

**Process Operations  
Technology (PRO) Program  
Career Pathways Curriculum  
Alignment Project**  
2024 External Evaluation Report

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# EXECUTIVE SUMMARY

The Texas State Technical College (TSTC) Process Operations Technology (PRO) Program Career Pathways Curriculum Alignment Project has made solid progress on its goals in year one. The team is on track with the curriculum deconstruction for the Process Operations Technology program, which will be completed in the next few months. Over the next year, they will continue redesigning the Process Operations Technology curriculum to incorporate Performance Based Education (PBE) assessments, also known as Competency Based Education. They are also developing new Liquefied Natural Gas (LNG) courses to support that career pathway and will implement those courses in August 2024 in the traditional modality. Finally, they leveraged Perkins V funding to acquire simulation training modules that will support students in the program. These achievements have been supported by employer engagement, faculty curriculum development, and faculty professional development.

This year, the TSTC PRO Team has had many successes and a few challenges. The key takeaways are listed here.

## Key Success – Employer Engagement:

- Engagement with the region’s Liquefied Natural Gas (LNG) companies by the TSTC PRO Project Team during year one has been a key success. The connections with these companies fostered collaboration and substantial input on curriculum design for the LNG courses added to the Process Operations Program. These employers will join the broader Industry Advisory Board for the Process Operations Technology Program and have indicated a commitment to ongoing work with TSTC and the program.

## Biggest Challenge – Equipment:

- The Project Team identified the cost of equipment for courses as one of their biggest challenges. Over the past year, they have worked to identify training equipment and materials needed for the new LNG courses. They learned that this equipment is cost-prohibitive to purchase for use by a cohort. To resolve this challenge, they have identified simulation software as at least a partial solution to this challenge. However, the team is also considering reallocating funds to purchase equipment to fill gaps identified in implementation.

## This Report Includes:

1. A brief overview of TSTC PRO’s background, adjustments to scope, and goals.
2. A description of the methodology for this evaluation.
3. Year-one findings on progress toward deliverables, successes, and challenges.
4. Appendices detailing professional development and an employer survey.

# INTRODUCTION

## TSTC PRO's Background

The Texas State Technical College (TSTC) Process Operations Technology (PRO) Program Career Pathways Curriculum Alignment Project was established in June 2023 through the support of NSF award number 2300967. This project addresses a new initiative created, in part, by the Performance Based Education (PBE) initiative to develop Career Pathways for technician education programs. The primary goal is to increase the quality and number of highly skilled technicians in Process Operations in multiple career-specific pathways.

**Project Scope and Focus:** As the TSTC PRO Team started implementing the project, they determined that the flexibility afforded students by integrating PBE assessments would be as effective or more effective than converting the PRO curriculum to Multiple Entry/Multiple Exit (MEME). PBE, a competency-based education approach, allows students to accelerate because of its focus on mastery assessments. Students can move through the curriculum as quickly or slowly as needed to achieve mastery. This model supports students in accelerating their progress and saving money. With that in mind, the project will continue to move forward with the PBE focus and will not implement MEME.

## TSTC PRO's Goals

The three principal objectives of TSTC PRO are:

1. Integrate the Liquid Natural Gas (LNG) curriculum into the current Process Operations program.
2. Transition from a traditional model to a competency-based model of instruction, supporting students to accelerate progress to completion. TSTC refers to this as Performance Based Education (PBE).
3. Enroll 30 students in fall 2024. Ten percent of those students will be retained through spring 2025, and 20 will be enrolled in spring 2025. Ten percent will complete the program. Enroll 30 new students in fall 2025. Ten percent will be retained for spring 2026 with 20 additional students. Fifty percent of students will complete the program.

TSTC PRO proposes to meet these goals by executing three deliverables and four activities, as detailed in the Findings – Year 1 Performance Snapshot section. In year one, the TSTC PRO Team focused on goal one. The other two goals will be addressed in years two and three of the project.

## Intended Audiences

1. TSTC PRO's Principal Investigator/Co-Principal Investigator and Support Team
2. NSF Program Officer(s)
3. Other stakeholders include Texas State Technical College, Two-year colleges implementing PBE assessment, the TSTC PRO Project Business and Industry Leadership Team, State and National Career and Technical Education (CTE) organizations.

# METHODOLOGY

This evaluation focuses on a qualitative review of the TSTC PRO project's year-one implementation success and challenges. It also describes the curriculum redesign process, including employer engagement and faculty feedback.

The mainstay measurements for this project are:

- Performance versus plans
- Student outcomes (years 2 and 3)

### Year 1 Data sources:

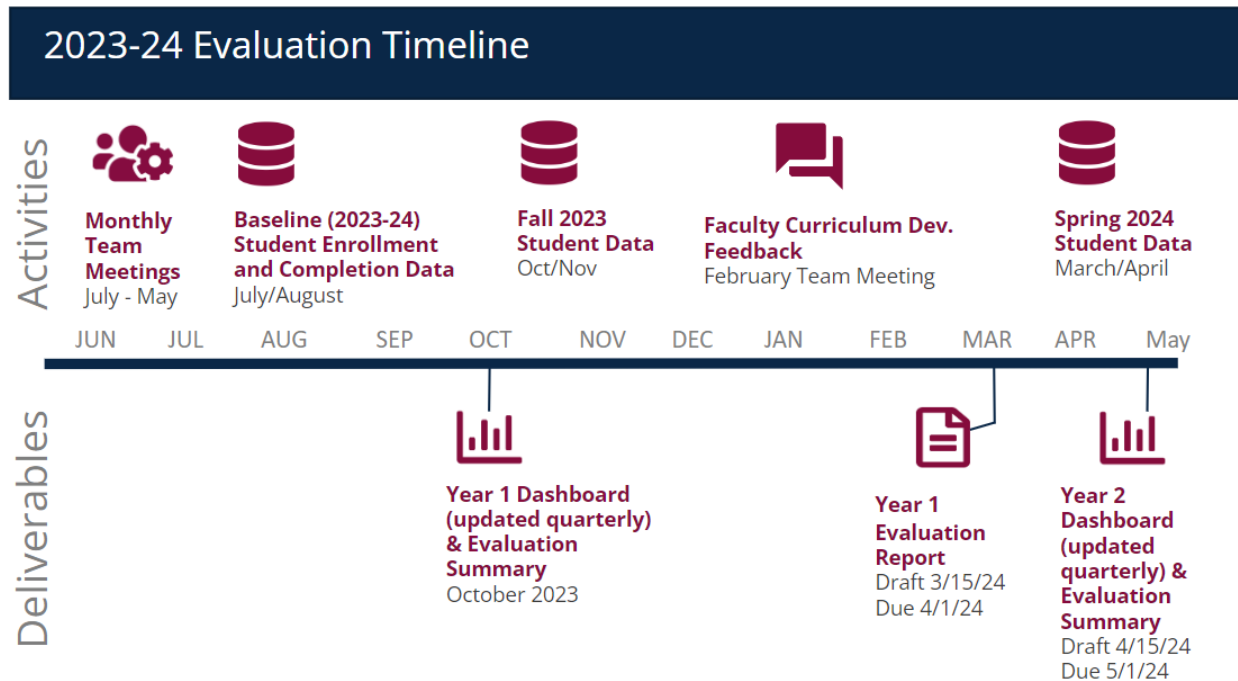
- Project documentation from PI, Co-PI, and Project Team
- Faculty feedback on the curriculum deconstruction/development process

Monthly meetings with the TSTC PRO Team and the External Evaluator supported information gathering and the evaluation process. This project had a mid-year PI change, and regular communication supported that transition.

**Evaluation Questions:** The project includes four evaluation questions. Question one is the focus of this evaluation, and questions two through four will be added to the evaluation reports for years two and three.

Evaluation Questions	When reported?	
	Year 1	Years 2 & 3
How effectively is the project being implemented? What successes are being achieved, and what challenges are being addressed?	✓	
Which Performance Based Education (PBE) methods were the most effective in helping students acquire and retain the knowledge and competencies required for completing the PRO program and successful employment upon graduation? What methods did 1) students and 2) industry partners and employers identify as the most impactful?		✓
To what extent is/did professional development prepare the faculty to teach Process Operations Technology LNG courses and implement PBE assessments? Did the PBE assessments support students in achieving their academic goals? Did the collaborations between the college and industry leaders enhance faster job placement?		✓
To what extent is/did the project increase the engagement, persistence, graduation, and job placement of TSTC PRO Project student participants?		✓

**Timeline, Activities, and Deliverables:** In year one, the evaluation team met monthly with the TSTC PRO Project Team to support project implementation, gather qualitative data, and collect baseline student data that will be used in years two and three. The Evaluation Team also provided a dashboard and evaluation summary to support the Project Team. Details on the evaluation activities and deliverables are illustrated below.



**Evaluation Data Collection:** In addition to the timeline, the Evaluation Team worked with the Project Team to outline the data collected for the evaluation and who would provide the data. In year one, the Project Team provided the Evaluation Team with student data and project documentation. The Evaluation Team created the project dashboard and evaluation report and collected faculty feedback on year one implementation. Details on the data collection for evaluation are listed below.

Data Collection Details				
Methods	Who	When collected?	Purpose	Sample
Enrollment, Retention, and Graduation Rates	PR	Ongoing, send to IA November and April annually	Track the enrollment. Retention and completion rates of students for program by modality	Starting with Fall 2024 Enrollment & ongoing cohorts
Project Documentation	PR	Ongoing, send to IA February, April, August, & October	Track activities and progress toward goals/objectives	Faculty, staff, & student project activities
Project Dashboard & Evaluation Reports	IA	Dashboard updated quarterly from all data sources, annual Evaluation Reports	Activity and key results tracking for project staff and evaluation team	Project documentation and survey data
Faculty, Staff, and Student Feedback	IA	After curriculum development, professional development, and program participation	Participant knowledge and feedback	Faculty, staff, & student participants
Focus groups (as needed)	IA	After Events	Additional feedback to inform changes in project activities	Faculty and staff participants
Employer feedback and student job placement	PR	After employer engagement and student completion	Participant knowledge and feedback	Employer partners and graduates

IA Impact Allies  
PR Project Team

# FINDINGS

## Year 1 Performance Snapshot

**Year One:** In the project's first year, the team focused on the project deliverables and activities 1-3, which will support Activity 4 in the next two years of the project. This table shows the project deliverables with corresponding activities described below. Guidance documents have been started, and work to complete those and disseminate best practices will continue in year two.

TSTC PRO Deliverables	Curriculum Development	Standardization of Instructional Equipment	Professional Development	Dissemination of Best Practices
Guidance Documents	✓	✓		
Updated Curricula Outlines	✓	✓	✓	
Recommendations for Lab Equipment		✓	✓	

**Deliverable 1:** Guidance documents that highlight best practices and lessons learned in technician curriculum redevelopment and alignment with Performance-Based Education (PBE)

- Curriculum Development
  - The development and dissemination of guidance documents depend on this year's work to redevelop the PRO curriculum to include PBE and develop new Liquefied Natural Gas (LNG) courses. With that work completed, the team can finalize draft work on the guidance documents for that development in year two.
  
- Standardization of Instructional Equipment
  - The work to assess and implement training simulations in year one will support the guidance document work in years two and three.

**Deliverable 2:** Updated online/hybrid competency-based curricula outlines for the Process Operations Technology (PRO) program that incorporates PBE assessments

# FINDINGS cont.

- Curriculum Development
  - To ensure the curriculum redevelopment and new courses reflect industry needs and standards, the team engaged the PRO Industry Advisory Board to review and approve the proposed changes in the overall program. They also engaged with three LNG-specific employers in developing the LNG courses, surveying to better understand the knowledge, skills, and abilities needed for these technicians. The survey included 148 KSAs or Tasks (Appendix B). These employers have been invited to join the PRO Industry Advisory Board to provide ongoing consultation and support. Presentations used in the process are linked here:
    - [Process Operations & LNG Skills Validation](#) - October 2023 - Initial presentation to evaluate the knowledge, skills, and abilities (KSAs) with industry partners using the Business and Industry Leadership Team (BILT) model.
    - [Process Operations & LNG Course](#) - November 2023 - Based on the KSA analysis, suggested changes and a proposed new degree plan incorporating the new LNG courses.
    - [Process Operations Special Advisory Committee Meeting](#) - January 2024 - Presented curriculum changes, finalized and approved.
  - The curriculum redevelopment and development processes are complete, and TSTC's Curriculum Committee has approved the changes for implementation in the Fall of 2024. The implementation of PBE will begin in the fall of 2025. One of the key changes with PBE assessment is a mastery level of 80%, compared to 70% for the traditional grading model.
- Professional Development
  - To support the curriculum development for the LNG courses, PRO program faculty have been engaged in professional development through PetroSkills online training courses and learning tools. The modules purchased by the program focus on developing LNG technical process skills and have been vetted by LNG employers. These online modules are supported by three days of in-person instruction (Appendix A - <https://www.petroskills.com/>). Two instructors have been set up for online access to the modules, and a third instructor will be added once they have been identified and onboarded to the program.

## FINDINGS cont.

- The team is working to engage student support staff and schedule additional professional development in the Summer of 2024. Once these staff members are identified, they will receive training, specific to the Process Operations program to support them in advising students.

**Deliverable 3:** Recommendations for Process Operations Technology for accessible and flexible instructional lab equipment that will enable educational institutions to develop their own Process Operations Technology open labs with PBE assessments

- Standardization of Instructional Equipment
  - As the TSTC PRO Team worked through curriculum development on the new LNG courses, they identified training equipment and materials. Purchasing equipment has proven to be cost-prohibitive. Instead, the team focused on incorporating computer simulations from TechLabs to support student learning. The initial investment was leveraged from the Perkins V grant, and other materials or equipment will be identified in year 2 to support the project.
- Professional Development
  - Faculty are working with the vendor to schedule delivery, installation, and training for six LNG student trainers and an instructor station. As part of their contract, TechLabs provides technical assistance for implementation.

**Evaluation Questions:** As noted in the Methodology Section, the year-one report will address only the first evaluation question.

- How effectively is the project being implemented?
  - Overall, the project implementation is on track; the team has worked diligently over the past year to deconstruct and redevelop the existing curriculum while developing three new LNG courses, providing professional development, and purchasing simulation tools. This foundational work will give them a strong start in year two to implement the curriculum changes and measure student outcomes compared to fall 2024 enrollment data. Faculty involved in the project report that things are going smoothly and that the work continues to progress as expected.
- What successes are being achieved?

Faculty engagement in the project is strong; two faculty members have been working on the deconstruction and curriculum development, supported by the

## FINDINGS cont.

- TSTC Instructional Design Team and Faculty Development to successfully meet the goal of curriculum committee approval for implementation in the fall of 2024. Performance-based assessment will also be launched in the fall of 2025, increasing the mastery threshold to 80% versus the current 70% with traditional grading. The PRO program faculty members believe these changes and the addition of the LNG courses will provide employers with potential candidates with a foundational knowledge of process operations and will support students in securing good-paying jobs. These faculty members are also engaged in professional development with the PetroSkills curriculum, which they feel has helped them develop LNG content and provided a good foundation of knowledge for teaching the courses.
- Employers from the existing PRO Industry Advisory Board have provided input and guidance on adding PBE assessments to the PRO Program. LNG companies have been identified and engaged to support the development of the LNG curriculum/courses. PRO faculty report this as an initial success that will continue to benefit the program. These employers will join the PRO Industry Advisory Board and provide ongoing support to the program and opportunities for students, including exploration of internship opportunities and ongoing communication with faculty.
- What challenges are being addressed?
  - While multiple entry/multiple exit (MEME) scheduling options were identified in the project description, the team identified similar benefits to students by focusing on integrating Performance-Based Education (PBE). This focus supports a competency-based, flipped classroom model that enables students to progress at a pace that matches their mastery of the assessments. The team focused on this and developing the new LNG courses, keeping them on track to implement the PBE assessments in the fall of 2025.
  - Identifying training equipment and materials needed for the new LNG courses has been challenging due to the high cost of these items. Simulation has been identified as a solution to this challenge, but the team is also considering reallocating funds to purchase equipment to fill gaps identified in implementation.
  - Identifying and training the student support staff who will provide admissions, advising, and other student support has also been challenging. This challenge is related to some internal restructuring at TSTC. However, the project team is confident they can identify and train the student support staff to successfully recruit, advise, and support students entering the program in fall 2024.

# APPENDIX A

## Faculty Professional Development: Petro Skills

### Self-Paced eLearning Modules on Gas Processing

• A2500 Introduction to Gas Processing for Operations	3 hrs.
• PS-EPT-INO-120 Introduction to LNG	2 hrs.
• A2501 Hydrocarbon Phase Behavior & Vapor-Liquid Equilibrium	4 hrs.
• A2502 Gas Processing Thermodynamics	5 hrs.
• A2503 Turboexpander NGL Extraction	3 hrs.
• A2504 Fractionation in Gas Processing	4 hrs.
• A2505 Solid Bed Adsorption & TEG Dehydration	4 hrs.
• A2506 Amine Sweetening Process	5 hrs.
• A2507 Gas Processing Hazards	4 hrs.
• A2508 Molecular Sieve Dehydration	2 hrs.
• A2509 LNG Refrigeration & Heat Exchange	3 hrs.
• A2510 LNG & LPG Gas Carrier	2 hrs.
• A2511 LNG & LPG Gas Carrier Loading	3 hrs.
• A2512 H <sub>2</sub> S Scavenging	3 hrs.
• A2513 LNG Cargo Carrier	3 hrs.



<https://www.petroskills.com/>

# APPENDIX B

KSA Survey conducted in October 2023.



## Process Operations & LNG KSA Scoring

Knowledge, Skills and Abilities (KSAs) & Tasks Scoring

kkrobinson@tstc.edu [Switch account](#)



\* Indicates required question

Email \*

Your email

Name

Your answer

Knowledge

Knowledge focuses on the understanding of concepts. It is theoretical and not practical. An individual may have an understanding of a topic or tool or some textbook knowledge of it but have no experience applying it. For example, someone might have read hundreds of articles on health and nutrition, many of them in scientific journals, but that doesn't make that person qualified to dispense advice on nutrition.

K-1 Knowledge of processing equipment

Irrelevant to the position      1      2      3      4      Critical to the position

K-2 Knowledge of gas compression/transportation systems.