



Using Enrollment Management to Influence Student Quality and Retention

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Abstract

Many state supported schools face a conflict between maintaining a quality education while serving increasing enrollment numbers. At Texas Tech University, engineering degree programs draw students to attend the university; in 2013, the size of the entering engineering cohort grew by 4 percent. Unconstrained growth, particularly in popular engineering programs (mechanical engineering and petroleum engineering) results in high student to faculty numbers that negatively impact the availability to convey a quality education. To manage growth in the engineering college, an enrollment management system was implemented in 2012 and employs program admission requirements and student performance as performance metrics. The purpose of this paper is to document the enrollment management plan's impact on first year-retention data for the first year of implementation as well as review the impact on student quality as indicated by the review of the computer science program, which has experienced retention and quality issues in the past.

Introduction

Enrollment management issues and student population size is a challenge faced by universities and colleges nationwide. Enrollment management issues are often discussed at the university admission level to control entire university populations or reach a desired student population goal.¹ Universities, whether public or private and 4-year or 2-year, are concerned with providing services to recruit students to their institution. Additionally, colleges and universities are focusing on improving retention of students, particularly STEM students, transferring from 2-year to 4-year institutions.²

Many state supported schools face a conflict between maintaining a quality education while serving increasing enrollment numbers in their engineering programs. At Texas Tech University, the Whitacre College of Engineering (WCOE) degree programs draw students to attend the university; in 2013, the size of the entering engineering cohort grew on average of 4 percent. Prior to 2013, the entering student cohort, defined as the student population entering each fall, grew as much as 12%. The growth observed in engineering is desirable to the university, which has set an enrollment goal of 40,000 students by 2020. However, the unconstrained growth, particularly in popular engineering programs (petroleum and mechanical engineering) results in high student to faculty numbers that negatively impact the availability to convey a quality education. Other programs, such as computer science, have long-standing retention issues and need to retain students in their degree program.

At Texas Tech, the enrollment growth of concern is due to the admittance of first-time students and transfer students and is independent of the retention issues existing in the college of engineering. As the university and the college of engineering focuses on retaining students as a strategy to increase student enrollment to 40,000 by 2020, the enrollment management dilemma created by high first-time student and transfer student admissions combined with improved retention rates will further create an enrollment management issue.

Retention is a national discussion and entering freshman readiness surveys indicate students may not have the dedication necessary to pursue challenging degrees in STEM fields and the high school preparation. More importantly, incoming freshman students may not see the value of the college education.³ Despite these attitudinal issues, students are entering engineering programs. Thus, the challenge is to retain the large number of students entering engineering program while removing the students who have no interest in being retained. Enrollment management activities must address these issues while addressing the pressure to grow the institution population without compromising engineering program quality.

To manage growth in the engineering college, an enrollment management system was implemented in 2012 and employs program admission requirements and student performance as well as performance metrics. The enrollment management plan was developed by a committee of faculty and staff advisors in the college of engineering. The plan addressed the increase in new admits to the college as well as strategies to remove non-completers in an effort to improve 4, 5 and 6 year graduation rates. The goal of the plan was to set milestones for students to reach while pursuing their education as well as set student quality metrics, which includes minimum GPA to remain in engineering, number of hours (18) that must be completed per year, and the number of times a course may be repeated.

This paper outlines the procedures employed, the impact on enrollment, and potential revisions of the program's elements related to student performance (the minimum GPA requirement). The paper does not address the impact of the minimum hours that must be completed per year or the number of times a course may be repeated. More students are required to leave the college for failure to meet the GPA standards as compared to the other two enrollment management strategies.

Enrollment Management Plan Approach

The WCOE at Texas Tech includes eight departments and ten different degree programs. The degree programs include chemical engineering, civil engineering, computer engineering, computer science, construction engineering, electrical engineering, environmental engineering, industrial engineering, mechanical engineering and petroleum engineering.

To enter in the WCOE, a student must be an assured admit to the university and all assured admitted students are denoted as a foundational engineering student with a concentration as their desired major (i.e., FNLD-program name for example petroleum, mechanical etc.). The academic qualification of the assured admission qualification is a function of class rank in combination with ACT or SAT score. The assured admission values are presented below (Table 1).

Table 1. Assured Admission Requirements for [school name]

High School Class Rank	Minimum Test Scores for Assured Admission	
	ACT	SAT
To 10 Percent	No minimum	
First Quarter (other than top 10 percent)	25	1140
Second Quarter	28	1230
Third Quarter	29	1270
Fourth Quarter	Application Review	

If the student is not an assured admit to the university, which would classify the student as a foundational student, the student is placed in pre-engineering. To qualify for foundational engineering from pre-engineering, a pre-engineering student must complete a minimum of 12 hours at Texas Tech, become calculus I-ready and maintain a GPA of 3.0. External transfer students entering Texas Tech must have a 3.0 GPA to enter engineering, which is similar to the requirements for internal transfer students (pre-engineering or other departments).

Once in the WCOE, engineering foundational students must maintain a minimum GPA of 2.5 to stay in engineering and qualify for their intended degree plan (i.e., mechanical engineering). This is a significant change compared to prior enrollment requirements. Previously, students were required to maintain in academic good standing with the university, which means the student cumulative GPA must be 2.0 or greater. Under the new enrollment management plan, if the student's GPA drops below 2.5, the student is placed on engineering probation and the student must attend an academic recovery workshop and mandatory tutoring once a week. Please note, a student may be placed on engineering probation and may be in academic good standing with the university.

If the GPA drops below 2.5 for two consecutive semesters, the student is expelled from engineering. Expulsion is managed by placing a Dean's office hold on the student's advising account so that when the student attempts to register for their classes, the student is unable to do so. If the student is enrolled in engineering courses, the student is notified they will be dropped from their engineering courses and are subsequently dropped from their courses. Once expelled

from engineering the student may not return to engineering. Please note, a student may be expelled from engineering and may be in good academic standing with the university.

The college of engineering forwards the names of students on the engineering expulsion list to the University Advising office. The University Advising office contacts the student to encourage them to make an advising appointment. The University Advising office contains tools to assist the student in identifying their interests, which can help them select another major.

The enrollment management plan was implemented for students entering fall 2012 and thereafter. As such, students entering the college must maintain a cumulative 2.5 GPA in order to obtain their degree. At any point during their study, the student may be placed on engineering probation or may be expelled from engineering. Additionally, students may be removed and readmitted on engineering probation. Students may even be placed on continued engineering probation if their semester GPA was greater than 2.5 but their cumulative, institutional GPA is below 2.5. The engineering probation and suspension decision must be made immediately upon completion of the semester (fall, spring or summer sessions) to ensure grade replacement does not alter a student's academic standing. The impact of grade replacement is addressed below. Lastly, students entering the college of engineering before 2012 are exempt from maintaining the minimum 2.5 GPA requirement.

Enrollment Management Plan Assessment Methods

The purpose of the data collection and analysis is to review the GPA from the 2012 fall semester and the 2013 spring semester to filter students achieving the 2.5 GPA requirements for continued enrollment in the WCOE. Data collection requires access to the university reporting tool (Cognos) to retrieve information on students in the administrative software (Banner) application used at Texas Tech University. The 2012 fall catalog year and the “pure” GPA is essential information for the analysis. Students can replace the grade of D or F with a higher grade of A, B or C when the exact course is taken again. The student’s transcript will show the previous lower grade and eliminate the course hours and grade points from the new calculation of GPA for the semester. This change in GPA can offer the appearance of a GPA greater to or greater than 2.5 in the previous semester. With assistance from programmers, a Cognos report was modified to include catalog year and pure GPA for each semester for each student. The cumulative GPA included the action of the grade replacement and therefore each student can take advantage of university grade replacement policy. For reliability, two reports contain similar information and were used to check to comprehensive reports. In addition, random visual checks of the students’ transcript were made for 10% of the total students on the probation and expulsion lists.

To determine the impact of the foundational curriculum and the 2.5 GPA requirement, student retention and performance was reviewed for computer science. Although desirable to know the

impact on all programs, the computer science department is small, this allows for a quick review and assessment of the impact of the enrollment management plan timely enough for this paper. Due to the implementation of foundational engineering and when it was instituted, all freshmen computer science students are foundational and almost no juniors or seniors are classified as foundational. Hence analysis focused on sophomores. In fall of 2013 the university database was queried for all currently enrolled sophomores who were either classified as being computer science majors or who were classified as foundational engineering with a computer science preference.

The data was divided between foundational and non-foundational computer science sophomores. Transfer students who had not completed at least 12 hours of credit at Texas Tech were removed from both sets. The mean was then computed for each set as well as for them combined. As the data showed a significantly higher GPA for foundational students, the analysis was performed again for data for students enrolled and classified as sophomores during spring of 2013.

The results presented in this paper do not include the impact of the pre-engineering student population. Pre-engineering students are not considered engineering students and the pre-engineering population does not count in the college of engineering enrollment numbers. As such, the aspect of the enrollment management plan discussed in this paper is not affected by the pre-engineering student population. The pre-engineering discussion is only presented for completeness of the admission process.

Enrollment Management Plan Results

At the end of the Fall 2012 semester, 48% of the entering 2012 cohort (freshman, transfers (sophomore, juniors, seniors and second degree students, n=727) were placed on engineering probation (Table 2). Of note, 377 of the entering 2012 cohort were in good standing at the end of the Fall 2012 semester.

Table 2. Academic Standing Summary of the Fall 2012 Entering Class

Classification	Number of Engineering Probation Students	Percent of Engineering Probation Students out of Total Fall 2012 Entering Class
Freshman	230	31.6
Sophomore	61	8.4
Junior	40	5.5
Senior	16	2.2
Second Degree	3	0.4
Total	350	48.1

Table 3 presents the academic standing of the Fall 2012 entering cohort upon completion of the spring 2013 semester. Of the 350 students on engineering probation, 150 students were expelled

from engineering and freshman constituted 29 percent of the expelled student population. Two of the three second degree students were expelled from engineering.

Table 3. Academic Standing Summary of the Spring 2013 Engineering Expulsion Students

Classification	Number of Spring 2013 Engineering Expulsion Students	Percent of Engineering Expulsion Students out of Fall 2012 Engineering Probation Cohort	Percent of Engineering Expulsion Students out of Fall 2012 Engineering Entering Class
Freshman	101	28.9	13.9
Sophomore	24	6.9	3.3
Junior	17	4.9	2.3
Senior	6	1.7	0.8
Second Degree	2	0.6	0.3
Total	150	42.9	20.6

By the end of the spring semester, 43% and 31% percent of the engineering probation students were expelled from engineering or returned to good standing, respectively (Table 4). Eighteen percent of the probation students chose not to return to engineering. Overall, the 21% and 67% of the total 2012 entering cohort was expelled or in good standing at the end of the spring semester.

Table 4. Spring 2013 Enrollment Management Plan Summary Statistics

Spring 2013 Enrollment Management Plan Classification	Number of Fall 2012 Probation Students	Percent of Fall 2012 Engineering Probation Cohort	Percent of Total Fall 2012 Engineering Entering Class
Expulsion	150	42.9	20.6
Not Returning	64	18.3	8.8
Continued Probation	29	8.3	4.0
Good Standing	107	30.6	66.6

The intended impact of the enrollment management plan is to ensure students meet a minimum quality before advancing to their degree plan. As such, retention of students may be decreased from year 1 to year 2 compared to historical data. In review of 1st year retention rates from 2002 to 2011, the average students continuing into the second year of their engineering program is 71% and varies from a low of 66% (2004 entering cohort) to a high of 79% (2007 entering cohort), and the standard deviation is 4% (Table 5). Although there is considerable variability in student retention during that 10 year period and the 2012 retention value is within the range of values observed, the 2012 cohort retention value is less than 9 of the 10 data points.

Table 5. Fall Cohort Retention From 2002-2012

Cohort Year (Fall)	Retained Into Second Year (%)
2002	68
2003	69
2004	66
2005	69
2006	71
2007	79
2008	76
2009	70
2010	74
2011	70
2012	67

Enrollment Management Plan's Impact on the Computer Science Program

In a review of the GPA of the 2012 sophomore students to the 2013 sophomore students that were and were not classified as foundational-computer science students. Computer science sophomore students that were classified as foundational performed greater than 0.5 GPA points higher than non-foundational computer science sophomore students (Table 6). The data suggests the enrollment management plan is managing the computer science population while improving student academic performance. The elimination of students with a GPA less than 2.5 would assist in improving the overall GPA of a class; however, the other implication is that students are improving their performance to stay in the college of engineering. The data presented below includes the average GPA for students at the time of expulsion so expelled students are considered in the cohort analysis.

Table 6. Comparison of Foundational and Non-Foundational Computer Science Student Performance

Category	GPA	
	Spring 2013 (number of students)	Fall 2013 (number of students)
Non-Foundational	2.5 (25)	2.46 (15)
Foundational	3.08 (16)	3.09 (35)
All Students	2.73 (41)	2.90 (40)

Recovering From Engineering Probation

In the semester a student is classified as engineering probation, the student is limited to enrolling in 14 or 15 hours of coursework and is encouraged to enroll immediately in the course(s) that are

negatively impacting their GPA so that the student may benefit from grade replacement. Grade replacement may not retroactively change a student's academic status from engineering probation to good standing; however, the replaced grade may be used in future academic standing decisions. The limitation in the number of hours a student may be enrolled is implemented to improve their academic success by managing a student's course load.

Before the semester begins, the students participate in the academic recovery workshop and develop an academic recovery plan. The students are strongly encouraged to enroll in a one credit hour class offered by the university that provides opportunities for students to develop and build effective learning strategies and personal management skills for academic life. Although optional for an engineering probation student, the course is required for a university probation student. As such, a student that is classified as engineering probation and university probation, the student is required to complete the one credit hour course.

The students are notified of their engineering probation status via email and letter. The letter is sent to the student's permanent address and is often discovered by parents. As such, many parents call the engineering dean's office to understand the implication of the student's performance upon their academic standing in engineering and the student's possible paths forward to recovery. The dean's office personnel reiterate the contents of the letter, which describe the academic recovery workshop, the tutoring opportunities available in engineering and the institution and outline the consequences if the students continue on the existing academic path.

Due to the expulsion consequence, engineering probation is a wake-up call for many students, as evidence by number of students from fall 2012 that returned to good standing (n=107) or remained as engineering probation (n=29) by the end of the spring 2013 semester. The enrollment management process opened communication lines with students to show that the college and university cared about the student and as such, the students communicate their concerns and needs with the dean's office personnel. Due to these connections, students were directed to academic (tutoring and student disability services) and in some cases, non-academic assistance (such as student counseling center) in an effort to obtain the help needed to improve their academic standing.

In response to the increasing academic standards, the dean's office has increased the availability of academic support. Tutoring is now available for any class (freshman to senior courses) within engineering and for all degree programs through the implementation of Ph.D. student tutoring program and undergraduate tutoring program. The number of hours of academic support has increased 100 percent through the use of Ph.D. students. Tutoring is physically offered in residence halls as well as in the designated tutoring rooms within the engineering academic buildings.

Summary

The enrollment management plan has reduced the population of the 2012 entering cohort to levels observed historically. The engineering probation and expulsion process has existed for one year and more data is needed to determine the long range impacts of the program, including retention of students between the second and third year. Additionally, the impact on student graduation rate remains to be seen. Preliminary data from the Computer Science program suggests the newly enforced GPA requirement of 2.5 improves student quality, as measured by GPA.

Increasing the GPA requirement to stay in engineering has produced other benefits. For instance, student mobility within the university is increased. Student mobility between colleges is much higher when the student is in academic good standing (cumulative GPA greater than 2.0), as compared to the impaired mobility of a student who is on university probation (cumulative GPA for one semester less than 2.0) or a student suspended from the university (cumulative GPA for two consecutive less than 2.0). The enrollment management plan has the ability to improve the university's student retention numbers.

Operationally, students try to challenge the expulsion process. Students expelled from engineering may choose to complete a university interdisciplinary degree. In this degree program, students select courses from three concentrations. Expelled students are requesting to take engineering courses to complete the interdisciplinary degree; however, the students do not meet the minimum GPA requirements of 2.5 for non engineering students to take engineering courses. The GPA requirement is clearly articulated in the course catalog; however, the expelled students are being advised to request admittance into the needed courses to complete the concentration. Although, completion of a concentration is supported, the concern is that students will exploit the concentration as a path to pursue an engineering degree without being an engineering student. To address this issue, the college of engineering must work with the University Advising staff to ensure the concentration path is not abused.

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