From Local to Global: Growing Engineers through Community College Partnerships

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Currently: Director of Engineering Academies and Engineering Co-Enrollment programs, Texas A&M Engineering Experiment Station and Texas A&M University College of Engineering, College Station, TX

- Lead academic and outreach initiatives for TAMU College of Engineering's statewide two-year partnership program for transitioning general engineering students to Texas A&M University's Engineering majors. - Facilitate smooth transitioning of co-enrolled students from two year partners to 4 year Texas A&M University College of Engineering through coordination of institutions departments - Regularly evaluate the impact that co-enrollment with 2yr partners, curriculum/academic pathways, and non-traditional coursework have on the recruitment and retention of a diverse student population. - Membership – American Society of Engineering Education (ASEE); National Institute for the Study of Transfer Students (NISTS); League for Innovation Community Colleges; American Management Association (AMA); Texas Association for College Admission Counseling (TACAC) - Presentation(s) - Bassett, E., Gutierrez, A., "Incorporating an Academic Coaching Role to Regional Recruiters Employed in a Co-Enrollment Program in Engineering" (ASEE 2024), Bassett, E., De Sousa, D., "Stay Local, Save Money: An Innovative Engineering Education Pathway", NISTS Conference, Portland OR. 1/2023; Onate, P., Bassett, E., De Sousa, D., Innovation Conference, "Texas A&M – Dallas College: A New Way to an Engineering Degree" (3/2023); Cedor, T., Bassett, E., Onate,P. TRACS Summit, "Promoting Social Capital and Environmental Citizenship: Partnership between A&M, Dallas College, and Chevron." Bassett, E., De Sousa, D., TACAC Conference "Alternative Pathways to Engineering Majors" (9/2022).

Dr. Cecelia Diane Lawley, Texas A&M University

Dr. Lawley is responsible for the PK-12 Engineering Education Outreach Program, the Engineering Academies Program, the Professional and Continuing Education Program, the System-wide Engineering Academic Program, TEES Regional Divisions, and the Conference and Events Division for Texas A&M Engineering. She has a Ph.D. in Higher Education Administration from Purdue University, a M.A. in Education from the University of Alabama, and a B.S. in Computer Information Systems from Mississippi University for Women. She has over 30 years of experience in project management, with over 25 years in Higher Education. Dr. Lawley does research in engineering education, PK-12, professional and continuing education, and workforce development. Over the last 30 years, Dr. Lawley has worked extensively with industry and academia in creating a talent pipeline, upskilling, and reskilling workers, as well as providing pathways for underserved populations to obtain degrees in engineering. Dr. Lawley was recently selected by the Texas A&M Board of Regents as a Regents Fellow, one of the highest honors bestowed on an individual within the Texas A&M University System. Dr. Lawley is the PI on five ($32 M total) workforce development projects with the Department of Defense to create a talent pipeline for the defense industry These project initiatives collaborate with regional stakeholders across Texas and the U.S. to understand their specific local workforce shortfalls and skills gaps. These projects engage stakeholders (industry, academia, and community) to identify and address the skills, tools, and techniques (including manufacturing and other competencies) needed to succeed in STEM fields and increase awareness of DoD manufacturing workforce needs.

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- Leads academic recruitment and retention outreach initiatives for TAMU College of Engineering's statewide two-year partnership program for transitioning general engineering students to Texas A&M University's Engineering majors.

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- Membership: American Society of Engineering Education (ASEE); Texas Association for College Admission Counseling (TACAC); Engineering Staff Advisory Council (ESAC) at Texas A&M University

- Volunteer Work: Staff First-Generation College Student Mentor in the Aggie Mentoring Network; Staff Advisor for the Texas A&M Engineering Academies Student Organization (TEASO)

- Presentation: Bassett, E., Gutierrez, A., ”Incorporating an Academic Coaching Role to Regional Recruiters Employed in a Co-Enrollment Program in Engineering” (ASEE 2024)

WIP: From Local to Global: Growing Engineers through Community College Partnerships

Abstract

The Texas A&M University Engineering Academy program, launched in 2015, is the first engineering co-enrollment transition program of its kind in the United States. Unlike traditional transfer programs, students are admitted into both Texas A&M University and a two-year partner college. While completing core curriculum requirements at the partner institution, students concurrently take lower division, general engineering courses taught by the Texas A&M University faculty embedded at the community college campus. After meeting the engineering major's criteria and completing the required coursework, students seamlessly **transition**—rather than transfer—to Texas A&M University to complete their bachelor's degree in engineering. One of the primary challenges in the traditional enrollment process was the university's policy of allowing any interested applicant to apply to engineering programs, with admissions decisions (i.e., admit or deny) made only after application review. This approach, however, is not feasible when partnering with two-year institutions; therefore, a complementary admissions model must be established.

This Work in Process paper examines the co-enrollment admissions framework, focusing on standardized prequalification criteria across ten partner colleges, admissions trends between Engineering Academy and traditional engineering applicants, and institutional outcomes following process standardized in 2021. The partnership demonstrates the critical role of community colleges in broadening STEM access and provides a scalable framework for universities seeking to expand equitable engineering pathways.

Introduction

Establishing a true co-enrollment model that integrates dual admissions processes presents significant organizational and academic complexities. In this structure, students must be fully enrolled at both institutions and meet the same academic qualifications as other engineering students at Texas A&M University's main campus. Without equivalent preparation and qualification, students would not enter the major on equal academic footing with their traditionally admitted peers.

To ensure this alignment, partner institutions must uphold shared standards for mathematics and science preparation. Specifically, students must be prepared to enter at the precalculus level and be ready for introductory chemistry and physics coursework at the start of enrollment. To streamline the dual-enrollment process and reduce barrier to entry, the academy and two-year partners collaboratively developed a structured *prequalification* process. Through this model, a prospective students' academic preparation – particularly in math and science – is evaluated by the partner institution according to its established placement methods, which may include high school performance metrics and/or math placement examination scores. Through this math and science prequalification process the university accepts the qualification to achieve a minimum pre-calculus level and considers the student prequalified to receive an application for admission.

To maintain academic consistency across institutions, the following baseline requirements were established:

1) Students must be Math ready (Precalculus or Calculus ready)

2) Students must be qualified to take Chemistry 1 (or Chemistry for Engineers) and/or Physics 1 ready
3) To ensure authentic co-enrollment status, the students must first be admitted to the two-year partner college PRIOR to the application being submitted to the university.

Because this process differs from the university's traditional freshman application cycle (August 1–December 1), an alternative admissions timeline was necessary. Two-year partner institutions maintain rolling admissions throughout the year, which could result in qualified students missing the university's standard deadline. To address this mismatch, the university implemented an extended application window specifically for the co-enrollment program. The agreed-upon cycle runs from December 1 through June 1, with admissions decisions rendered in the summer with enrollment the following fall semester. See Figure 1 for details on the enrollment process.

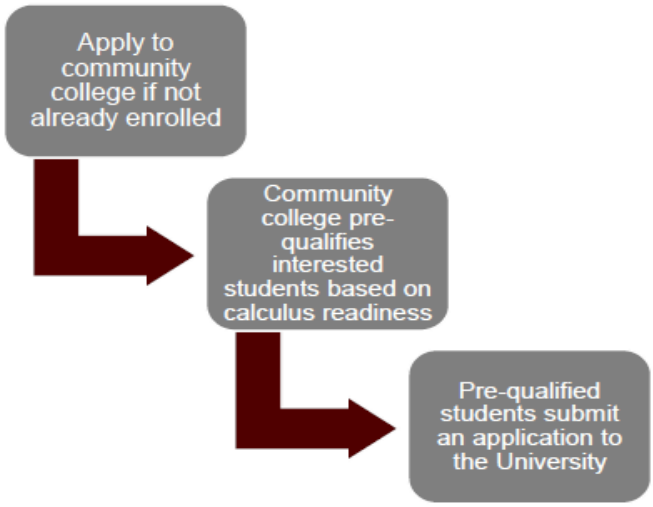

Figure 1: Enrollment and Application Process

Method

A mixed method approach was employed to collect and analyze data, integrating both qualitative and quantitative methodologies. Given that data were provided by two-year institutional partners and derived from multiple admissions cycles, a secondary data analysis was conducted to evaluate existing datasets from both the prequalification and admissions processes.

Quantitative analysis focused on admissions outcomes, applicant trends, and placement patterns across multiple years. Qualitative methods included document and content analysis of institutional materials, internal discussions, and policy documents related to application processing and qualification standards. This combination of approaches enabled a complete evaluation of the co-enrollment admissions process.

This paper details the co-enrollment admissions model and highlights key insights from multiple years of implementation, with particular emphasis on pre-qualification. The analysis includes:

- A comparison of prequalification criteria and placement standards across the ten community college partners.

- An examination of admission trends and acceptance rates for Engineering Academy applicants compared to traditional engineering applicants.
- Identification of lessons learned and ongoing improvements aimed at streamlining the student experience and enhancing equity in access to engineering education.

The first criterion examined in the study focused on how the prequalification process verified students' math readiness, this served as a foundational requirement for program eligibility.

Results

At Texas A&M University, a holistic review approach is used to determine students' math readiness for admission into the engineering program. Admissions staff evaluate the applicants individually, considering high school math coursework, grades, class rank, and overall academic performance within a fair and balanced framework. Following admission to Texas A&M University students complete a Math Placement Exam (MPE) developed by the university's math department. The MPE determines whether the student will start in Precalculus or Calculus I.

However, applying the university's specific evaluation criteria and placement calculations uniformly across ten different two-year partners was determined to be impractical and inequitable. Each partner institution operates within its own academic policies, student demographics, and placement frameworks. As a result, the decision was made to allow the partner college to continue using their established method for determining math readiness during the prequalification stage.

Across the ten partner institutions, approaches to determining math readiness vary. Some institutions employ a holistic review model of evaluating HS math performance, often in conjunction with SAT/ACT math scores. Others utilize standardized placement testing models. The most used assessments systems include ALEKS or the Accuplacer College-Level Math Placement test. Both systems establish minimum qualifying scores to permit students to enroll in Precalculus or Calculus level coursework.

Academy	Math Placement Test	Score for Precal	Score for Calculus
Alamo	No math test provided – AP, IB, Dual Credit, CLEP accepted	-	
Austin	ALEKS	65	80
Brenham	Accuplacer - Advanced Algebra & Functions	263	276
Collin	Accuplacer - Advanced Algebra & Functions	255	285
	ALEKS - Accepted, Not Offered	61	76
Dallas	ALEKS	66	76
Houston	Accuplacer - Advanced Algebra & Functions	265	285
Midland	Accuplacer College-Level Math Placement test	237	265
South Texas	No math test provided – AP, IB, Dual Credit, and SAT/ACT tests accepted	-	-
Tarrant	ALEKS	61	76
Tyler	No math test provided – AP, IB, Dual Credit, CLEP, SAT/ACT tests accepted	-	-

Figure 2: Ten Two-year Partner Academy Math Placement Processes

As illustrated in Figure 2, math readiness requirements vary across the ten partner locations. Despite this variation, a significant positive outcome has emerged: each partner college has become fully invested in preparing and qualifying students not only for admission to its own institution, but also to ensure that these students are adequately prepared to succeed in the university-level engineering program. This shared responsibility has strengthened alignment between the two-year partners and the university.

Once the students meet their respective partner institution's math readiness qualifications, they are invited to complete and submit the university admission application. At this point, the university admissions office initiates its formal review process for admissions into engineering at Texas A&M University. Students who are admitted to both the partner college and the University are now considered math-qualified and are not required to provide any other math/science qualifications for either partner.

Because the Engineering Academy admission process differs from the traditional Texas A&M University admissions process, important evaluative questions arise:

- Are students in the dual enrollment program academically comparable to those directly admitted to the university's College of Engineering?
- Do these students persist at similar rates?
- How can consistent prequalification standards be maintained across multiple two-year partner institutions while respecting institutional autonomy?

In collaboration with our partner colleges and university stakeholders, a structured prequalification interest form was developed to help address these questions. This form allows students to indicate their intent to pursue engineering through the co-enrollment pathway while enrolling at their local community college (one of the ten partner institutions). The interest form

is intentionally streamlined in design, capturing essential information – excluding official transcripts – to assist with evaluating math readiness and gauging commitment to an engineering major. While the layout in the Addendum provides a simplified example, the form is typically implemented through an HTML-based interface to create a more accessible, engaging, and student-friendly experience.

Discussion

Since implementing this standardized prequalification method, program enrollment has increased at a staggering rate, (see Figure 3). In 2021, the Texas A&M University Engineering Academy formally instituted a unified prequalification questionnaire format. Prior to this change, prequalification interest forms independently developed and administered by each partner institution, resulting in variability in data collection and student outreach processes.

The transition to a standardized format, developed collaboratively with the two-year partner institutions, appears to have contributed significantly to program growth. Since the program's inception, enrollment has increased by 846%, with participation more than doubling between 2021 and 2025. This period aligns directly with the adoption of the centralized prequalification process, suggesting that improved consistency, clearer communication of eligibility expectations, and more streamlined student entry point enhances both recruitment efficiency and coordination.

These finding indicate that the co-enrollment model – supported by a structured yet flexible prequalification framework – has been highly effective in expanding student outreach. Moreover, the growth trend suggests that reducing procedural ambiguity and clearly signaling academic intent through the interest form may positively influence students' participation. Continued evaluation will be necessary to determine whether this enrollment growth is accompanied by comparable gains in student persistence, academic performance, and degree attainment.

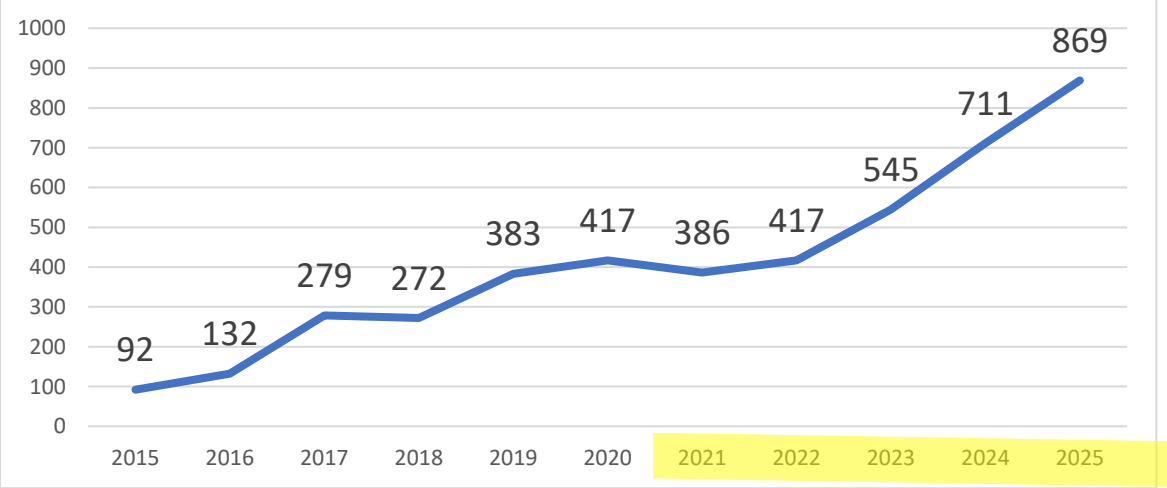

Figure 3: Enrollment growth since inception of the program through Fall '25.

From an admissions perspective, prequalifying students for math readiness prior to submission of the university application has significantly reduced the workload of reviewers. Because students entering the review process have already met the established math readiness benchmarks, admission staff can focus on holistic evaluation with greater efficiency and consistency. This process promotes fairness while reducing decision delays, even before applying to the university, allows for more fairness in the review process with little delay in the decisions.

Beyond enrollment efficiency, it is critical to examine whether the prequalification process contributes to longer-term student retention and graduation outcomes. First-year retention rates for Engineering Academy students (Figure 4), have remained relatively stable in the mid to upper 70% range, with an overall average of 75% across partner locations. While retention varies by site (ranging from 31% to 89%), most locations cluster near or above the overall average.

Program Name	Avg 1st yr Retention
#1	71%
#2	74%
#3	77%
#4	73%
#5	78%
#6	63%
#7	89%
#8	62%
#9	31%
#10	86%
total/avg	75%

Figure 4: Retention average for all locations

When contextualized against national benchmarks, these outcomes are notable. According to the National Student Clearinghouse Research Center, the average retention rate for public four-year institutions is approximately 69%, while two-year institutions average closer to 57%. The Engineering Academy's aggregates 75% retention rate exceeds both benchmarks, suggesting that the structured co-enrollment and prequalification model may positively support student persistence.

Additionally, graduation rates within the program have shown steady annual improvement. Graduating students consistently maintain an average GPA of 3.2 or higher, comparable to – and in some majors exceeding – the overall GPA averages with the University's College of Engineering. These findings suggest that Engineering Academy students are not only academically prepared for entry but are performing at levels consistent with traditionally admitted peers.

Conclusion

Evaluation and historical data demonstrate that the structured prequalification model has meaningfully improved program effectiveness. By verifying mathematics readiness prior to the university admissions review, the approach enhances application efficiency and ensures appropriate academic placement for incoming engineering students.

Despite these gains, challenges remain. Partner institutions assess math readiness using varied criteria and methodologies, which may affect consistency, though this study does not determine the superiority of any approach. Additionally, the impact of initial placement—Precalculus versus Calculus I—on first-year retention and long-term progression warrants further investigation. The dual-application process also introduces administrative complexity, highlighting opportunities to streamline document submission, reduce applicant burden, and improve data sharing between partner institutions.

Future research should examine how prequalification models influence both institutional outcomes and students' experiences with the admissions process. There is also potential to extend aspects of the framework upstream, informing high school preparation and major-specific advising to strengthen early engineering pathways.

Overall, the Texas A&M Engineering Academy's prequalification model demonstrates that collaborative, structured admissions practices can expand access to engineering education while maintaining academic rigor. Continued refinement and longitudinal evaluation will be essential to sustain enrollment growth, promote equity, and support student success.

ADDENDUM A

Example Program Prequalification Form

Students are reviewed for prequalification and if found to have met the minimum requirements for the program, students will receive an email notification containing the Application Link. A member of our team will let you know if you need additional documentation in order to meet prequalification requirements.

***Student Name**

First

Last

***Contact Information**

Email

Phone Number

Date of Birth (mm/dd/yy)

***May we text you**? ◯ Yes ◯ No

***Academy Location** – (Listing of locations)

***How were you first introduced to the Academy?** (select one)

University Employee| Partner Employee| University / Partner Website| High School Counselor / Teacher| College Fair| Friend / Classmate| social media / Google| Other

Gender (M/F/O)

Ethnicity (select listed)

Residency (listed as state, out-of-state, international)

***Partner College Student**

Students must secure admission to Partner College and get an ID number before submitting a prequalification form.

Partner College ID? ##########

Partner College Student – Email:

*Student Status (Check all that apply, HS, Dual, Current College student, former student, etc.)

*High School Name:

High School Graduation: (month, year)

Highest Level Science Course: College or High School - Course - Grade

What AP/College credits do you anticipate being awarded or have already been awarded?
Check how AP/IB credits will be awarded here.

Test Scores
Enter the highest score from any attempt.

SAT Math Section

SAT Reading/ Writing Section

ACT Math Section

ACT Science Section

Math Placement Exam (Accuplacer Advanced Math Placement or ALEKS Math Placement):

*National Merit:
Have you progressed to National Merit Semifinalist? ◯ Yes ◯ No

*Submission Confirmation

☐ This is the last page. Please confirm you are ready to submit the form.

(the form is in HTMLformat)