AC 2008-1889: TRANSFER SUCCESS OF CIVIL ENGINEERING TECHNOLOGY DEGREE COMMUNITY COLLEGE GRADUATES TO A BACHELOR DEGREE CIVIL ENGINEERING TECHNOLOGY PROGRAM

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ABSTRACT

This paper analyzes historical data of transfer students coming from two community colleges offering Associate of Applied Science Degrees in Civil Engineering Technology entering into a Bachelor of Science in Civil Engineering Degree program at a near by University. A review of literature indicates that many degrees offered at the community college are intended to be "terminal" by their design. An analysis of the data tracks a series of students through courses in which the engineering technology specific pre-requisites were taken at the community college.

The courses were chosen to represent a student's "critical path" of sequential courses required by the university. The author's experience with many of the students at both levels has indicated that the transfer student performs as well as the student beginning at the university level through a series of critical courses. The data compares continuing university students and transferring community college students on success measured by final grade point averages. The paper also compares and contrasts the objectives of the each institution.

The main objective of this paper is measure the success of transfer students entering a university and determining how:

- The students compare with university students.
- The students compare with the university statistics of all community college transfer students.
- The curricula at both institutions align.
- Well the students progress through the remaining courses.
- An effective transfer agreement makes for a smooth transition.

On the basis of the author's experience, existing literature and the data results of this study, it can be concluded that the community college transfer can move efficiently through a remaining two years of a Civil Engineering Technology Degree.

Project Scope

The scope of this paper was to analyze ten years of data available on transfer students coming from a community college with a Civil Engineering Technology Degree or Engineering Technology Degree (with an emphasis in Civil Engineering) to a University offering a Bachelor of Science in Civil Engineering Technology. In order to qualify as a transfer student for this study the student must have completed a series of courses which serve as the prerequisites of the upper division courses at the university. The author has chosen to define these courses as the critical path courses. The transfer student is then measured by obtaining the GPA of the student after having completed the BSCET and averaging with the other transfer students having completed during that ten year period. That transfer student group was then compared to the average of the all of the Civil Engineering Technology graduates for the same period. The transfer student success was then determined by comparing the results.

Since the author chose to use such a specific degree at both institutions there was not much available literature to compare with the author's results. This paper introduces a comparison of specific data as apposed to the transfer student having completed a series of general transfer courses.

Introduction

Today's universities recognize the important and vital contribution that community colleges and junior colleges are making in the education of tomorrows workforce. In the state of Colorado the university and community college sectors guided by the Department of Education have teamed up to sponsor ongoing meetings and dialogue between the two sectors to enhance transferability. Policies such as the Colorado Community Colleges' Associate of Arts (AA) and Associate of Science (AS) Core Transfer Agreement have paved the way for a guaranteed transfer of specific courses to many of the state funded universities and colleges. Many other programs attempt to make a seamless transition from the community college to university by a defined curriculum agreed upon by both institutions and referred to as a two plus two agreement. One of the biggest hurdles encountered by students is the uncertainty of their degree choice or perhaps career choice and many a student find themselves taking several experiential courses in the early years of their post secondary experience.

This paper looks at students who are very focused in their degree plan and have chosen a specific degree at the community college. These students then transfer into the university setting to complete a bachelor's degree. Each student in this study have been awarded an AAS (Associate of Applied Science) degree in Civil Engineering Technology (CET) at any of the Colorado Community Colleges offering the degree or have taken a

significant number of the required courses defined in the two plus two transfer agreement. The students are tracked through a series of courses which are required for successful completion of the BSCET (Bachelor of Science in Civil Engineering Technology). This sequential series of courses will be referred to as the "critical path". This path defines the pedagogical sequence to take the student through the evaluation, analysis and design components of a Civil Engineering Technology Degree.

Student Success

Student success for this study was defined as a university student having completed the required courses necessary for a Bachelor of Science Degree in Civil Engineering Technology between 1995 and 2005. The levels of success were determined by a BSCET student's grade point average (GPA) at the time of the graduation. A successful community college transfer student was defined as student having completed the coursework necessary for an Associate of Applied Science (AAS) degree in Civil Engineering Technology. The AAS student must have also completed the Statics and Strength of Materials course at the community college which issued the AAS degree.

Curriculum

A key factor in this study is the existence of specific transfer agreements between the institutions. The agreements specifically define the degree requirements at two community colleges and transition those requirements to the bachelor degree requirements in Civil Engineering Technology at the granting university. The community college requirements are specifically for students completing an AAS degree in the Engineering Technology. The historical research of the community college system has shown an evolution of the degree from Civil Engineering Technology to Engineering Technology which each degree was previously titled. The community college system also developed a common course numbering system which drove the change from CET to ET. This change helped to define each individual course by adopting common course numbers, common course outlines and common course objectives. Each of the paralleling university classes were compared to the common community college courses and the transfer agreements were adopted.

The two transfer agreements outline a match of credit for about 45% of the required credit hours at the university. By the transfer agreement being specific to the ET Degree the student is prepared with the pedagogical sequence of the BSCET at the university and prepares the student to blend with students beginning at the university from the freshman level.

The Colorado Community College System also has in place a policy for the Colorado Universities and the Colorado two-year colleges which defines a list of courses which if taken in the proper sequence and grouping can define an AA (Associate of Arts) and an AS (Associate of Science) Degree. This policy is designed to have community college students successfully complete numerous general education courses in the areas of English, humanities, social sciences, natural science, math and computer science which will prepare them for transition to a University or 4 year state college. The AA/AS transfer policy, when compared to the BSCET degree requirements, satisfies 46% of the program. An analysis of the students taking advantage of this policy did not fit the requirements of the AAS transfer student for this study. This author has chosen to exclude this type of student from the study.

The Critical Path

This study focuses on students who are taking degree requirements at multiple institutions offering similar courses for the first two years of study. During the first two years of study the institutions have specific course work in surveying, drafting, CAD (computer aided drafting), and ET technical sciences. The surveying, drafting and CAD courses can be defined as terminal since the student will not take any critical path coursework at the junior or senior level, which require them as prerequisites. The ET technical science courses however become very important stepping stones to the continued success of the student. The author has chosen to define these ET technical science courses as the beginning of the critical path through a Civil Engineering Technology Degree. The technical science courses include a three credit hour course in statics followed by a minimum three credit hour course (although most of the institutions use a four credit hour course) in strength of materials. Successful completion at the sophomore level of these courses will transition the student into the junior and senior level courses at the transfer institution. The statics and strength of materials courses are only included in the transfer agreement using the AAS in Engineering Technology or Civil Engineering Technology.

Once the student has successfully completed the first two courses in the critical path the students move on to the university level with courses which use the skills, attitudes and knowledge gained in Statics and Strength of Materials to enter the analysis and design classes. The author has chosen to track the students through the Structural Analysis, Reinforced Concrete Design, and Structural Steel courses as the next steps in the critical path. The Structural Analysis class however was only implemented into the BSCET during the last two years of the period chosen for this study therefore removed from the study. The final course

used in the critical sequence was the capstone course required for all graduating seniors.

The Transfer Agreement Effectiveness

A study of the transfer agreements indicated that various differences between the two community colleges and the university as well as different generations of the same agreement existed. All agreements consistently require Statics and Strength of Materials within the AAS degree. Various versions of transfer agreements came as programatical changes happened at both levels. It is this author's opinion that an agreement of this nature requires constant dialogue with all institutions involved to increase the probability of student success.

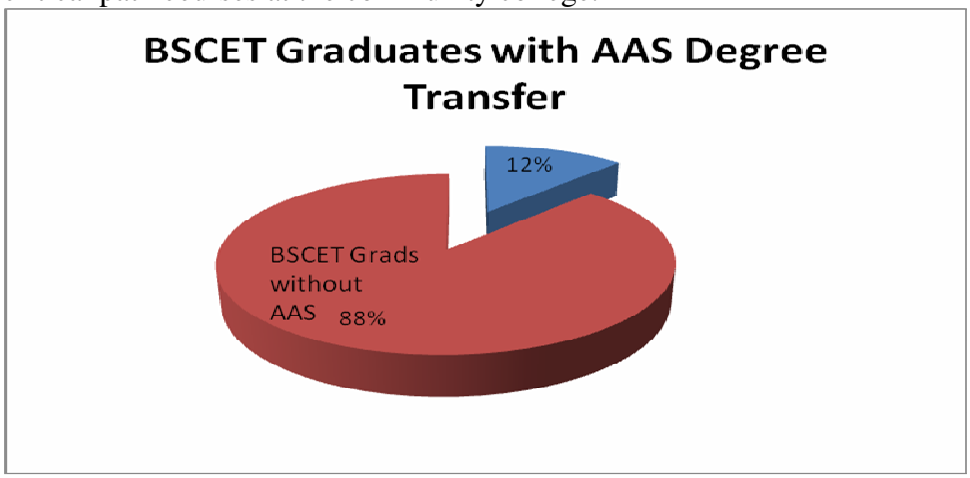
After a thorough evaluation of the curricula at both the community colleges and the university it was apparent that the mathematics requirement at the community college did not align with the university's plan for the mathematical sequence. The highest level math requirement for the community college AAS degree is College Algebra while the mathematical requirement at the university is a minimum of Calculus.

Therefore, the transfer student can easily move along the mathematical sequence when enrolling at the university. However, the BSCET degree at the university recommends that students complete the Calculus course prior to or concurrent with Statics and Strength of Materials courses. Therefore a student who has completed the AAS degree at the community and has fulfilled the transfer requirements could still be at a disadvantage when entering the junior level courses at the university. The author did not compare students starting at the university and completing the math sequence to students starting at the community college and completing the transfer agreement requirements at this time. The author intends to extend the study to encompass such a comparison.

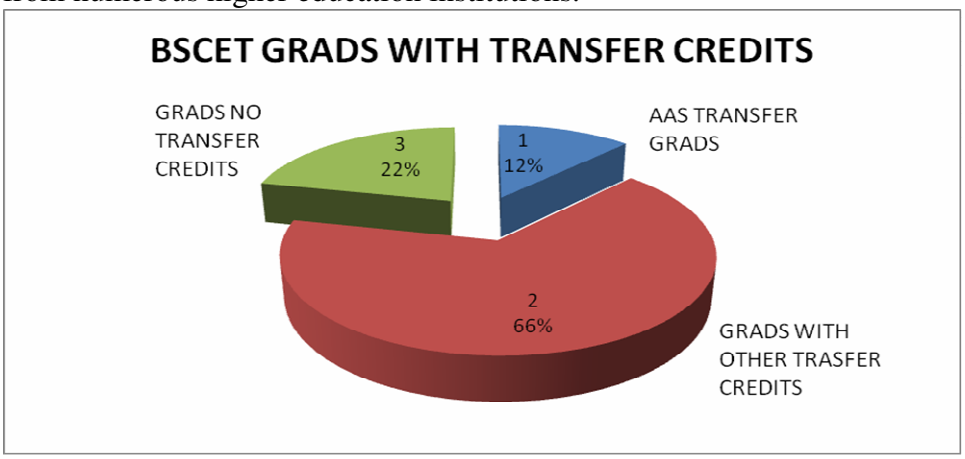
Results of the Study

Data was collected on students designating Civil Engineering Technology as their major, having successfully completed a Statics and Strength of Materials course (the critical path courses) at either the community college or at the transfer university, and having received a Bachelors of Science in Civil Engineering Technology between the Fall Semester 1995 and the Spring Semester 2005. Each student's transcript was analyzed with the student's cumulative Grade Point Average (GPA), number of transfer credit hours, and graduation year was recorded. Additionally the student was identified as transferring from the community college and having successfully completed the transfer agreement requirements between the community college and the university.

During the study period 12% of the graduates were transfer students from the community college having completed the AAS degree and taken the critical path courses at the community college.



Additionally 66% of the remaining graduates had at least 3 transfer credits from numerous higher education institutions.



All the graduates during the study period earning a BSCET were analyzed and their cumulative grade point averages (GPA) were recorded. The average for the entire group for this period was 3.156 on a 4.0 scale. The data for graduates who transferred from a community college with a Civil Engineering Technology AAS degree yielded an average of 3.160 on a 4.0 scale.

Conclusions

The results of the study showed the AAS transfer student made up 12% of the BSCET graduates at the university within 1995 and 2005. The students, who completed an AAS degree at a community college with the specific transfer curriculum defined, maintained nearly the same average graduation GPA of all BSCET graduates during this period.

A successful transfer agreement which requires very specific courses taken in a very specific sequence requires constant communication. Both the transferring institution and the receiving institution need to prevent changes to curricula without consultation of the each other. All evidence of the study indicates a smooth transition to the university setting is possible with successful completion of an AAS degree in Civil Engineering Technology at the community college.

This author intends to extend this study to analyze the completion to drop out rate of the AAS student and the BSCET student.

References

Colorado Community College System Website, Transfer information for Students and Educators, URL http://www.cccs.edu/EdServices/Transfer (visited January, 2008)

Pueblo Community College, Engineering Technology Degree, URL http://www.pueblocc.edu/Academics/DegreesCertificates/AssociateDegrees/E/ENT_Req (visited January, 2008)

Appendix

Transfer Students vs. Nontransfer Students

Graduation GPA	Transfer Y or N
2.654	Y
3.241	Y
3.063	Y
3.000	Y
3.739	Y
2.692	Y
2.885	Y
3.743	Y
2.635	Y
2.798	Y
3.314	Y
3.852	Y
3.747	Y
2.496	Y
3.689	Y
3.016	Y
2.435	N
2.809	N
2.571	N
2.875	N
2.905	N
3.429	N
3.239	N
3.333	N
3.094	N
2.807	N
2.117	N
3.883	N
3.082	N
3.232	N

Graduation GPA	Transfer Y or N
3.602	N
2.755	N
2.950	N
3.431	N
2.855	N
3.104	N
2.618	N
3.921	N
2.909	N
3.170	N
3.178	N
3.590	N
3.685	N
3.509	N
3.161	N
3.873	N
2.600	N
2.976	N
3.872	N
2.549	N
3.365	N
3.655	N
3.736	N
3.314	N
3.521	N
3.133	N
2.388	N
3.119	N
3.100	N
3.206	N

Graduation GPA	Transfer Y or N
4	N
3.735	N
3.562	N
3.145	N
3.947	N
3.606	N
2.436	N
3.620	N
2.078	N
2.613	N
3.413	N
2.910	N
2.789	N
3.783	N
2.603	N
3.346	N
4.000	N
2.463	N
3.561	N
2.873	N
3.739	N
3.138	N
3.239	N