Baylor's New Engineering Admissions Plan- Phase I

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Abstract

Baylor University is best known for academic programs in medicine, liberal arts, business, law, and religion. Baylor's School of Engineering and Computer Science (ECS) is a relatively young and small component of the university, although ECS is Baylor's highest *U.S. News and World Report*-ranked school or college. Baylor's undergraduate recruitment and admissions process is centralized, and besides auditions required for performing arts programs, academic entrance requirements are the same for each of the academic units. ECS partners proactively with the offices associated with student identification and recruitment with a strong focus on attracting and encouraging prospective students who will raise the ECS student academic profile. Although admission to Baylor is classified as "more" selective, some students positioned on the lower range of the spectrum are not strong candidates to persist in an engineering or computer science curriculum. An effort was initiated for fall 2007 to better guide and serve students identified as academically at-risk, even before they enrolled. The process included phone conversations and interviews to better assess their preparation, motivation, and understanding of ECS. Although all of the accepted at-risk students were asked and encouraged to participate in the program, only a small percentage took advantage. Of those who did participate, all were enthusiastic and confident about their academic preparation and abilities. The outcome of this endeavor was that all of the identified students who were interviewed and enrolled at Baylor did so with an ECS major, although this sometimes was not the recommendation of the counselor. This feedback is being used to restructure and improve this intervention initiative, with the revised program design containing academic- and preparatory-skills components available during the summer and in advance of normal fall enrollment.

Introduction

The importance of engineering and computer science innovations and creativity to American prosperity and quality of life is widely acknowledged.[1] Many studies have documented the need and demand for U.S. engineers, especially in the Sunbelt states.[2,3] University and college academic engineering programs play a paramount role in supplying the nation's technical workforce through attracting, retaining, educating, and graduating a diverse and capable population of practicing engineers.[1]

Although collegiate education is often considered the first priority of engineering schools, their influence is also felt through k-12 outreach programs,[4] diversity enrichment activities,[5,6] and student recruitment efforts.[7,8,9] The rigor, challenge, and specificity of the engineering curriculum dictates

that admission requirements or preferences consider academic talent and preparation, motivation, and even institutional fit.[10, 11, 12] Upon entrance into the university's program, with the investment already made into recruiting and preparing for entering engineering students, there is a strong need and motivation to retain them until graduation.[13] Retention efforts including learning communities,[14, 15] interest groups,[16] first year experiences,[17] undergraduate research,[18] and peer pairing[19] are among the many student-retention improvement projects under investigation. Even with these very fine programs, student retention in engineering and computer science programs remains a great challenge.

Student retention, quality of student learning, and student engagement have long been a priority at Baylor University.[20] Recent initiatives in the School of Engineering and Computer Science include numerous related facets.[21] For example, the Engineering and Computer Science Living-Learning Center was launched in 2004,[22, 23] discipline-specific honors tracks were implemented in 2005,[20] appropriate technology missions projects conducted in 2006,[24, 25] and an Energy and Society Engaged Learning Group (ELG) was introduced in 2007,[26] and a second ELG on Computational Learning approved for 2008.[27]

It is difficult in the short term to greatly affect the quality and specific academic-preparation experiences of students applying to and entering engineering programs. However, some changes and efforts to sculpt and elevate the quality the entering freshman class, with the aim of improving retention, may be achieved through affecting admission criteria. At Baylor, with the exception of performing arts programs (which require auditions), admitted students may choose among any of the undergraduate academic units to initiate their collegiate studies. Though Baylor is moderately selective, students with academic-preparation credentials near the lower cut-off level are at high risk for retention in engineering and computer science. Most of these students are capable of successfully navigating less rigorous and intensive majors, but could be lost to the university if their first-year engineering academic performance is poor.

For students who applied to be a member of Baylor's fall 2007 entering engineering freshman class, it was decided to initiate further discussion with those whose SAT/ACT score was between the university's minimum, and one standard deviation below the ECS mean (below 1110 SAT/24 ACT). In addition to receiving the standard congratulatory acceptance letter from the dean, these students also received a follow-on letter asking them to contact the ECS Student Support Specialist to arrange for a phone or in-person interview. The content of this letter is shown in the box below.

> Dear <Name of Student>,
>
> Congratulations on your admission to Baylor University! At Baylor, we place high priority on students' academic, as well as personal, success. Success is due in no small part to being matched with an academic program that best utilizes your strengths and motivations.
>
> To that end, we would like to speak with you about your interest in the School of Engineering and Computer Science. At my request, our Student Success Specialist will be interviewing prospective Engineering and Computer Science majors. This interview will be an informal session meant to gauge your aptitude and motivation for success in

the School of Engineering and Computer Science, and is a vital part of you degree-selection process.

Please contact Adam Ecklund at Adam_Ecklund@Baylor.edu to schedule an appointment for a telephone or in-person interview. Interview appointments will be available April 10-13.

We will look forward to our conversation with you.

Sincerely,

Dr. Benjamin S. Kelley, P.E.
Dean, School of Engineering and Computer Science

The planned purpose of the phone conversation was to gage the student's motivation, interest, and preparation to study engineering or computer science at Baylor. If it was judged that the student would be better served by selecting and studying in a non-ECS major, then the interviewer (the ECS Student Success Specialist) would consider what other paths and Baylor resources might be appropriate for the student to investigate. Campus resources such as the Paul L. Foster Success Center and the Career Services office would be made fully available to these students, so that the conversation would remain as positive and constructive as possible.

A list of seven questions was suggested by the ECS faculty for inclusion in the interview. These questions ranged from asking the student whether they liked math word problems to describing their extracurricular activities. The questions included in the survey are shown in Table I below.

Table I: Student Survey Questions	
1. As an Engineering and Computer Science student, you'll be expected to spend at least 3 hours preparing, doing homework, or studying, for every one hour that you spend in class. College is clearly a full-time job in our field. Are you ready to commit to this full-time responsibility, and what things have you done to prepare yourself to handle it?	4. Describe the math courses that you have taken in high school. Have you gone beyond the Algebra 1, Geometry, and Algebra 2 basic requirement?
	5. What activities have you undertaken outside of coursework that are related to math and science?
2. Did you do well at word problems in Algebra 2? Why or why not?	6. What Extracurricular activities have you been involved?
3. Tell me about your high school background in Physics and Chemistry. Did you feel that you were offered a challenge in these classes? Did you do well in the classes and laboratories?	7. Why do you want to be an Engineer/Computer Scientist? How long have you wanted to work in this field. Is there a particular role model who has inspired you?

For fall 2007, there were 2,223 ECS applicants. Of these applicants, 1,047 (47%) were offered admission. Of the admitted students, 197 (18.8%) new freshman students enrolled in ECS for the

fall 2007 semester. Of the 1,047 admitted students, 90 (8.6%) were identified as at risk for ECS and sent the letter shown above.

The request that the 90 ECS at-risk admitted students schedule interviews, though not portrayed as voluntary in the letter, was not an enrollment requirement. This is because the undergraduate recruitment and admissions process at Baylor is centralized, and the qualifications of these students exceeded the university's minimum requirements for admission. ECS has been reluctant to recommend implementing admission criteria above that of the university standard. It is perceived that this additional requirement and related extra formalities could on occasion make admission counselors less enthusiastic about pursuing an ECS candidate. Further, as a predominately a liberal arts university, it is Baylor's broader practice to permit, if not even encourage, students to try out a variety of academic disciplines before declaring and settling in on one. Like with retention efforts, ECS is proactive in working with and leveraging the recruiting activities conducted by Office of Admission Services, and often ECS's extra-mile efforts convert into extraordinary Admission Services efforts for recruiting ECS students.[7, 8] The process and study described in this paper were conducted in concert with the Office of Admission Services, and one of the co-authors, a Senior Admissions Counselor, is assigned as the admissions liaison to ECS and was integral and instrumental to these efforts.

Results

Of the 90 students identified as ECS at-risk students and asked to arrange for interviews with the Student Success Specialist, 16 (18%) complied. All of the interviews were conducted by phone, and students most often used email to arrange for an interview time. Little effort was made to contact or pursue those who did not arrange for interviews. Of the 90 students identified as ECS at-risk students, 16 (18%) enrolled at Baylor (the same rate as the ECS freshman population as a whole). The majority of these two groups of 16 students did not intersect.

Observations of the Student Support Specialist that conducted the student interviews, included that this was a good way to connect with the students and this proactive approach was well received. A typical interview lasted for 10-15 minutes. The questions on the survey covered broad topics and helped to launch the conversation. Although there was an academic reason these students were identified as at risk, all were enthusiastic and confident about their choice and ability to pursue engineering or computer science major in college.

Of the sixteen ECS at-risk students that enrolled at Baylor, five (31%) were interviewed. Of the 74 who did not enroll at Baylor, 11 (15%) were interviewed. The at-risk students who enrolled at Baylor were twice as likely to have followed up on the interview request that those who did not enroll at Baylor. While these results may suggest that conducting an interview with a student was an effective recruitment strategy, this cannot be confirmed. Because the students interviewed took the initiative to arrange for the interview, they may have already had a higher affinity for attending Baylor than those students who took no action. Furthermore, as this population of students is at the lower end of the acceptance range, they generally are not the population from which a higher yield (enrollment) rate is sought.

Of the 16 students ECS at-risk students that enrolled at Baylor, three changed their major to a non-

ECS discipline prior to enrolling. None of these three students participated in the interviews. Of the remaining 13 at-risk students that enrolled, five (38%), either switched to a non-ECS major during their freshman fall semester, were placed on academic probation at the end of their first semester, or were struggling academically and questioning their selection of an ECS major. Of these five students, two participated in the interviews and three did not. These two groups combined yielded eight of the 16 students (50%) that did not successfully complete their first semester as an ECS major. This rate is much higher than the retention for the ECS freshman population as a whole.

Conclusions and Future Work

Quantitatively, there were several interesting features revealed from the interview process. The first is reported above, in that less that one-in-five of the students followed up on a direct request from the dean to schedule/arrange an interview. From a positive perspective, the compliance rate for those who ultimately enrolled at Baylor was twice as high as it was for those who did not. Second, considering the 16 students who were interviewed, none of them indicated they were persuaded to change their planned academic major, or even to give changing serious consideration. Later information shows that around 50% did change or were weighing their options by the end of their first semester. And finally, the rationale in identifying this group as at-risk was confirmed, as their rate of changing major or encountering serious academic problems was much higher than the ECS freshman population as a whole.

Although there remains a goal of helping to guide at-risk ECS students in academic directions that best match their talents and interests, it is clear that the approach described here did not achieve the intended results. In that a large majority of the students dismissed participating in interviews, those who did were un-swayed by our apprehension over their academic preparation and concern for their future. With this knowledge and realization, the program is being redesigned for freshman ECS students entering during the fall 2008 semester. The same parameters will be used to identify at-risk students, however, instead of arranging for an interview, they will be invited to attend summer school. This invitation to attend summer school is not mandatory. During the second summer session, participating students will take a regularly scheduled math class and a second class that is nontechnical. Further, they will reside in the residence hall that during the academic year houses the ECS Living-Learning Center. Baylor's Foster Success Center will assign a graduate student to work with these students, and Success Center staff, and the ECS Student Success Specialist, will coordinate other community and academic enrichment activities. Again, it will be a balancing act to encourage students to participate in this enrichment program that will improve their chances of persisting in an ECS curriculum, versus an unintended result of actually increasing the enrollment yield within the at-risk admitted population.

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