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Work in Progress - Increasing Transfer Student Enrollment, Retention and Graduation through the Strengthening Transitions into Engineering Programs

Stephanie G. Adams¹, Lance C. Pérez², John J. Ballard³

Abstract –Large populations of students are matriculating to community colleges (CC). However, transferring from a CC to 4-year undergraduate engineering degree program is often quite difficult. There are few, if any, engineering courses offered at the CCs. In addition, long prerequisite chains reduce many transfer students to Freshman or Sophomore status, even though they have had two years of post-secondary education. The University of Nebraska-Lincoln (UNL), Strengthening Transitions into Engineering Programs (STEP) is a program designed to facilitate the transfer of CC students to undergraduate baccalaureate engineering degree programs. The program consists of four engineering courses taught at the CCs with support from UNL and several complementary student support programs. This paper discusses the specific courses and strategies being implemented and the progress to date of the UNL STEP program.

Index Terms – Transfer students, Transfer Pathways, Community College

INTRODUCTION

There is a nationwide need for engineering talent, especially from minority and female populations [1],[2]. Across the nation, high school graduates are increasingly beginning post-secondary education at community colleges (CCs) and then transferring to 4-year institutions. According to the *Higher Education Task Force 2004 Baseline Report: Challenges and Opportunities for Nebraska* [3], there is an increase in the number of students going to CCs in the State of Nebraska. Transferring from a CC to a 4-year undergraduate degree program is always challenging, but is especially difficult for potential engineering students due to the lack of engineering courses offered at the CCs and the long prerequisite chains frequently found in engineering curricula.

While articulation agreements exist between the CCs and some UNL disciplines, no agreement is in place with the College of Engineering (COE). The implication is that students who transfer to the COE lose their junior standing even though they have completed two years of study. These students would then often take nearly double the engineering and science course load of students who began their education at the 4-year granting institution trying to “catch up”. As a

result, student’s GPA and overall feelings of success suffers. To address this issue, COE faculty and the Chief Instructional Officers of the CCs propose to develop four introductory engineering courses that can be offered at the CCs and that will transfer to UNL as engineering courses in most undergraduate engineering curricula. This effort is being funded by a 5-year National Science Foundation (NSF), Division of Undergraduate Education, Strengthening Transitions in Engineering Programs (STEP) grant. UNL is currently in the first year of this grant.

PROPOSED SOLUTION

The University of Nebraska-Lincoln (UNL), in partnership with Nebraska’s six community colleges, has designed a preprogram which was recently funded by the National Science Foundation to institutionalize an effective program that enables students to complete select freshman and sophomore engineering courses at the CCs and transfer seamlessly into the UNL College of Engineering (CoE). The UNL STEP Program has three components: 1) developing and implementing four introductory engineering courses that will be taught at the CCs; 2) establishing a complementary set of student supports that facilitate mentoring, community building, and retention, particularly among women and minorities; and 3) facilitating paid internship opportunities to complement the high quality instruction students will receive in the CoE.

I) Introductory Engineering Courses

The courses will be developed by teams consisting of the PIs, UNL faculty from appropriate disciplines, and CC faculty that will be teaching the respective course. ENGR 101 and ENGR 201 will be offered beginning the Fall 2007 semester. The remaining courses will begin in the Spring of 2008 with all course offerings in a steady state by the Fall of 2008.

II) Student Support

The following will serve as the foundation for student academic and social support to ensure students success.

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Class	Hr	Purpose
ENGR 101	3 chrs/ 4.5 qhrs	Freshman Multidisciplinary Design: Introduce freshman students to the engineering problem solving process in the context of several disciplines and develop teamwork and communication skills.
ENGR 102	3 chrs/ 4.5 qhrs	MATLAB Programming and Problem Solving: Computer programming course that teaches structured programming and problem solving using computers. Consists of a sequence of programming assignments that require students to write MATLAB programs to solve engineering problems.
ENGR 201	3 chrs/ 4.5 qhrs	Introduction to Circuits and Electronics: Basic analysis of passive and electronic circuits.
ENGR 202	3 chrs/ 4.5 qhrs	Engineering Statics: Basic engineering statics that will be based on the existing UNL course.

TABLE 1: COURSE DESCRIPTIONS FOR STEP CURRICULUM

Campus Visits. Students from CCs will attend transfer workshops on the UNL campus. During the workshop students will also attend information sessions, hands-on demonstrations, and presentations by faculty and/or current students, tour the college and the university, and make classroom visits.

Summer Transfer Enrichment Program. Many transfer students are understandably nervous about moving from a small college to a large university. The summer after a student’s sophomore year, they are invited to a free multi-day campus visit to learn about campus resources and meet the people who will make UNL feel like home. This provides students the opportunity to network with future classmates and talk to faculty about what courses to take.

Parent Orientation Program. Parents get their questions answered during a one-day seminar that covers topics such as academic majors and degree requirements, typical engineering students’ experiences, the College of Engineering’s expectations, nonacademic support services, and adjustments transfer students may face. Parents develop their own network with other parents.

Peer Mentoring Program. Current engineering students will help transfer students adapt to university life during their first year at UNL. Peer mentors counsel others in coping with study demands, understanding the university’s expectations, and developing and improving study strategies.

III) Internships

Students will be required to complete a 10- to 12-week summer internship in their field of study. Internships help students gain work experience and connect concepts learned in the classroom to real-world experiences. The internships will take place during the summer following the freshmen and sophomore year. An internship experience enhances classroom experiences by providing practical work experiences in areas related to course content and career goals. Internships will also serve as a way for students to gain valuable work experience, connect classroom experiences and concepts to real-world experiences, gain a better

understanding of corporate America, and earn money for school expenses.

To facilitate these internships, UNL plans to work with organizations such as INROADS, the Nebraska Chapter of the National Society of Professional Engineers (NeSPE), and the American Council of Engineering Companies (ACEC) to identify internship opportunities for student participants.

PROGRAM GOALS

The programs goals for this five year effort are:

1. An increase in the number of students transferring into engineering at UNL such that by the end of the project, the percentage of transfer students choosing engineering is equal to the COE’s percentage of total students enrolled.
2. An increase of 100% of the number of underrepresented minority students transferring into the COE during each year of the grant period.
3. An increase of 100% of the number of women transferring into the COE during each year of the grant period.
4. A minimum retention rate of 80% for all transfer students.
5. A minimum graduation rate of 65% for of all transfer students after three years of enrollment in the COE.

The progress associated with this grant is being assessed and monitored by an Internal Advisory Board, External Advisory Board, Evaluation Team and the Chief Instructional Officers of the Community Colleges.

CONCLUSIONS

UNL is currently in the first year of a 5-year NSF STEP grant that supports a statewide effort to facilitate the transfer of community college students into undergraduate engineering degree programs. During the first year, the four courses are being developed in a partnership between UNL and the CCs and developing programmatic materials for use by support staff.

REFERENCES

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