

Highlights of Over a Decade of University/Community College Partnerships

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Abstract

In 2002, an NSF sponsored (# 0123146) S-STEM academic scholarship program for upper division engineering and computer science (designated as ENGR) students materialized at Arizona State University with about half of the students being transfer students. This directed attention to the need for more support for potential and actual transfer ENGR students. After working with six local Community Colleges (CCs) for several years (2003-2007), in 2008 the authors began working with three non-metropolitan CCs. This program grew to five non-metropolitan CCs and was supported by an NSF STEP grant (#0856834). This program worked in partnership with the Academic Scholarship and Professional Development Program which had been established through NSF S-STEM grants. During this past year we have added four additional CCs, all HSIs, to our program through a supplement to an NSF S-STEM grant (#1060226).

The authors describe the highlights on this ongoing program and the primary lessons learned both in the administration of such a program and in working with CC students. Included are main research results obtained through focus groups and surveys. These findings are noteworthy because scholarship students in this program are graduated at a 95% rate and 50% of them continue right on to graduate school. These rates are much higher than the usual 70% graduate rate for upper division transfer students and the less than 15% who go right on to graduate school.

Sustainability is also addressed, including how the academic and professional development course is now offered to all transfer students through the Dean's Office. Future plans for the program as the grant monies come to a close are addressed.

Introduction

In 2002, Arizona State University (ASU) was awarded a National Science Foundation (NSF) S-STEM scholarship award (# 0123146) for upper division engineering and computer science students, with an emphasis on females and underrepresented minority students, all with unmet financial need. This program was administered out of the College of Engineering and Applied Sciences. Beginning in 2000, ASU had been awarded an NSF S-STEM award for lower division engineering and computer science students (hereafter known as ENGR students). This program also had an emphasis on underrepresented minority students and females. It recruited heavily from a local high school summer program in mathematics for underrepresented minority students. An early observation of the first participants of the upper division program beginning in 2002 was that several of the students were transfer students from local community colleges (CCs). The authors suspected that these transfer students might just be the tip of a large iceberg of students who sought and could benefit strongly from a "supportive hand." ¹ There were no programs at that time specifically for new transfer students in ENGR; the only option available to learn about life at a large school for these students was to join freshmen students in an ASU

101 introductory class. Transfer students averaging age 25 are not particularly enthralled to be in class with 18 year olds who are very interested in what happened in the dorm last night. The first author and director of the NSF STEM for upper division students then wrote a second successful proposal (#0324212) to NSF to support upper division transfer students in an S-STEM program. In fall 2003, this second S-STEM program began. At first, transfer students and native students meet separately, but this proved to be difficult to schedule and by striving to meet the needs of the transfer student, the native student was also well-served. In addition, the native students, in some cases, could act as mentors to the new transfer students in helping them find resources that could help them academically and socially.

At the same time, 2003-2005, a \$400K NSF grant (#0315817) was awarded and shared with six local community colleges (CCs), all part of the Maricopa County Community College District, one of the largest CC districts in the nation. A program entitled Maricopa Engineering Transfer Students (METS) was begun. When this program concluded, the authors determined to use what they had learned with local CCs to work with non-metropolitan CCs. The authors then received a one year NSF exploratory grant (#0836050) to work with three non-metropolitan CCs. Based on this successful project, ASU was awarded a five-year STEP grant from NSF (#0856834) to work with five non-metropolitan CCs, only one of which was within an hour's drive of the university; most are about three hours distant. After the program was expanded out from Maricopa County, our acronym METS was defined to stand for "Motivated Engineering Transfer Students" with an understanding that computer science is included in the term "engineering."

Our "Motivated Engineering Transfers STEM Talen Expansion Program (METSTEP)" has as its **mission**: to enrich the engineering student experience – to recruit, graduate, and send to graduate school students in engineering and computer science with unmet financial need, especially rural, women, and underrepresented students from community colleges. The program strives to support the students academically, socially, and financially and follows Tinto's² philosophy quite closely. He advocates that the main mission of universities in regard to retention is to:

- High expectations
- Academic, social, and, if needed, financial support
- Immediate feedback
- Involvement

The authors have high expectations for the students. The students are encouraged and expected to go right on to graduate school. Most transfer students are looking forward to getting the Bachelor's degree and then going out to make a good salary. The students are told of the myths about graduate school, why it is important, how to go about applying to graduate school (taught by graduate students), and hear a panel of graduate students each semester tell what graduate school is really like. The major support for academics is through the Guaranteed 4.0 Plan,³ which is a learning system especially for ENGR students. The students are encouraged to participate in two ENGR related organizations, they are given quick feedback on their assignments, and encouraged to study in groups.

The main three goals in working with the CCs were:

- Encourage and support CC students to consider a major in engineering and computer science
- Help students transfer and support them after they are at ASU
- Help build and strengthen engineering programs at the CCs

At the beginning of the NSF scholarship transfer program it was not clear what should be emphasized and what the best program would be. However, after working with transfer students over the years and growing the program based on what was learned, the authors have a program with excellent results. The graduation rate is 95% for scholarship transfer students compared with an ASU 70% graduation rate for upper division transfer students. This 70% rate is average for the nation according to Noel & Levitz.⁴ At the same time, about 50% of these students who graduate go right on to graduate school full-time and additional students go to graduate school part-time or later. The national average of engineering graduates going right on to graduate school is less than 20%.

In the beginning, we held only about three meetings per semester for the transfer scholarship students. The authors did not want to burden them with extra work, but at the same time, wanted to encourage them, support them, and be available to answer questions or alleviate fears. Looking back, the authors can conclude that the essential items for a successful ENGR transfer program are the following:

1. Program Plan/Philosophy: support students academically, socially, and financially
2. Passionate Program Leaders
3. Strong Community College partners
4. Transfer Center: a place for students to meet, study, network, get questions answered from staff, to call “home,” and hopefully contains a kitchen
5. Passionate, creditable Center Director and staff (successful transfer students)
6. For-credit “Academic Success and Professional Development” class
7. Refreshments to make the students feel “special
8. Scholarships to hold students accountable and to allow them to work less
9. Institutional Commitment

Encouraging and Supporting CC Students to Consider ENGR

Community colleges are a largely untapped resource for more engineering students, with high female and underrepresented minority enrollments. Many schools work with CCs, but few university ENGR faculty actually interact with CC students. About 30% of the ENGR transfer students that ASU receives only decided on their major at the CC. This means that there are many CC students who have not decided on their major. A sobering fact is that in California, 70 percent of CC students fail to graduate or transfer.⁵ In order to build a strong partnership with CCs in order to be able to access and work with their students, **passionate program leaders** are needed.

The authors had an institutional history of working well with students to enhance their education, with an emphasis on females and underrepresented minority students. After receiving transfer program funding, the authors had support for ENGR faculty to actually travel to CCs both local

and rural. It was not very difficult to work with large, local CCs. A “Be An Engineer” Day can easily be arranged. Mathematics and science teachers excuse their classes so the students can attend an hour event featuring engineering projects, a professional engineering panel, a panel of engineering student models, and refreshments. With just a small amount of advertising and the course releases, such an event could easily gather a crowd of 75 – 100 or more students, some of whom were being challenged to consider ENGR as a career for the first time. The same “Be an Engineer” scenario was tried at non-metropolitan CCs, but did not work. Because the non-metropolitan CC usually has fewer and smaller math and science classes, the best approach there was to have the ENGR professors visit the CC math and science classes and present ENGR to a captive audience. CC engineering and science divisions were willing to provide a solid agenda of math and science class visits.

Since most of the CCs were about three hours distant from ASU, this meant that the professors visiting the CCs had to rise by 5:30 in order to get to the CCs and address most of the math and science classes for that day. It is well known that research has shown that the best role models for our visits would be ENGR student role models; however, since our trips to the CC was an all day trip, we could not include students since this would make them miss classes. This meant that the professors (in this case an electrical engineering Hispanic male and an industrial engineering Caucasian female) had to be passionate about their work in order to interest students who did not have ENGR on their career horizon. Many of the transfer scholarship students first thought about ENGR in those classroom visits. These two professors were the first engineering professors that had ever visited with students on the campuses at all five non-metropolitan schools.

In order to make this work, **strong community college partners** are needed. As part of the NSF STEP grant a CC Advisory Board was formed which included a liaison from each CC. As part of the grant these liaisons were paid a small stipend to administer grant scholarship money and make arrangements for ASU professor visits to their school and to bring students from their CC to ASU for a visit each semester. Arranging the classrooms for the professor’s visit was key to the success of the project. At first some CC instructors would only allow 15 minutes for the authors to bring an ENGR message. Part of the message included encouraging the CC student to take as many math, science, and engineering courses at the CC as they could. Although actually attaining an Associate’s Degree is not important, the students were encouraged to stay at the CC until they could no longer take courses that would transfer into their ENGR degree at ASU. After a first visit, most instructors would let professors have an hour or their entire class period of 75 minutes. Several papers have been published detailing our classroom approach with the students.⁶⁻¹⁹

As a result of these efforts, very strong CC partners were developed. Though the Advisory Board meetings and exchange of information, the CC liaisons also received help from each other on best practices.

Helping and Supporting Transfer Students at ASU

All of the 22 community colleges in Arizona are connected through a course equivalency guidebook, so there are complete articulation agreements already in place. Any course taught at a

CC is shown its equivalent at each of the three major public universities in the state of Arizona. This helps potential transfer students know which of their courses will transfer to an Arizona university degree. Transfer may still be somewhat complicated and most CCs do not have a full lower division engineering program available. Potential transfer students are encouraged to get in contact with an academic advisor in their intended major to make sure of what courses will still be needed for a Bachelor's degree after transfer. Also, the authors were involved with maps which have been developed by ASU so that any student in a CC can have a map in their particular major showing what courses can be taken at their CC and what ASU courses will be needed for a degree in their major.

The transition, from a small CC with small classes and free parking, can be difficult. Primarily the new transfer student doesn't know where the resources are and where to go to ask questions. In addition, most new transfer students feel very alone. A **transfer center** is very helpful: a place for students to meet, study, network, get questions answered from staff, to call "home," and to hopefully include a kitchen for food for events.

At first a small half office was called a "Transfer Center." After receipt of the STEP grant, the authors were given their choice of two center sites and were able to move into space that had recently been renovated for a center, but never occupied. This space provided adequate room including private office space for a Director, a conference room for meetings (up to about 30 students), and an area for computers and study tables, as well as desk space for several students to staff the center. Adjoining the Center was a kitchen which made it very handy to store water, soda, and food for events. The area is approximately 1,300 square feet. At first there were times when the Center appeared to be quite empty. The administration suggested that other groups might be moved in the space with the transfer students. Additional occupants were resisted on the grounds that having other groups would change the ambiance of the center as a home for transfers. Fortunately, no one else was moved into the space and the center has grown to accommodate 300-400 students per semester. About 70% of the students using the space are transfer students. The non-transfers usually attend the Center as friends or study groupmates of transfer students. This Center is also used for events with visiting community college students. The Center is a good recruiting tool because potential transfers know that there is a place where they can talk to other transfers and get help as needed.

Along with the actual space, a **passionate, creditable Center Director and staff** (successful transfer students) are needed for success. A director with both a Bachelor's and Master's degree in engineering, some engineering experience, and a passion for working with students makes an excellent director. The director also trains and helps enhance the skills of the transfer students working in the Center. Transfer students know that they can come into our METS Center any time of the day and be able to ask questions and get assistance. An incentive of 25 pages of free printing per week helps to get students interested in coming to check out the center. Having dedicated space saves a lot time in scheduling meetings. In addition to seven regular meetings each semester for the two credit Academic Success and Professional Development class, industry information sessions, and meetings with visiting CC students are also held in the METS Center.

When the S-STEM scholarship programs began, the students were invited to three or four seminars per semester on general topics to help them. The meetings were primarily for networking and answering questions. Although assignments were given and attendance expected, there was no enforcement in place. The program then changed the seminar to a one-credit Academic Success class that can be repeated since the syllabus changes each semester. This course is required by NSF scholarship students and also attended by any other interested upper division ENGR student. By student request, this class is now a **two-credit “Academic Success and Professional Development”** repeatable class which has seven 75 minute meetings each semester. Students new to the course take an hour introduction course to the 4.0 Plan at the beginning of the semester. The course may count as a one-credit replacement for ASU 101, but otherwise does not count on a Program of Study, also the grade does count in the GPA. A major basis for the course is the “Guaranteed 4.0 Plan” learning system by Donna O. Johnson Mackey designed for ENGR students.³ The authors found that “transfer shock” in academic grades can be stopped if students will take this system seriously.

This class with the “4.0 Plan” is considered to be the main reason that the graduate rate of the scholarship students is so high and that 50% of these students go right on to graduate school. The course includes the following topics: detailed time management, elevator speech, resumes, how to work a career fair, planning for a job or a career, Carlson’s “Don’t Sweat the Small Stuff at Work,” career planning for 10 years past the Bachelor’s degree, portfolios, interviews, internships, graduate school, and research. The questions and answers to over 100 pertinent ENGR career questions are posted on the METS website: www.asu.engineering.mets. More details about the Academic Class can be found in publications.

From the beginning, **refreshments** have been served at the scholarship meetings in a nice carpeted room. This has continued in the Academic Success and Professional Development class. In this way, the students **feel special**, and not as a remedial student, or one who need special help. The atmosphere of the class is casual, but serious, with encouragement. Many students testify that the reason they enroll in the class semester after semester is that it helps keep them doing what they should be doing.

The **scholarships** to hold students accountable and to allow them to work less are very important to the program. Although students without scholarships attend the Academic Success and Professional Development class, those with scholarships tend to withdraw from the class less and do better with their grades. It is assumed that this is because the scholarship students know that they will lose their scholarships if their GPA goes below a 3.0 and if they don’t earn an A or A+ in the course. The scholarships are very important to the potential transfer student who is hesitating to do a transfer because they are afraid they will not have enough money to continue at a university. The NSF S-STEM scholarship or the equivalent scholarship through the STEP program has made this difference and allowed the student to not have to work or to work less.

Institutional commitment is also very important to the well-being and survival of a program such as has been described. As a requirement for the STEP grant, a Board has been formed consisting of a liaison and the chief academic officer from each CC, as well as an ASU Vice-

President of Affiliates. Strong letters of support from this board have accompanied proposals for additional funding from NSF.

The benefits of a special class for new transfer students has been recognized by our Dean's Office and it began offering a one-credit Academic Success and Professional Development class a few years ago. There are now several sections offered each semester, one-time, in a seven-week session at the beginning of each semester. This class was built on the two-credit Academic Success and Professional Development class that has been described. Some students enroll in the two-credit success class after completing the one-credit success class. All of the transfer students are invited to use the METS Center.

As the STEP funding is coming to a close this year, our Engineering Schools has pledged to keep the METS Center open for transfer students and to support transfer students to staff the center. They are not willing, however, to support a center director as has been described in this paper. Scholarship funding will be given for the next academic year. New funding is being sought to be able to continue the program in more than just a minimal way.

Building and Strengthening CC Engineering Programs

During the years of our STEP grant, the authors have worked with the CCs to help develop their engineering programs. One of the five schools did not have an engineering program when this collaboration began, but now it does. When the authors began working with the five schools, there were 80 ENGR transfer students at ASU from these schools. In six years this number increased to 187 students. Major administrative changes have occurred in each of the five CCs during the last six years to affect the engineering programs. Due to these changes some of the colleges are somewhat in limbo at this time and are defining again their commitment to engineering. In other schools, in spite of change, their commitment to engineer remains strong and is growing.

A primary focus of this research has been to understand how to best get the attention of CC students so they will consider ENGR as a major. As more students indicate an interest in ENGR, the CCs will better able to provide the proper courses for them. The authors assist students in the transfer process and then help support them when they transfer. Focus groups, surveys, and interaction with the students have been used to learn best practices and better ways to support them. The focus of the academic scholarship and professional development program has been on students who have at least a 3.0 GPA, are full-time upper division ENGR students, are US citizens or permanent residents, and have unmet financial need. The program also had a focus on females, underrepresented minorities, and first-generation students. In addition to having the goal of graduating the transfer students, student were encouraged to go on to graduate school full-time after receiving their Bachelor's degree.

Results

The authors have worked intensely with CC transfer students for nearly 15 years. Much has been accomplished including helping to establish an engineering program at one CC and strengthening other CC engineering programs. The number of transfer students from the five specific non-

metropolitan CCs has doubled since this work began. Research was conducted and published on better ways to recruit CC students to ENGR and on how to best support ENGR students and get them to go to graduate school. The scholarship students have graduated at a 95% rate and 50% of them continued right on to graduate school in ENGR majors. These rates are much higher than the usual 70% graduate rate for upper division transfer students and the less than 15% who go right on to graduate school.

Conclusions

In spite of its success, the program is now at a critical point of sustainability. The two-credit Academic Success and Professional Development class has been partially duplicated by a one-credit Academic Success and Professional Development class. As grant funds have come to an end, the METS Center will be continued, but at this time, without a Center Director. Transfer students will staff the Center and be funded by the Dean's Office. Thanks to a supplement to an S-STEM grant focusing on Hispanic Serving Institutions, scholarship money is available for one more academic year. The scholarship part of the program will then end if additional new funding is not secured.

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