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S-STEM First Year Progress: Baylor Engineering and Computer Science Scholar's Program

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S-STEM First Year Progress: Baylor Engineering and Computer Science Scholar's Program

The major goal of the project is to contribute to the national need for well-educated scientists, mathematicians, engineers, and technicians by supporting the retention and graduation of high-achieving, low-income students with demonstrated financial need at Baylor University. Over its five-year duration, this project will fund four-year scholarships to 22 students who are pursuing Bachelor of Science degrees in Engineering, Electrical and Computer Engineering, Mechanical Engineering and Computer Science. Engineering and Computer Science (ECS) Scholars will participate in activities which include an orientation, a seminar series and required faculty mentoring. Support services and activities for ECS Scholars build upon existing activities at Baylor and feature peer mentoring, study abroad opportunities, alumni mentoring, support and training for undergraduate research, professional development workshops, and tutoring support from the ECS Learning Resource Center.

A distinguishing feature of the project is the use of EAB's Navigate, a web-based software platform for tracking student progress, coordinating student care and employing predictive analytics. The expertise generated using a student dashboard capable of predictive analytics will have the broad impact of informing the STEM community of best practices for timely interventions and improving retention and graduation rates.

The Navigate platform is used for predictive analytics and to track and document ECS Scholar progress toward achieving benchmark goals in the areas of retention, graduation rates, internships, undergraduate research experiences, and job placement. The use of predictive analytics has significant potential for helping students arrive at successful outcomes. However, it is an assumption of this project that the successful use of predictive analytics should take into consideration not simply the accuracy in identifying students who are struggling but in the social attributions of success and perceptions of a "big data" tool that might be received alternatively with enthusiasm or suspicion. This project investigates how student perceptions of what factors influence their success align with those attributed by faculty/mentors and predictive analytics. Additionally, the project is investigating students and faculty/mentors' perceptions about the extent in which predictive analytics are helpful for identifying factors that inhibit and promote success.

First Year Accomplishments

First year accomplishments included ECS Scholar student recruitment, the use of Navigate, student, ECS Scholars Orientation, ECS Scholar Activities and Training, and completion of qualitative research with preliminary findings. The next sections describe project accomplishments in these areas, followed by additional details mapped to the Project Objectives.

Recruitment of ECS Scholars

The typical recruiting process for incoming students at Baylor is organized around campus tours, contact with admission councilors, and special event recruiting sessions. The recruiting process

for ECS Scholars was impacted by the campus shutting down due to the emergence of Covid19. However, as described in the *Objectives* section, the fall 2019 recruiting schedule went as planned and we were able pull together creative virtual recruiting activities for the latter half of the Spring 2020 semester. The specifics of how were able to meet our recruiting objectives is provided under Objective 1 in the *Objectives* section.

Backend set-up of Navigate

EAB's Navigate software is an important component of the project. Tracking student progress within Navigate is an essential part of the project along with the use of predictive analytics that help us identify and connect students to the wide variety of success support programs that Baylor has to offer. More details about the progress made in this area is covered under Objective 5 in the *Objectives* section.

ECS Scholar's Orientation and Activities

Organizing and delivering student success programming, including orientation, for ECS Scholars were major activities that required the most time and effort from the project management team. We provide a summary of these activities under Objective 3 in the *Objectives* section of this paper.

First-year Qualitative Research Study

The research component of this project is coordinated by Dr. Nathan Alleman who serves in the education researcher role required by the S-STEM program. A summary of the qualitative research accomplished in the first year is provided in the *Objectives* section of this paper.

Project Objectives

The proposal for this project included both Project Objectives and qualitative research plans organized around two research hypotheses. *Project Objectives* describe operational activities and desired outcomes for accomplishing the goals of the project. The *Research Hypotheses* guide the qualitative research component of the project. The items shown in italics are summarized from the project proposal with text below each item giving a summary of the progress made toward each objective.

Project Objective 1: Adapt existing recruiting activities to increase the number of low-income, academically talented students applying and enrolling in ECS programs.

Baylor University coordinates two special recruiting event types for high-ability students. The premier event is known as *Invitation to Excellence (I2E)*, where students would traditionally come to campus for a faculty hosted evening reception and then participate in campus tours and academic engagement events the following day. All students who attend I2E are awarded $1000

renewable scholarships. The other type of recruiting event is called *Distinguished Scholars Day (DSD).* DSD events are not as lengthy as I2E yet offer student the chance to visit campus, tour facilities and meet with students, staff and faculty. During the early part of the AY19-20, we modified our academic session for I2E and DSD to promote ECS Scholars and received considerable interest from eligible students.

Baylor's normal recruiting processes had to be significantly modified due to Covid19. All campus tours were suspended for several months before resuming in at the beginning of the fall semester on a very limited basis. However, "major" specific tours of ECS facilities were canceled making it more difficult to interact with students interested in ECS majors. For the latter half of AY19-20 and for all of AY20-21, the university moved to a virtual format for both I2E and DSD events. A positive consequence of moving to a virtual format was that we could offer more sessions (roughly twice as many) of these events along with reducing the need for students to travel to campus. The university shifted to a "scores optional" admission process where students are no longer required to take the ACT or SAT for admission to Baylor. Early admission statistics have been encouraging and it is noteworthy that the percentage of minority student applications rose by 9% compared to last year. Targeted recruiting for the ECS Scholars program was incorporated into the new formats for I2E and DSD. Additionally, we held two virtual Q&A sessions about the program that were well attended.

Project Objective 2: Enroll 22 low-income, academically talented students according to a staged plan of forming two cohorts of 11 students.

The recruiting efforts for the ECS Scholars program were successful in drawing 42 applicants for the program. The project management team evaluated applicants based on their admission essay, standardized scores, academic record and reference letter and we were able to completely fill the first cohort of 11 with high-ability students who were excited to participate in the program.

Project Objective 3: Insure that ECS Scholars are engaged in cohort and support activities to achieve first year retention within ECS majors of at least 82% and to achieve 4-year graduation rates for ECS scholars of at least 72%.

The project team was able to deliver the student success activities outlined in the original proposal. Student activities are summarized in the table below.
One challenge was the difficulty students faced because of COVID related issues. For example, face-to-face tutoring at the ECS Learning Resource Center was not possible to COVID protocols. Tutoring was offered virtually, but student participation was much lower than normal and our plans for "real-time" tracking student tutoring were impacted.

In the original cohort, 9 of the 11 students made good academic progress. Two students were below the target gpa performance levels, but continue in the program. The original threshold gpa for scholars to stay in the program was not enforced for the first semester because of the extraordinary challenges these students faced. We interviewed these two students and made the judgment that they still show good promise for success in their chosen major and have allowed them to move forward in the program on a probationary status.

ECS Scholars Summary of Activities		
Activity	Date	Mode of Delivery
Summer Orientation: Introductions, Qualtrics Survey, Icebreakers	June 2020	Online
Welcome to Campus: Check in, Introduction of Research Team, Success Mindset, Debrief with faculty	Sept. 2020	Online
Academic Support Programs: Check in, Academic Support Program (ASP) presented a Study Strategies session, Student Panel, Bucket List activity introduced	Oct. 2020	In-person
Bowling Social:	Nov. 2020	In-person
ASP Final Exam Workshop	Nov. 2020	Online
Faculty Mentoring Workshop: Debrief fall semester, Mentoring Training, Small Group Session	Feb. 2021	In-person
Peer Mentoring Workshop: Introduction, Small group activities	Mar. 2021	In-person

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Project Objective 4: Provide ECS Scholars with opportunities to engage in research, internships, professional development, and career training with the goal that 90% of graduating ECS Scholars will find career related employment or enter graduate studies.

Engaging interested ECS Scholars undergraduate research opportunities is a year 2 activity. First year scholars have received encouragement to explore research topic areas with faculty in their major.

Project Objective 5: Investigate and establish best practices for collecting and analyzing student data using the SSC dashboard to inform intervention strategies, produce predictive analytics, and assess the impact of student support and career preparation activities.

Within Navigate, we set-up an ECS Scholars Care group that allows our project team to monitor activities such as participation in student success activities (including tutoring), progress reports issued by the student's instructors, notes from mentoring sessions, and the risk level (low, moderate, or high) assigned by Navigate's predictive analytics. Two of the members of the project management team were tasked with regularly monitoring the ECS Scholars Care group dashboard and coordinating interventions.

Research Hypotheses

The Navigate predictive analytics tool used by Baylor and in this project offers great potential for identifying students who are struggling and the nature of the struggle. The tool can allow quicker, more effective interventions and a greater likelihood of persistence to graduation and placement through targeted resources and support. However, questions remain about how the foci of this tool will dovetail with the perceptions of low-income students and the faculty/mentors working with them. In other words, the function of a predictive analytics tool is not simply whether it is accurate in identifying students who are struggling and why, but in the social attributions of success and perceptions of a "big data" tool that might be received alternatively with enthusiasm or suspicion. Thus, the project assumes positive associations and outcomes, articulated in the following hypotheses, but utilizes a multi-modal qualitative inquiry which will analyze how the tool compares to expectations of success factors and helpfulness by those it is intended to serve. Knowledge generated from each year will be used to sharpen mentoring and intervention strategies.

> **Hypothesis #1:** *Student perceptions of what factors influence their success align with those attributed by faculty/mentors and predictive analytics.*
> **Hypothesis #2:** *Students and faculty/mentors perceive that predictive analytics are helpful for identifying factors that inhibit and promote success.*

In the first year of the project, our qualitative research team from Baylor's School of Education conducted comprehensive interviews with both ECS Scholars and the Project Team members. In addition to foundational questions that will address the research hypotheses over the life of the project, the research team investigated three important themes: Student Fit, Institutional Fit and Student Identity.

Summary and Observations

There were obvious challenges associated with the first year of the ECS Scholars program. Recruitment strategies and scholar activities were adapted very quickly to move on-line, although, we were able to have face-to-face activities as conditions regarding Covid evolved. Some student success activities were adversely impacted by the move to virtual. For example, student interest and participation in academic tutoring in a virtual environment was very low across all areas of campus. We were successful in capturing student participation data in

Navigate, however, some of the data is not as comprehensive as we would have liked because extraordinary demands on faculty, staff and students during these difficult times. Project team members look forward to building on our first-year successes as we move forward with the ECS Scholars program.

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