.2%
14.	Being involved in the CIRC program has increased my knowledge of engineering careers.	Minority Non-Min		1	1	9 8	10 9	100.0% 89.5%
15.	Participating in the CIRC program has made me think about a career in Research.	Minority Non-Min		1	2 4	7 6	10 8	89.5% 73.9%
16.	Designing my portfolio has contributed to my self- awareness.	Minority Non-Min			4 4	5 8	9 7	77.8% 78.8%
17.	Participating in the CIRC program has helped me understand how Engineers have contributed to solving problems in the world.	Minority Non-Min		1	2 4	7 6	10 8	89.5% 73.9%
18.	I am confident in my overall communications skills.	Minority Non-Min		1	3 3	9 5	7 10	84.2% 78.8%
19.	Participation in CIRC has helped me with my study skills	Minority Non-Min			3 1	5 8	11 10	84.2% 94.7%

Table II. Program Evaluation of Fall 09 by the CIRC students by ethnicity.

*1SD=Strongly Disagree, 2D=Disagree, 3N=Neutral, 4A=Agree, 5SA=Strongly Agree.

In Table III we contrast the minority transfer students with the non-minority transfer students. Among the non-transfer or graduate students in Table II, the minority students had a distinct higher agreement than the non-minority students for five categories and a lower agreement for 19 on study skills help. Among the transfer students, five categories have a distinct higher agreement among minority students and three categories have a higher agreement among non-minority students. The questions that showed the most difference between the groups with minority students in higher agreement are 12 (helped networking), 13 (good at exploring options), 16 (portfolio helping self-awareness), 17 (understanding engineers' contributions), and 19 (study skills help). The largest differences between the minority students and the non-

minority students occur in Questions 16, 17, and 12 involving self-awareness from the portfolio, understanding engineers' contributions, and being helped with networking. The three categories where the transfer minority students were not in as high an agreement as the transfer non-minority students were that the program had helped with 7 (thinking about attending graduate school), 10 (thinking about research), and 18 (confidence in communication skills). This last

For the following statements, shade the area that corresponds to how strongly you disagree or agree with each item.		C/METS Group n=14,14	1* SD	2* D	3* N	4* A	5* SA	% Agree/ Strongly Agree
7.	Participating in the CIRC program has made me think about attending graduate school.	Minority Non-Min		1		2 4	11 10	92.9% 100.0%
8.	Participating in the CIRC program has helped or made me decide to attend graduate school.	Minority Non-Min		1	1 3	5 3	7 8	85.7% 78.6%
9.	I learned about graduate school options.	Minority Non-Min				9 5	5 9	100.0% 100.0%
10.	Participating in the CIRC program has made me think about research	Minority Non-Min	1		1 1	7 9	5 4	85.7% 92.9%
11.	Being a CIRC Scholar helped me learn about research.	Minority Non-Min		1	1 2	6 9	6 3	85.7% 85.7%
12.	Being a CIRC Scholar has helped me network better.	Minority Non-Min		1	2 6	6 7	4 1	71.4% 57.1%
13.	Being a CIRC Scholar has helped me become good at exploring options.	Minority Non-Min		1	1 5	4 6	8 3	85.7% 64.3%
14.	Being involved in the CIRC program has increased my knowledge of engineering careers.	Minority Non-Min		1	1	5 10	8 3	92.9% 92.9%
15.	Participating in the CIRC program has made me think about a career in Research.	Minority Non-Min	1		3 4	4 8	6 2	71.4% 71.4%
16.	Designing my portfolio has contributed to my self- awareness.	Minority Non-Min		3	3	9 6	5 2	100.0% 57.1%
17.	Participating in the CIRC program has helped me understand how Engineers have contributed to solving problems in the world.	Minority Non-Min		1 3	1 3	7 6	6 2	92.9% 57.1%
18.	I am confident in my overall communications skills.	Minority Non-Min			3 2	5 8	6 4	78.6% 85.7%
19.	Participation in CIRC has helped me with my study skills	Minority Non-Min			2 3	5 8	7 3	85.7% 78.6%

Table III. Program Evaluation of Fall 09 by the CIRC/METS students by ethnicity.

*1SD=Strongly Disagree, 2D=Disagree, 3N=Neutral, 4A=Agree, 5SA=Strongly Agree.

result should not be surprising when we consider the very low representation of minority students in engineering graduate schools and research programs. Since many of these minority

transfer students are Hispanic, with Spanish as their native language, it is not surprising that many still feel inadequate with their English communication skills.

In Table IV the other student group of minority students is compared with non-minority students. The numbers are quite small, but the largest difference in the percentages of strongly agree and agree are found in questions 15 (thinking about a career in research), 12 (helped networking), 8 (attending graduate school), and 17 (understanding engineers' contributions). With this group, in

For the following statements, shade the area that corresponds to how strongly you disagree or agree with each item.		OTHER Group n=9,4	1* SD	2* D	3* N	4* A	5* SA	% Agree/ Strongly Agree
7.	Participating in the CIRC program has made me think about attending graduate school.	Minority Non-Min				1 2	8 2	100.0% 100.0%
8.	Participating in the CIRC program has helped or made me decide to attend graduate school.	Minority Non-Min			3	2 1	4 3	66.7% 100.0%
9.	I learned about graduate school options.	Minority Non-Min				2 2	7 2	100.0% 100.0%
10.	Participating in the CIRC program has made me think about research	Minority Non-Min			2	4 3	3 1	77.8% 100.0%
11.	Being a CIRC Scholar helped me learn about research.	Minority Non-Min				6 3	3 1	100.0% 100.0%
12.	Being a CIRC Scholar has helped me network better.	Minority Non-Min		1	3	1 1	4 3	55.6% 100.0%
13.	Being a CIRC Scholar has helped me become good at exploring options.	Minority Non-Min			1	5 2	4 1	100.0% 75.0%
14.	Being involved in the CIRC program has increased my knowledge of engineering careers.	Minority Non-Min			2 2	3	4 2	77.8% 50.0%
15.	Participating in the CIRC program has made me think about a career in Research.	Minority Non-Min			5	2 3	2 1	44.4% 100.0%
16.	Designing my portfolio has contributed to my self- awareness.	Minority Non-Min			4 2	3 1	2 1	55.6% 50.0%
15.	Participating in the CIRC program has helped me understand how Engineers have contributed to solving problems in the world.	Minority Non-Min			3	4 3	2 1	66.7% 100.0%
18.	I am confident in my overall communications skills.	Minority Non-Min			2	4 3	3 1	77.8% 100.0%
19.	Participation in CIRC has helped me with my study skills	Minority Non-Min				4 1	5 3	100.0% 100.0%

Table IV. Program Evaluation of Fall 09 by the OTHER students by ethnicity.

*1SD=Strongly Disagree, 2D=Disagree, 3N=Neutral, 4A=Agree, 5SA=Strongly Agree.

each case the minority students are less convinced that the program is obtaining its desired outcomes. On the other hand, 100% of these minority students say that participating in this

program has made them think about attending graduate school, helped them learn about research, has helped them to explore options, and has helped them with their study skills.

IV. Summary and Conclusions

We know that the Academic Scholarship Programs are making a difference in retention and graduation, as well as in having more students go right on to graduate school in engineering full-time after receiving the Bachelor's degree. Less than 70% of upper division transfer students in the Ira A. Fulton Schools of Engineering graduate in engineering or computer science. Close to 90% of the upper division transfer students in the CIRC/METS program graduate as engineers and computer scientists. Although perhaps not a good comparison, less than 50% of the first-time, full-time freshmen in the Schools of Engineering graduate from the Schools of Engineering, while over 90% of the non-transfer program students graduate from the Schools of Engineering. Nationally, only about 18% of all engineering graduates go right on to graduate school full-time and about 10% of Fulton Schools of Engineering graduates go right on to graduate school. However, 40% of the non-transfer and 30% of the transfer students in the Academic Scholarship programs go right on to graduate school full-time after earning their Baccalaureate degrees.

In this study we are looking at a finer evaluation of the program by program and ethnicity through an evaluation taken at the end of Fall 09. In general, all of the groups give the program a strong rating: the program is accomplishing its outcomes of getting the students to think about graduate school, research, networking, and exploring options; to increase their knowledge of engineering careers, their communication skills, and their self-awareness through a portfolio; to help them understand how engineers have contributed to solving problems in the world; and to improve their study skills. In order to make sure that these goals are accomplished with all groups, a more overt attempt can be made in some of these areas. For example, a discussion of the primary inventions of engineers during the last century and of the big challenges still facing engineers may help improve some of these percentages. By bringing in a speaker on portfolios, the first in a few years, the students may all gain a better idea of how a portfolio can help them. The author was pleased that only in the CIRC group did the minority students feel that the program had not helped them with their study skills as much as the non-minority group. Further study is warranted on what help the students wish to receive.

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