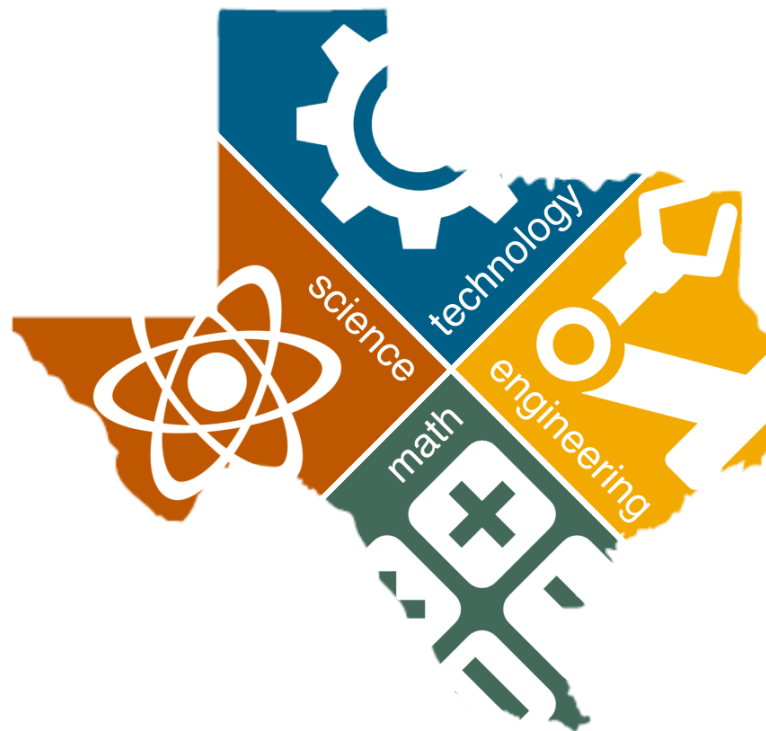




The University of Texas at Austin  
**STEM Center**

# Texas Teacher Externship (TEX<sup>2</sup>) Program Final Report



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**NOGA 170341157110001**

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## TABLE OF CONTENTS

INTRODUCTION .....	2
Background .....	2
Program Parameters .....	3
IMPLEMENTATION OVERVIEW .....	5
PROJECT OVERVIEW .....	9
TEACHER EXTERN PROFILE .....	12
PROJECT DESCRIPTIONS .....	13
PERFORMANCE MEASURES .....	22
TEACHER EXTERN EVALUATION METHODS .....	23
TEACHER EXTERN POST-SURVEY FINDINGS .....	24
Extern Engagement .....	24
Extern Satisfaction and Outcomes .....	24
Extern Challenges and Recommendations .....	29
TEACHER EXTERN FOLLOW-UP SURVEY FINDINGS .....	33
Extern Engagement .....	33
Extern Application and Outcomes .....	33
Extern Challenges and Recommendations .....	39
INDUSTRY PARTNER EVALUATION METHODS .....	43
INDUSTRY PARTNER POST-SURVEY FINDINGS .....	44
Partner Engagement .....	44
Partner Satisfaction and Outcomes .....	44
Student Internship Opportunities .....	47
Partner Challenges and Recommendations .....	48
INDUSTRY PARTNER FOLLOW-UP SURVEY FINDINGS .....	51
Partner Engagement and Outcomes .....	51
Partner Challenges and Recommendations .....	54
SUMMARY AND RECOMMENDATIONS .....	55

## Introduction

### Background

Funded by the Texas Education Agency (TEA), the STEM Center at The University of Texas at Austin (UT) (now the EPIC group at the Texas Advanced Computing Center) created and coordinated the statewide Texas Teacher Externship (TEX<sup>2</sup>) program that ran from September 2017 through July 2019. The TEX<sup>2</sup> program employed a collective impact model to provide teachers across Texas the experience of interacting directly with science, technology, engineering, and mathematics (STEM) industry leaders and learning about industry trends, needs, and opportunities that they can bring back to the classroom to enhance instruction and student learning. TEX<sup>2</sup> builds on the Teacher Externship Pilot Program that the STEM Center spearheaded from January - August 2017.

For the purposes of this program, **teacher externship** is defined as:

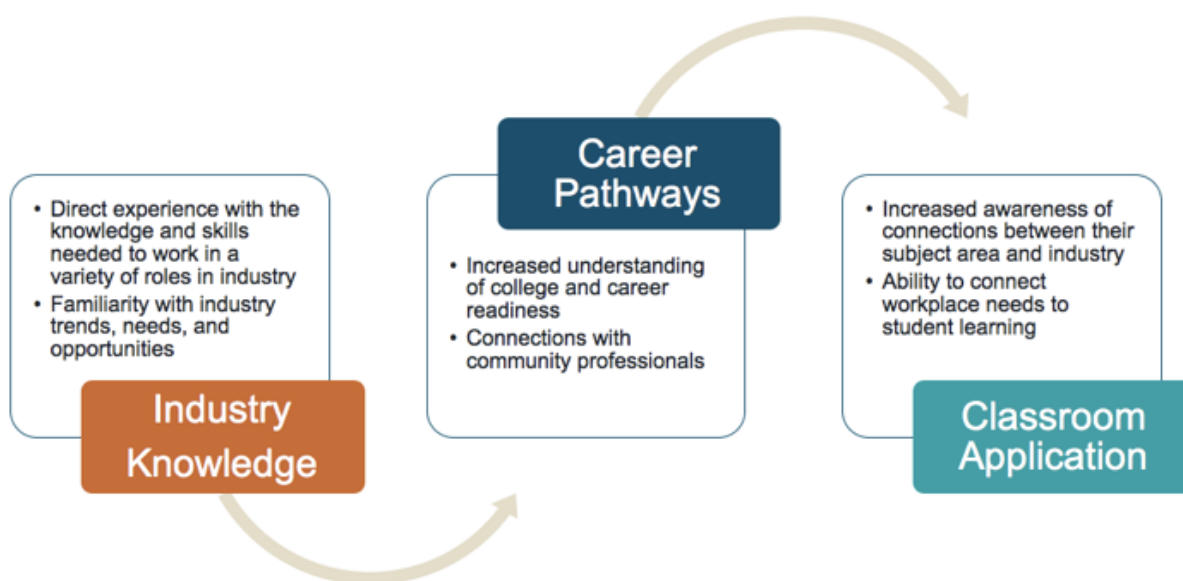
*A professional development opportunity connecting the classroom to the workplace. Through conversation with industry leaders and via direct experience at a job site, the teacher learns about the trends, skills, and opportunities in industries related to their content area in order to enrich and strengthen instruction and to bring relevance to student learning.*

The purpose of the TEX<sup>2</sup> program was two-fold:

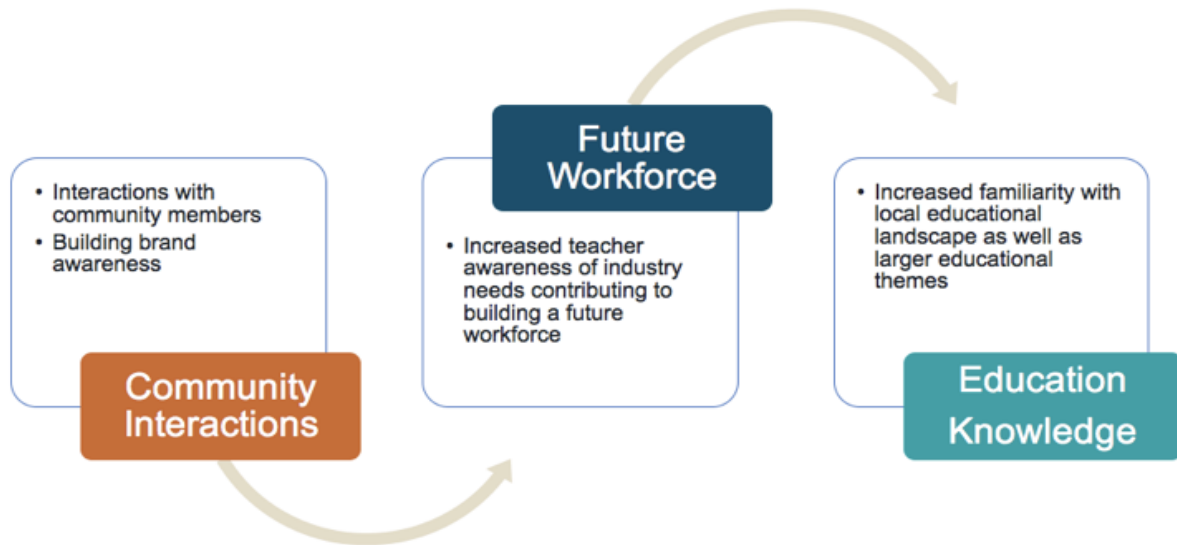
- Provide **resources** and **opportunities** for educators to participate in externship experiences across the state of Texas.
- Offer educators a unique professional development opportunity that connects the **classroom** to the **workplace** to improve student academic **achievement**.

The TEX<sup>2</sup> program benefits teacher externs, industry partners, and ultimately students, as highlighted in **Figures 1 - 3**.

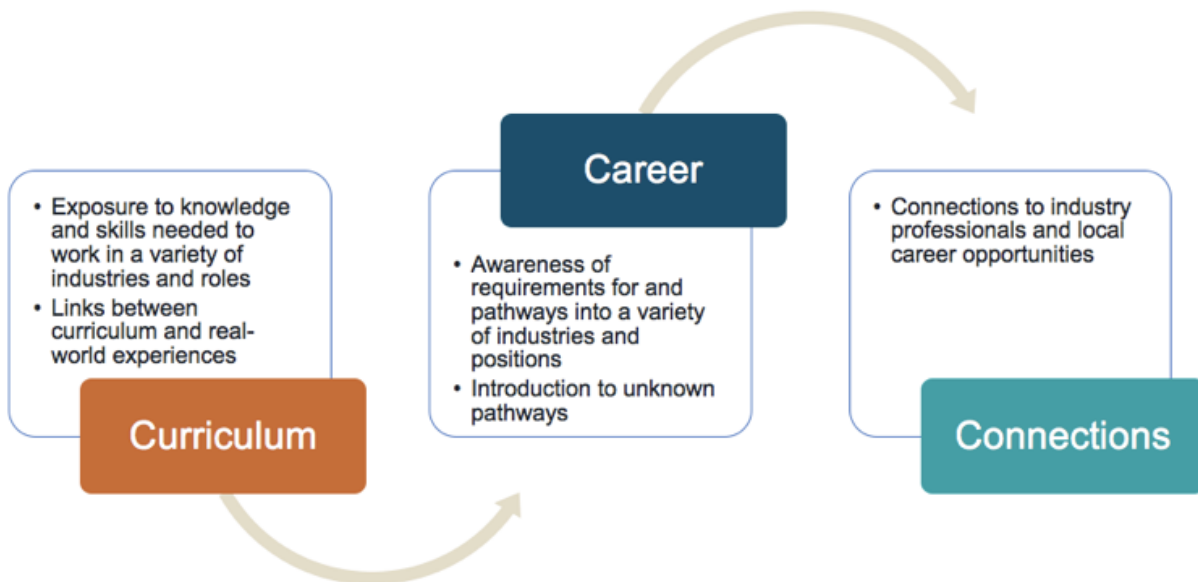
**Figure 1. TEX<sup>2</sup> Benefits to Teacher Externs**



**Figure 2. TEX<sup>2</sup> Benefits to Industry Partners**



**Figure 3. TEX<sup>2</sup> Benefits to Students**



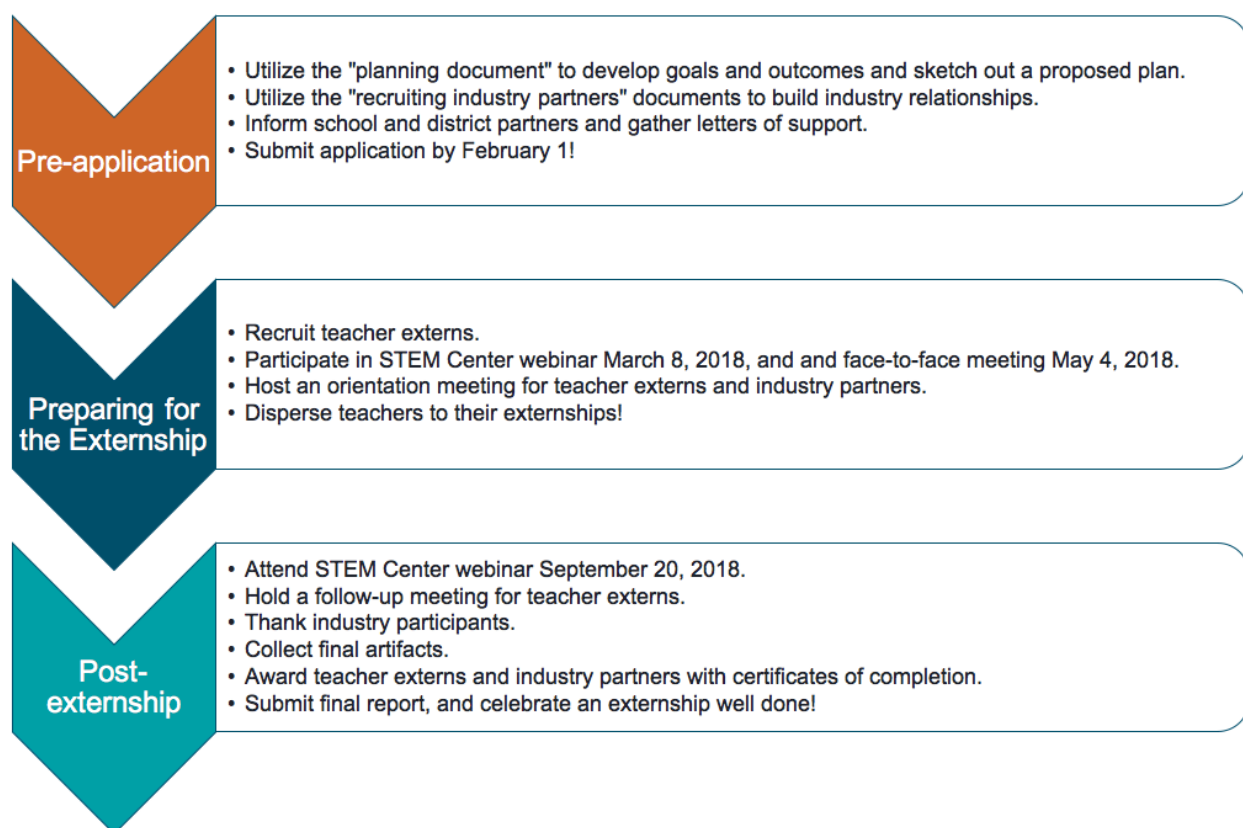
### Program Parameters

Serving as the backbone organization designing and facilitating the statewide TEX<sup>2</sup> program, the STEM Center developed and published a Request for Applications (RFA) in December of 2017 that delineated the program parameters. The STEM Center reached out to its former network of providers in the Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching (TRC) and WeTeach\_CS (Computer Science) Collaboratives, in addition to pilot projects from the Teacher Externships Pilot Program, encouraging them to propose teacher externship projects for the TEX<sup>2</sup> program. Interested organizations were encouraged to research other externship programs and to develop and describe a model most suitable for their educators and local industry partners.

Awardees were expected to implement their described projects between March 1, 2018 - February 28, 2019. During that time, Project Directors were to use their budgets (ranging from \$15,600 to \$40,000) to cover their institution's costs for time for planning, oversight, and reporting plus incidental overhead. Additionally, funds were expected to be allocated toward stipends and expenses for a minimum of ten teachers who would be directly involved in the externship experience.

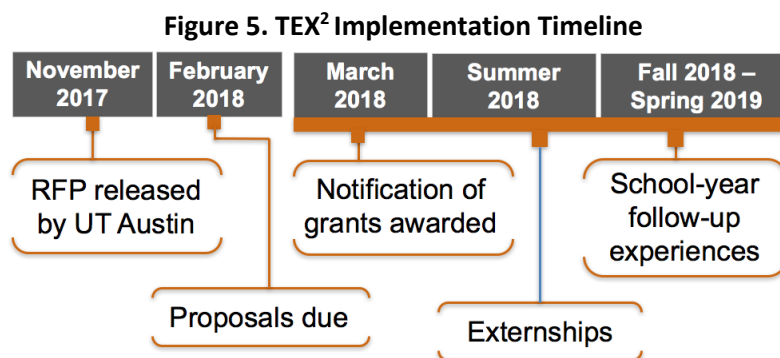
Discretion was left to the local Project Director to identify appropriate industry partners and design their project with the support of the TEX<sup>2</sup> Project Manager. Project Directors were encouraged to consider major employers in the community and to think in terms of the full range of local jobs and careers offered. Projects were expected to address employment opportunities for students with high school diplomas, advanced degrees, and everything in between and to have teachers be prepared to describe how the STEM instruction they deliver (or will deliver in the future) prepares students with the needed knowledge and skills for those jobs. The STEM Center gave Project Directors the timeline in **Figure 4** to help guide their planning.

**Figure 4. Project Director TEX<sup>2</sup> Timeline**



## Implementation Overview

In early September 2017, the STEM Center hired the TEX<sup>2</sup> Program Manager and began developing infrastructure and materials. The timeline in **Figure 5** describes the stages of program implementation.



**Table 1** describes the activities that took place in the planning period prior to the teacher externships.

**Table 1. Activities Timeline: Planning Period**

Activity	Description	Start Date	End Date	Notes or Comments
Refinement and expansion of the Teacher Externship model	See website for description of model.	9/1/17	10/31/17	<a href="#">About TEX<sup>2</sup></a>
Develop and post a website	Program Manager and webmaster developed content and resources for the website.	10/1/17	12/15/17	<a href="#">TEX2 Website</a>
Develop an application process; promote	A Request for Applications developed in the fall and was put out in December 2017, along with a PDF of pre-application resources for potential applicants. Proposals were accepted online between December 1, 2017 and February 1, 2018. A total of 20 proposals were received.	10/1/17	2/1/18	<a href="#">RFA</a> <a href="#">Pre-Application Resources</a>
Review and select grantees	Applications were reviewed and feedback was given to all projects. All 20 applicants were awarded grants.	12/1/17	3/1/17	See <a href="#">this folder</a> for notification letters.
Conduct a webinar to kick off the program	An introductory webinar was held on December 7, 2017.	12/7/17	12/7/17	<a href="#">Webinar Slides</a> <a href="#">Live Recording</a>
Develop and test participant data files	Data Manager created participant portal and data management center ( <i>DataCenter</i> ).	11/1/17	3/15/18	Participant data made public to web via <a href="#">project pages</a>

**Table 2** describes the activities that took place during the externship implementation period, or, the period when projects were conducting externships.

**Table 2. Activities Timeline: Externship Implementation Period**

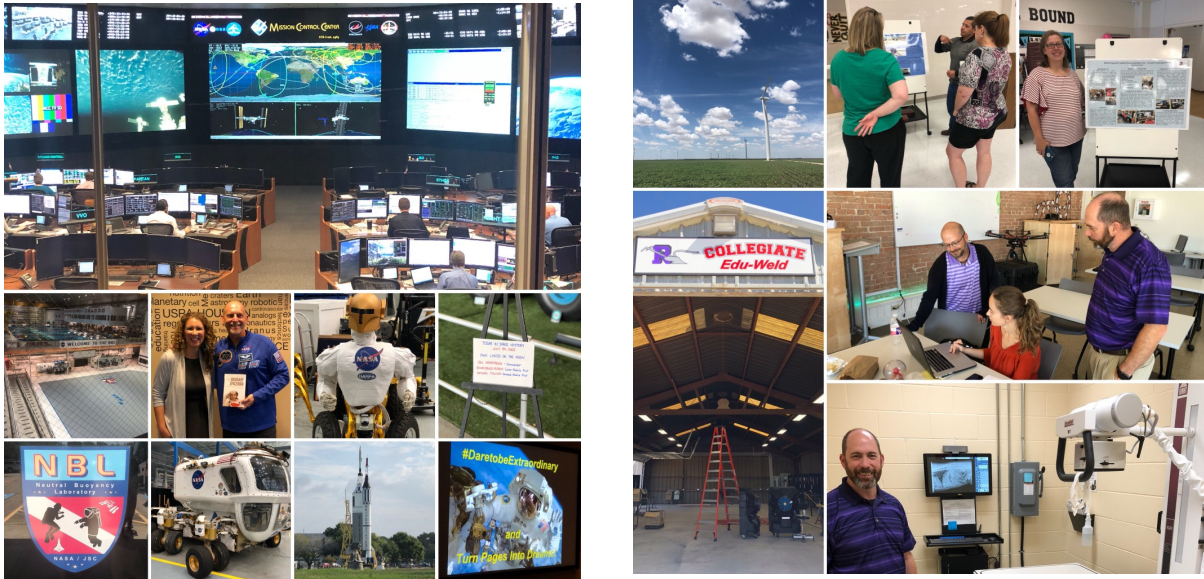
Activity	Description	Start Date	End Date	Notes or Comments
Develop Training Modules	A Project Director webinar was held on March 8, 2018. There was an optional webinar on May 9, 2018, for training in the use of the DataCenter. A meeting of Externship Project Directors and industry partners was held on May 4, 2018, to discuss the program and reporting requirements.	9/1/17	3/15/18	<a href="#">March 8 Webinar Slides</a>  <a href="#">May 9 Webinar Recording</a>  <a href="#">May 4 Meeting Slides</a>
Develop guidelines and tools for teacher externships	Resources to help projects frame, advertise, and plan for their externship were created.	9/1/17	3/15/18	<a href="#">TEX<sup>2</sup> Resources</a>
Conduct Site Visits	Program Manager conducted 10 site visits between May and September 2018.	5/1/18	2/28/19	See Table 3 for more information
Communicate with sites via webinars, phone, and email to provide ongoing support	Program Manager sent 12 project director updates throughout the year in addition to regular individualized communications.			Updates sent: 4/5/18 4/27/18 5/7/18 5/29/18 6/7/18 6/29/18 7/15/18 8/9/18 8/28/18 11/30/18 2/15/19 3/8/19
Develop evaluation tools, conduct ongoing evaluation of program activities, submit reports	Report #1 was due September 30 (including completed teacher profiles, PD Plans, and 40 direct contact hours with industry).	10/1/17	6/30/19	Evaluation tools and findings are described in this report

The program manager conducted ten site visits between May and September of 2018. **Table 3** details the projects visited, locations, industry partners observed, and notes about the visits.

**Table 3. Site Visits Timeline**

Date	Externship Project Visited	Location	Industry Partner(s)	Notes
May 2, 2018	Youth Code Jam	San Antonio	One Million Cups, Geekdom, CivTech San Antonio, Google Fiber	Observed Externship Kick-Off Day
May 5, 2018	ESC 20	San Antonio	Various	Observed Externship Kick-Off Day with GoPro Training
July 23, 2018	NASA Texas Space Grant Consortium	Austin/Houston	NASA Johnson Space Center	Spent day at Johnson Space Center
July 24, 2018	UTMB	Galveston	UTMB Health Professionals	Observed four speakers from the medical profession interacting with externs
July 25, 2018	Rice University School Mathematics Project	Houston	Bluware, Inc.	Observed a SCRUM protocol at Bluware
July 31, 2018	Leadership Preparatory School	Frisco	Southwest Airlines	Spent day at Southwest
August 2, 2018	Hays CISD	Kyle	Altra Coupling	Observed an extern “on the job”
August 7, 2018	Roscoe ISD	Roscoe	Various	Observed teacher presentations at back-to-school PD
August 10, 2018	Connally ISD	Waco	Various	Observed teacher presentations at back-to-school PD
September 24, 2018	Wayside Schools	Austin	data.world	Spent day at data.world





Finally, **Table 4** highlights program activities that occurred after the externship implementation period wrapped up at the end of summer 2018.

**Table 4. Activities Timeline: Post-Implementation Period**

Activity	Description	Start Date	End Date	Notes or Comments
Develop Training Modules	A Project Director webinar was held on September 20, 2018.	9/20/18	9/20/18	<a href="#">September 20 Webinar Recording</a>
TEA Project Update Meeting	Met with representatives from TEA to share progress to date.	9/26/18	9/26/18	<a href="#">TEA Meeting Slides</a>
Develop evaluation tools, conduct ongoing evaluation of program activities, submit reports	Project Directors submitted their Final Reports on March 15, 2019 (including artifacts, presentations, and post-survey administration).	10/1/17	6/30/19	Evaluation tools and findings are described in this report
Creation of special industry strand at WeTeach_CS Summit	Amendment was submitted to TEA to extend grant period one month to allow for a special strand for externship participants at the Summit. Scholarships to cover travel and registration were given to participants. 52 applications were received and awarded scholarships.	2/1/19	7/31/19	Emails notifications sent out on: 2/1/19 3/5/19

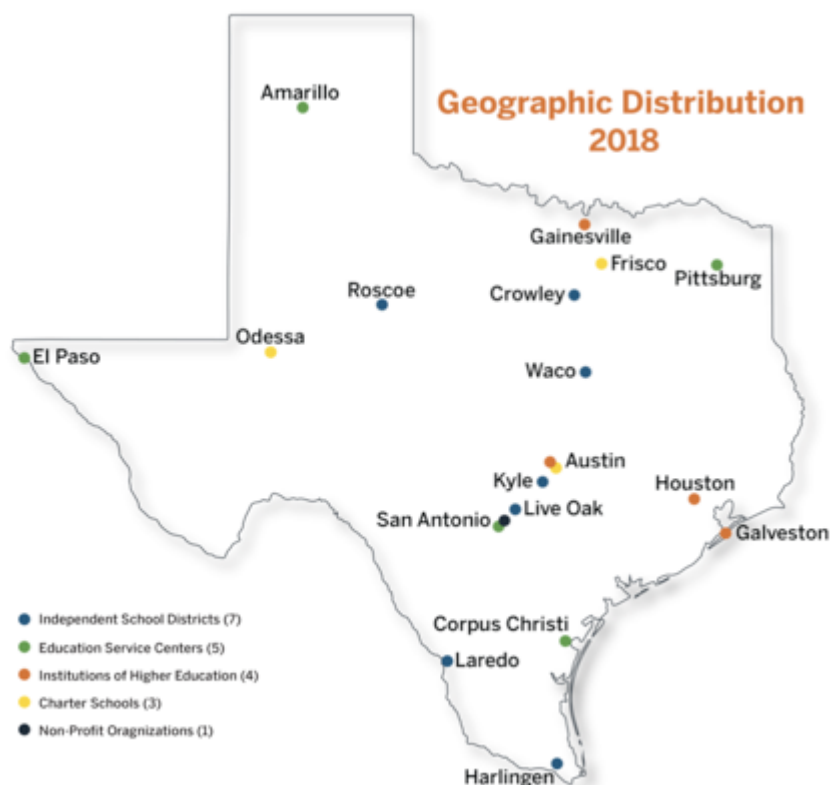
## Project Overview

As shown in **Figure 5**, the TEX<sup>2</sup> projects were geographically distributed across the state. Teacher externs from multiple STEM disciplines visited their industry partners in various communities surrounding the 20 projects. Seven of the 20 project providers were independent school districts, five were Education Service Centers (ESCs), four were Institutions of Higher Education (IHEs), three were charter schools, and one was a non-profit organization.

As shown in **Table 5**, a total of 281 educators and 107 industry partners participated in the TEX<sup>2</sup> projects. Projects were asked (and given priority points in their application) to recruit industry partners from the following Texas target industry clusters:

- Advanced Technologies and Manufacturing
- Aerospace and Defense
- Biotechnology and Life Sciences
- Information and Computer Technology
- Petroleum Refining and Chemical Products
- Energy

**Figure 5. Geographic Distribution of TEX<sup>2</sup> Projects**



**Table 5. Teacher and Industry Partner Participants by Region and Project**

Provider	# of Educators	# of Partners	Partners	Industry Cluster(s)
<b>REGION 1</b>				
Harlingen Consolidated Independent School District (CISD)	15	8	SpawGlass, Megamorphosis, Ferris Flynn & Medina LLC, United Launch Alliance, Valley Baptist Medical Center, Harlingen Medical Center, Burke Family Dentistry, VTX1	Advanced Technologies and Manufacturing, Aerospace and Defense, Biotechnology and Life Sciences, Information and Computer Technology
United Independent School District (ISD)	9	4	Prestige EMS, Ruthe B. Cowl Rehabilitation Center, Allied Health and Education Center, City of Laredo Health Department	Biotechnology and Life Sciences

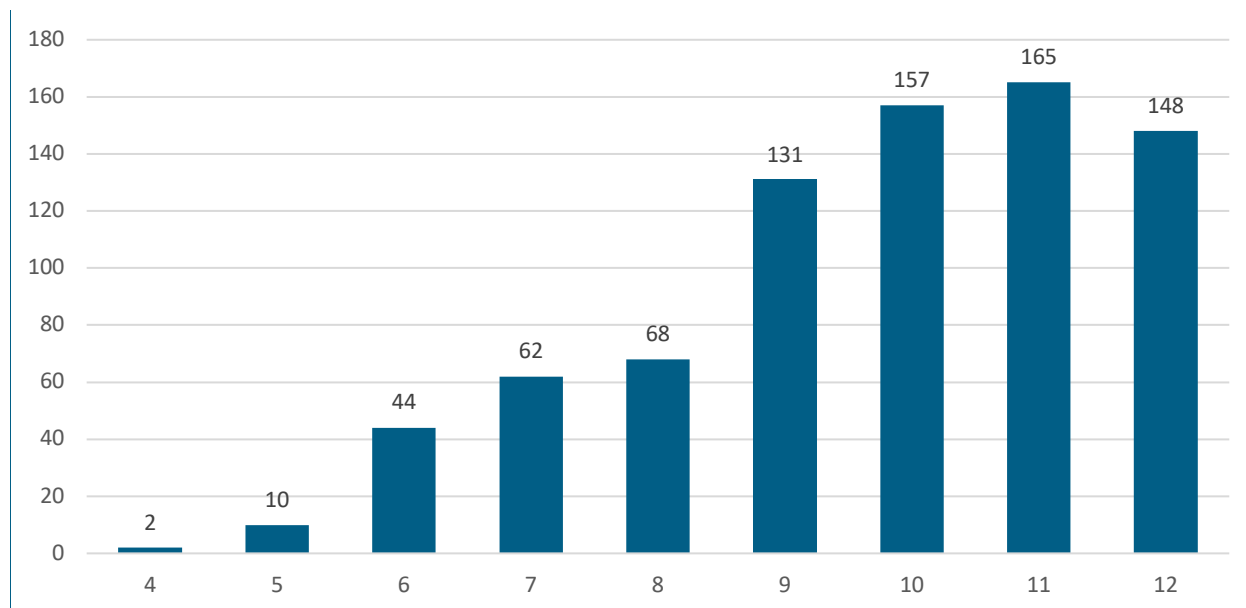
Provider	# of Educators	# of Partners	Partners	Industry Cluster(s)
<b>REGION 2</b>				
ESC Region 2	8	4	Hi-Res Media, Texas General Land Office – Oil Spills Response, Flatiron and Dragados LLC, TT Electronics	Advanced Technologies and Manufacturing, Information and Computer Technology
<b>REGION 4</b>				
Rice University School Mathematics Project	9	1	Bluware, Inc.	Information and Computer Technology
The University of Texas Medical Branch (UTMB) Southeast Regional Texas STEM Center	16	8	NASA Johnson Space Center, UTMB - School of Medicine, School of Nursing, School of Health Professions, Graduate School of Biomedical Sciences, Ocean Star Oil Rig Museum, Texas STEM Coalition, Ford, Bacon & Davis	Aerospace and Defense, Biotechnology and Life Sciences, Petroleum Refining and Chemical Products
<b>REGION 8</b>				
ESC Region 8	14	2	Northeast Texas Community College – Department of Agriculture, Workforce Solutions Northeast Texas	Advanced Technologies and Manufacturing
<b>REGION 10</b>				
Leadership Prep School	13	10	Intuit, Southwest Airlines, Frisco Style Magazine, LifeStyle Frisco, Frisco Association for the Arts, Gearbox Software, Jamba Juice National Headquarters, DACA Dental, ComHome Technologies, Bohler Technologies	Advanced Technologies and Manufacturing, Aerospace and Defense, Biotechnology and Life Sciences, Information and Computer Technology
<b>REGION 11</b>				
Crowley ISD	10	12	VLK Architects, Erepairz, Texas A & M AgriLife Extension Services, Texas Health Resources, University of North Texas Health Science Center, Bell Helicopter, Workforce Solutions for Tarrant County, Fort Worth Photo Lab, Safran Electronics and Defense, Elbit Systems of America, Somervell County Fire/EMS, RedBaron Consulting LLC	Aerospace and Defense, Biotechnology and Life Sciences, Information and Computer Technology
North Central Texas College	20	2	B29 Investments, Flusche Enterprises Inc.	Advanced Technologies and Manufacturing
<b>REGION 12</b>				
Connally ISD	20	6	Holt CAT, Mr. Electric of Dwyer Group, Texas State Technical College, Caterpillar, Providence Healthcare Network, Zack Morris Media	Advanced Technologies and Manufacturing, Biotechnology and Life Sciences, Information and Computer Technology

Provider	# of Educators	# of Partners	Partners	Industry Cluster(s)
<b>REGION 13</b>				
Hays CISD	15	4	Seton Hospital, City of Kyle City of Buda, Alta Coupling	Biotechnology and Life Sciences, Advanced Technologies and Manufacturing
NASA Texas Space Grant Consortium	20	3	NASA/University of Texas, NASA Johnson Space Center, Jacobs Technology	Aerospace and Defense
Wayside Schools	7	7	Tokyo Electronic Limited (TEL), RetailMeNot, FactSet Research Systems Inc., Parsley Energy, data.world, DELL, MD Anderson	Advanced Technologies and Manufacturing, Aerospace and Defense, Biotechnology and Life Sciences, Information and Computer Technology
<b>REGION 14</b>				
Roscoe Collegiate ISD	13	14	Ludlum Measurements Inc., Eljen Technology, ADIT Electron Tubes, Ludlum Medical Physics, Ludlum Wind, West Texas Molding, EMA Electro Mechanics, Edu-Weld, Edu-Vet Pet Hospital, Edu Vet Embryology, Collegiate Chiropractic, New Amsterdam Global Solutions LLC (wind, solar, oil, electric transmission), Gregory L. Wortham Law Firm (wind energy law), Wetsel Carmichael & Allen (energy law firm)	Advanced Technologies and Manufacturing, Biotechnology and Life Sciences, Energy
<b>REGION 16</b>				
ESC Region 16	19	7	Bell Helicopter, Talon/LPE, Texas A & M AgriLife, Amarillo Box Company, Altura, Plains Dairy, XCEL Energy	Advanced Technologies and Manufacturing, Aerospace and Defense, Energy
<b>REGION 18</b>				
UTPB STEM Academy	8	4	The Petroleum Museum of the Permian Basin, National Weather Center, NewsWest9, Conoco	Petroleum Refining and Chemical Products, Energy
<b>REGION 19</b>				
ESC Region 19	13	4	Jordan Foster Construction, Kay Bailey Hutchison Desalination Plant, El Paso Electric, Tech2O	Advanced Technologies and Manufacturing, Energy
<b>REGION 20</b>				
ESC Region 20	18	2	SA Works, EO2, plus others for individual teachers	Advanced Technologies and Manufacturing
Judson ISD	22	1	SA Works, plus others for individual teachers	Advanced Technologies and Manufacturing
Youth Code Jam	12	4	Geekdom, City of San Antonio Office of Innovation, CivTechSA, Launch SA, Google Fiber	Information and Computer Technology
<b>Total</b>	<b>281</b>	<b>107</b>		

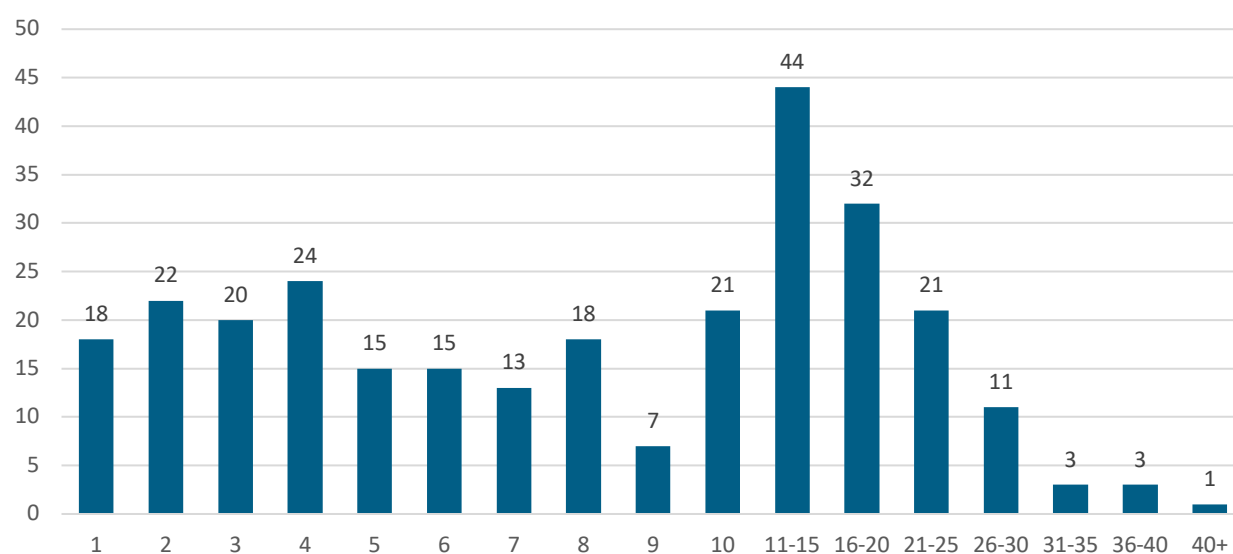
## Teacher Extern Profile

As mentioned above, a total of 281 teacher externs participated in the TEX<sup>2</sup> program. **Figures 6 and 7 and Table 6** describe the characteristics of TEX<sup>2</sup> teacher externs. There were 87 middle school and 201 high school teachers. *Note: Teaching assignments include multiple grades and subjects; thus, the sum of the number of teachers in the figures and tables below may exceed the total number of math and of science teachers provided above, and the sum of the percentages may exceed 100%.*

**Figure 6. Number of Teacher Externs by Grade Level**



**Figure 7. Number of Teacher Externs by Years of Experience**



**Table 6. Specialization/Role of Teacher Externs**

(Based on APR Parameters)	Number	Percent
Regular Core Content Teacher	231	82%
AP/IB	24	9%
Gifted/Talented	15	5%
Special Education Teacher	13	5%
Teachers of ELL	4	1%
Non-Teaching Math Teacher Coach	1	<1%
Other	8	3%

## Project Descriptions

Descriptions are provided below for each TEX<sup>2</sup> project, which are organized by region.

### Region 1

#### Harlingen CISD

The goal of the Harlingen CISD externship project was to provide 15 Career and Technical Education Teachers of the district's "Innovative Technology Academy," specific to the STEM and Informational Technology (IT) clusters, with field experiences through partnerships with local STEM and IT industry leaders and businesses. This project was designed to strengthen the local labor market/educator connection through hands-on extern practices in which the educators learned about current industry trends, employer needs, employment, and college and career opportunities that were translated into relevant classroom instruction and connections for students. This project was based upon a three-tiered system to measure, gauge, and ensure productive teacher experiences. The first tier involved an application process which involved the support and participation of the campus administrator. Based on the criteria, teachers were selected to join the cohort for the summer teacher externship program. After an informational session, teachers had the opportunity to communicate, collaborate, and engage with their Industry/Business partners prior to their actual 40-hour externship. During this meeting, teachers worked with their industry partner to set goals for learning and develop a needs-based experience with each educator. The second tier was the implementation of the externship, in which teachers learned notable similarities and differences in trends, opportunities, and required skills within their industry and gained knowledge of the skills and expectations the industry possesses for their students – their potential future employees. Examples of these include employee soft skills, constructive knowledge of applicable skills within their field, teamwork, workplace safety, proficiency of recognized industry-based traits, as well as technical knowledge and proficiency. Finally, after their 40-hour experience, teachers participated in a two-day Professional Learning Community (PLC). During this period, the externs collaborated to develop a lesson and a peer presentation pertinent to their experiences and teaching area. The expectation was for teachers to implement the lesson to their students in the fall semester.

## United ISD

Ten United ISD teacher externs from the Biology and Life Sciences Industry Academy (BLSIA) Early College High School (ECHS) project experienced externships of 40 hours (eight hours a day for five consecutive days) in real-world Biotechnology and Life Sciences industry activities, interacting with industry partners through their placement at industry partners' work sites. Teacher Externs in this program began their externship by attending a meeting in May of 2018 hosted by the Career and Technology Education Director and Coordinator that brought the participating employers and the externs together. During this meeting introductions were made, program goals were reviewed, an overview of the Teacher Externship Program Handbook was presented, and individual teacher technology was provided to facilitate the externship process. During the summer of 2018 the BLSIA ECHS teacher externs made observations, learned the state of the industry practices, and identified student skills needed for future employees to succeed in this field during their time at industry partners' work sites. As a result of the externship experience, teacher externs were afforded the opportunity to learn: the knowledge and skills students need to work in industry; industry trends, needs, and opportunities; and how to connect workplace needs to student learning.

Teacher externs met the specific program goals of being able to articulate the specific skill requirements (content and "soft" skills) for employees to be successful in a variety of roles within the Biotechnology and Life Sciences industry; describe career paths for a range of students to enter into a career in the Biotechnology and Life Sciences industry (i.e., opportunities directly out of high school, those that require advanced degrees, etc.); make relational connections between members of the Biotechnology and Life Sciences industry and their students (via virtual or in-person mentoring, guest lectures, etc.); and provide information and insight regarding the BLSIA Academy ECHS students and program by acting as ambassadors to the Biotechnology and Life Sciences industry. Teacher externs gathered for meetings on the Monday (all day) and Tuesday (half day) following conclusion of the externships. Activities at these meetings included evaluating the externship experience, developing a scope and sequence integration based on the information gleaned from the industry partners, and preparing presentations based on their experience that will inform the educational program taking place at the BLSIA ECHS. These presentations were shared at this meeting, and again during campus staff development at the beginning of the 2018-2019 school year.

## Region 2

### ESC Region 2

The Education Service Center Region 2 (ESC-2) externship project developed a professional development opportunity connecting the classroom to the workplace. Fifteen Region 2 teachers spent a total of 40 hours at two industry partner work sites learning about the trends, skills, and opportunities in industries in order to enrich and strengthen instruction. In addition to the 40 hours at industry sites, externs spent 30 hours at the ESC-2 site, researching industry trends; the knowledge and skills, including soft skills, needed to prepare for work within the industry; and collaborating on the development of lesson plans to connect workplace needs with student learning. Additionally, externs built career pathways for a range of student groups based on the current curricular offering at his/her local education agency (LEA). Teachers participating in the TEX<sup>2</sup> project gained experiences directly interacting with STEM industry leaders and learning about industry trends, needs, and opportunities within the local community and connected their learning to support student career goals.



## Region 4

### Rice University School Mathematics Project

The Rice University School Mathematics Project (RUSMP), in collaboration with the Houston Independent School District (HISD) and Bluware, Inc. (Bluware), offered externship experiences to 10 HISD middle and high school teachers during the Summer of 2018 through the RUSMP TEX<sup>2</sup> project. During these externships, the externs, selected from targeted schools within HISD (including HISD's early college high schools and middle school STEM academies), interacted with industry professionals in STEM fields through agile software development practices. Through these interactions, participating teachers gained insights into the knowledge and dispositions necessary for success in STEM careers which they were then able to share with their colleagues and students.



### UTMB Southeast Regional Texas STEM Center

The goal of The University of Texas Medical Branch (UTMB) TEX<sup>2</sup> project was to improve student academic achievement and career awareness by providing teachers with a professional development experience enabling them to learn directly from experts in three major Texas Industry Clusters: Aerospace, Petrochemical, and Healthcare/Research. The project consisted of: 1) a one-day program introduction; 2) a one-week externship experience that included 40 hours of direct contact with industry experts as well as a one-day job shadowing experience; and 3) a one-day post externship wrap-up session. By engaging in the externship experience, teachers gained experiential knowledge of the skills and academic preparation required for various careers and different career pathways. This knowledge was used to make relevant career-curriculum connections in class, integrate guest lectures from industry experts to provide career information and role models to students in their classrooms, as well as provide meaningful real-world connections that inspire student achievement and prepare them for future career success.

## Region 8

### ESC Region 8

Region 8 ESC partnered the secondary math department with the CTE department to create an externship effort that exposed and educated teachers about greater STEM career possibilities for their students in the region, ultimately resulting in students exercising the initiative to pursue those opportunities, benefiting themselves as well as the local economy. Partnering with a diverse group of industry partners through Workforce Solutions of Northeast Texas, teacher externs spent three days onsite and two days in the Region 8 facility meeting face-to-face with industry partners. In addition to connecting academic knowledge to industry application, this group examined the soft skills, specifically those of collaboration and communication, that are necessary to succeed in advancing industries. Teachers presented their knowledge of externships at the regional Excellence in Education conference and created lesson plans that coordinated the information gained from the externship with academics. These lesson plans are available to be shared within the region with teachers of like grade and content areas. As compensation for their participation, teacher externs received a stipend for requirements completed during non-contract time periods; a subscription to NEPRIS, allowing virtual contact with industry professionals for their classrooms; and professional development from Texas A&M University, Engineering Department through their SPARK program.



## Region 10

### Leadership Prep School

Leadership Prep School (LPS) offered 14 teachers and staff members at their secondary level (grades 5 - 11) the opportunity to participate in an externship in order that they may better prepare their students for the 21st century workforce. The goal of the externship was to increase teachers' ability to connect theory and practice, thus bridging the gap between knowledge acquired in the classroom and knowledge applied in the workplace. Additionally, teachers acquired tools to help students adapt in an ever-changing workforce that is often quickly disrupted by technological advancements. Finally, teachers examined the career pathways to guide students along their journey of career exploration and begin taking steps towards building a successful career. The externship opportunity included time with the company's Human Resources Department provided insight into recruitment, roles, skills, training, performance review processes, and pay; thus, providing teachers with exposure to skills necessary for real-world success so they could create curriculum and strategies for student growth in these areas in the classroom. The teachers also built a network of field experts who could serve as a resource as they developed lesson plans and activities around topics relating to a specific industry or profession.

By visiting different departments within a company and job shadowing, teachers gained a greater understanding of the soft skills needed to help students along the journey from problem statement to solution. The teachers were then able to seek opportunities develop these skills in their students. They also gained insight into trusted corporate methodologies, such as Agile, and can now encourage students to employ these techniques in order to familiarize them with these concepts. Finally, through externships, the teachers gained insight into career pathways for targeted industries in our area of North Texas. With this knowledge, teachers collaborated to create curriculum that focuses on academic and technical skills necessary to help students ultimately land high-demand, high-opportunity jobs.



## Region 11

### Crowley ISD

Crowley ISD offered externships to teachers at specified locations for forty hours. The externships allowed teachers to observe the required skills, technology, and workplace interaction in order to provide informed instruction in the high school setting. The goal of the externships was to provide reinforcement of the soft skills and industry specific skills for teachers teaching in the Biotechnology, Advanced Technology/Engineering/Manufacturing, Architecture Technology, Health Science Technology, and Animal Science programs of study. After completing site visits, teachers planned instructional projects that incorporated skills observed during the on-site visits. These projects were in the format of project-based learning (PBL), which requires students to work in a team setting and use employability skills such as communication and interpersonal skills, problem solving, self-motivation, initiative, organization skills,

and planning to meet deadlines. After participating in the externship, teachers developed a PBL opportunity that incorporated skills observed in the externship, along with employability skills. The PBL unit began with an essential question and required students to determine solutions along with which type of artifact will best communicate the results. Students were also required to develop a project calendar along with benchmarks for completion. After completing the PBL unit, students presented their findings to committees composed of industry representatives, which included professionals who hosted the externships.

### North Central Texas College (NCTC)

North Central Texas College hosted Industry in the Classroom (ICE). 10 teachers from the north Texas area participated in a 50 hour professional development academy composed of lecture, field trip, hands-on experience, and dissemination to teacher colleagues and their students. North Central Texas College serves the labor force for three counties in career and technical programs. This professional development allowed for participating teachers to have hands-on experiences and bring that experience to the classroom. B29 Investments and Flusche Enterprises are two companies in the north, central Texas area that specialize in welding and machining. The community partners have been long-term partners of NCTC and were pleased to be partners with this project providing instruction from industry leaders and employees. NCTC partnered with three districts in their service area. These schools have agreed to provide support for their participating teachers to attend training and bring that information back to the classroom/district.

## Region 12

### Connally ISD

In the fall of 2017, Connally ISD's (CISD) Early College High School (ECHS) and the College & Career Readiness Team (CCRT) identified the need to expand partnerships between secondary CTE programs and industry and to strengthen professional development for CTE teachers. The CCRT Team developed a common goal for teachers and students, to provide deeper insights into the needs, realities, and challenges of the workplace by implementing a TEX<sup>2</sup> project.

The Connally ISD TEX<sup>2</sup> project required teachers to complete a teacher extern profile highlighting their technology and writing skills; attend meetings and be actively engaged in the externship experience; maintain a reflective journal throughout the program; and participate in PLCs providing information about the externship to a minimum of five other teachers at the campus, district, region, or state level. In addition, teachers were required to connect their externship learning experiences with high-quality classroom work-based learning – a form of learning that facilitates the integration of academic and career education for students. Teachers also communicated with their peers across the region and state the skills and lessons they have learned from the externship experience.



## Region 13

### Hays CISD

Hays CISD Career and Technical Education (CTE) collaborated with ESC-13, the City of Kyle, and the City of Buda, all of whom work closely with the Workforce Solutions Rural Capital Area (WSRCA). Hays CISD CTE Project Director prepared the business sites and teachers for the externships through a series of orientations and meetings. The Project Director ensured alignment with state initiatives and House Bill 5. Hays CISD CTE aligned the design and development of the externships to local labor market data provided by WSRCA. They ensured that Achieve Texas Career Clusters and Programs of Study, as well as the Texas Foundation High School program endorsement pathways – Business & Industry, STEM, Public Services, Arts & Humanities, and Multidisciplinary Studies – were offered in the externship summer program. Hays CISD CTE, with the assistance of the Buda Chamber of Commerce, provided a five-day professional development (PD) program for fifteen middle and high school teachers. This multi-disciplinary team worked together on this TEX<sup>2</sup> project to provide teacher professional development in the STEM careers. The week-long professional development program included on-site externships at regional STEM businesses, virtual tours for sites which cannot support lengthy externships, and PBL professional development so that the teachers developed project-based instructional designs for their students to complete based on the externships.

The program: 1) enabled teachers to continue to develop and clarify their professional goals through participating in, and reflecting upon, the work of their host organizations; 2) further expanded teachers' understanding of professional responsibility and professionalism through participation in, observation of, and reflection of real-life scenarios; 3) developed and strengthened lifelong habits of reflective learning and self-awareness through engaging in written and oral reflection and analysis, so that teachers are able to guide their professional growth after the externship; 4) improved teachers' pathway skills, including research, writing, and oral advocacy (whether formal or informal) through putting these skills to work for their host organization and receiving detailed feedback on their work; 5) further developed teachers' career pathway knowledge and analytic skills through their work for their host organizations and classroom discussion; and 6) enhanced their understanding of PBL and implementing it in the classroom. This experience helped to develop teachers' capacity to implement experiential and inquiry-based teaching and learning, apply 21st-century technologies to STEM curriculum and instruction, integrate 21st-century workplace skills into the curriculum, and integrate STEM career awareness into classroom culture.



### NASA Texas Space Grant Consortium

The STEM Enhancement in Earth Science teacher externship addressed the national need to increase the number of high school students, particularly under-represented minorities and those from underserved areas, that will pursue STEM college degrees. Through a partnership of institutions and organizations that support STEM education, they used NASA's fleet of Earth observing satellites as a catalyst for the implementation of a high school internship program. By leveraging the strengths of this partnership, this project:

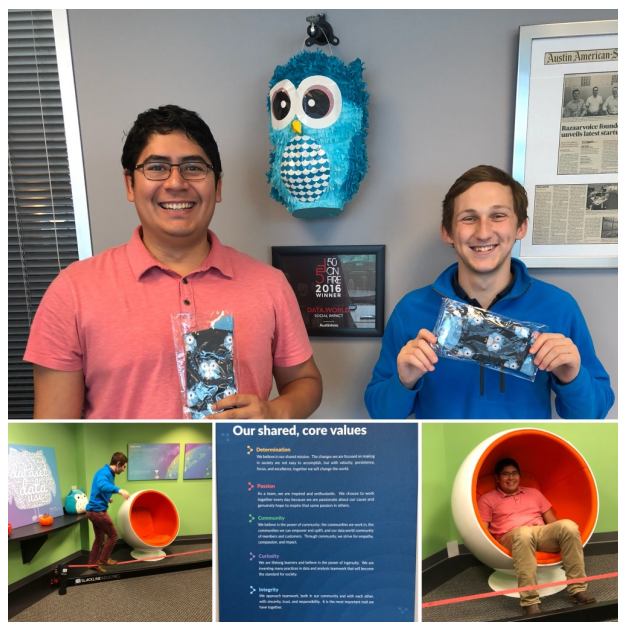


1. Provided secondary students and teachers with authentic NASA mission-based opportunities that build STEM knowledge, skills, and career awareness through a nationally competitive High School Summer Intern program and Teacher Externship opportunity that challenges both to conduct research from data supplied by Earth Science missions while being mentored by a project scientist;
2. Provided opportunities for high school students to jump start their future and explore the possibilities of a STEM-related major or career while experiencing an on-site university setting;
3. Educated students by utilizing rigorous STEM curriculum enhancement activities that meet national science, technology, engineering, and math standards and encompass the research and technology of NASA's Earth Science mission directorate;
4. Inspired a more diverse student population to pursue careers in STEM-related fields following involvement in NASA programs; and,
5. Provided educators with background knowledge and experiences to share with students to encourage careers in the aerospace and computer industries.

The primary audience was high school students and secondary teachers of Earth Science, Astronomy, Environmental Science, and Physics while directly addressing NASA's education mission goal to attract and retain students in science, technology, engineering, and mathematics, or STEM disciplines. In addition, it contributed to: enabling STEM education through mentorship, selection of existing NASA content supporting STEM, the opportunity for high school students and teachers to conduct authentic NASA mission-based research, and improving U.S. scientific literacy by integrating identified lessons and data for citizen scientists in repositories such as My NASA Data. This project also helped advance national education goals by utilizing NASA resources that align with the Framework for K-12 Science Education and leverage efforts through partnerships by drawing upon the strengths of the collaborators who are part of this project. Each component further contributed to NASA's desired outcome of enabling NASA scientists and engineers to engage more effectively and efficiently with learners of all ages.

### Wayside Schools

Wayside: Sci-Tech Preparatory (STP) is a non-profit, tuition-free, and open-enrollment T-STEM academy that serves a low-income, minority-majority student body in grades 6-12 in Southeast Austin. The overarching goal of the TEX<sup>2</sup> externship project was to build capacity within 10 high school STEM teachers at STP by leveraging STEM-related externships with industry partners, resulting in enhanced classroom instruction and improved academic and professional outcomes for our scholars. The externship experience involved 40 hours of site visits to industry partners and a speaker series hosted at STP. Site visits to industry partners included the following: Company Overview and HR Orientation, Facilities Tour, Panel Discussion, and Job Shadowing. Together, these activities were designed to help teachers: 1) understand the knowledge and skills scholars need to work in industry; 2) learn about prospective industry trends, needs, and opportunities; and 3) better connect workplace needs to scholar learning and the development of hard skills.



## Region 14

### Roscoe Collegiate ISD

Roscoe Collegiate ISD served teachers who undertook externships with regional businesses and industries that are involved in Advanced Technologies and Manufacturing, Aerospace and Defense, Biotechnology and Life Sciences, Information and Computer Technology, Petroleum Refining and Chemical Products, and other technical or related industries. Roscoe Collegiate is a school-wide Early College High School and a school-wide STEM Academy. Roscoe Collegiate is an international model for rural educational transformation recognized as one of 30 schools in the Global Learning Network in 2017 (30 globally, 17 in USA, 4 in Texas). Student apprenticeships and student research are crucial components of their model. Teacher externships directly informed teachers in their advice and preparation of students for business and industry apprenticeships. Roscoe Collegiate ISD has also worked directly with businesses to form collaborative public-private partnerships between professionals and student career opportunities. These collaborative businesses are housed on Roscoe Collegiate campus properties: Collegiate Edu-Vet (veterinary) (biotechnology & life sciences), Collegiate Chiropractic (biotechnology and life sciences), Collegiate Edu-Drone (aerospace and defense), and Collegiate Edu-Weld (advanced technologies and manufacturing). These business and industry partners, along with their diverse global industry partners within 15 miles, provided extensive and intensive teacher externship and subsequent student apprenticeship opportunities.

## Region 16

### ESC Region 16

The Region 16 ESC TEX<sup>2</sup> project supported 10 teachers with math, science, engineering, and computer science backgrounds. Teachers had an opportunity to work with engineers, consultants, and various industry professionals to see their content applied through hands-on, job shadowing experiences. The primary industries included a nuclear facility, a leading helicopter development center, a drilling, air and water pollution abatement program, and a research facility. The collaboration, connections, and partnerships the teachers and industry professionals received was invaluable to campuses and industry professionals. One of the main goals was for both sectors to gain insight into how to best prepare future generations for success in the workforce. While only ten teachers participated in the externship, the knowledge gained was shared with teachers across the state to help communicate the soft skills and content skills needed for students to be productive when entering the workforce.

## Region 18

### UTPB STEM Academy

The University of Texas Permian Basin (UTPB) College of Education developed a TEX<sup>2</sup> project for teachers to inquire and experience first-hand the local and state STEM industries, allowing teachers to inspire tomorrow's STEM leaders through highly engaging project-based learning opportunities centered on the knowledge and skills acquired from "the field". UTPB's "I to I" program focused on careers in various STEM industries including the Permian Basin's prevalent local industry of Oil and Gas Extraction (OGE), as well as the Atmospheric industry. Teachers shadowed local petroleum engineers, astronomers, and meteorologists to get a first-hand look at current trends and important discoveries in the industries. Teachers brought back their field experiences to the classroom and developed valuable "on-the-job" classroom projects. The classroom environment simulated the teacher's first-hand experiences "in the field."

## Region 19

### ESC Region 19

Teachers in Region 19 school districts gained valuable insight into the STEM industry clusters available for student pathways through the externship program. Industry partners offered field experiences and previewed the real-world connections encountered on a daily basis. Teachers were able to outline the career opportunities in STEM industries as well as follow trends and patterns in salaries, educational requirements, economic, and social impact. Teachers gained access to hands-on experiences in the STEM fields and were able to take their learning into the classroom. Externship teachers and students have access to virtual learning sessions and materials to use during their STEM programs and access to professionals in the field.

## Region 20

### ESC Region 20

The ESC-20 TEX<sup>2</sup> provided 10 secondary math, science, and CTE teachers an immediate opportunity to engage with local industry and business partners through an on-site 40 hour, hands-on experience. This opportunity allowed both industry and education partners to dive into each other's worlds and address the question of "When will I ever use this?" Teachers gained an awareness and understanding of College, Career, and Military readiness trends, needs, and opportunities with the intention of bringing STEM back to their classrooms.

### Judson ISD

Judson ISD hosted 25 teachers (who impact 800 students) at a summer externship opportunity. Participants attended a five-day professional development session designed to connect educators with industry to learn how exciting math and science can be when applied in real, workforce settings. Participants also visited three local companies throughout the week as part of the externship experience. At the end of week session, teachers developed a project-based learning lesson which incorporated externship opportunities for students during the school year. Direct application of the materials learned in the session was transferred to students. This increase in knowledge and skills provided students with the opportunity to explore additional careers and engage with industry partners.

### Youth Code Jam

Youth Code Jam had a unique take on teacher externships. Instead of embedding teachers in established companies, the goal of this innovative program was to give teachers a completely different look at business by embedding them in a tech startup environment. In one weekend, teachers experienced the highs, lows, fun, and pressure that make up life at a startup. They learned what it is to have an entrepreneurial mindset. They created a real company with other budding entrepreneurs. They met and learned from top mentors, investors, co-founders, and sponsors. By embedding teachers in Startup Weekend, they accelerated an understanding of what it takes to inspire their students to become entrepreneurs and what students need to graduate high school "innovation ready." After learning what it takes to turn an idea into action, teachers had the opportunity to work with their students to innovate tech solutions to some of San Antonio's most pressing challenges through the City's Office of Innovation CivTechSA initiative.



## Performance Measures

Overall, the STEM Center exceeded its performance measure goals in every category; **Table 7** provides details on the TEX<sup>2</sup> program achievements for each measure.

**Table 7. Performance Measures**

Performance Measure	Goal	Actual
Number of educators participating	200	281
Number of educators developing lessons/activities to implement	200	<a href="#">216 catalogued artifacts</a>
Number of business/industry partners	40	107
Degree to which educators were satisfied	80%	96%
Number of best practice artifacts developed	20	268
Number and type of tools/resources developed	20	25
Number of grantees reporting satisfaction with technical assistance provided	18	20
Number of teachers reached via presentations	>1000	>1000
Percent of business/industry partners reporting satisfaction with experience	80%	98%
Number of website/social media hits	100	Unique pageview as of September 2018: Totals – 4,178 TEX <sup>2</sup> Home – 1,087 TEX <sup>2</sup> RFA – 1,995 TEX <sup>2</sup> Resources – 440 TEX <sup>2</sup> About – 305 TEX <sup>2</sup> Recipients article – 350

As shown in **Table 8**, the TEX<sup>2</sup> program served 88 school districts and 146 campuses (including public, charter, and private schools). The vast majority of TEX<sup>2</sup> projects either met or exceeded their project measures as outlined in the Statement of Work. On average, TEX<sup>2</sup> projects achieved **126% of their goal of 40 hours** for an average **50.3 hours of direct industry partner contact per participant**.

**Table 8. Number of Districts, Campuses, Teachers and Students TEX<sup>2</sup> Served**

Teacher	Number
Campuses	146
Districts	88
Teachers	281
Students*	23,885

\* Student numbers are based on an average ration of 85 students per teacher.

## Teacher Extern Evaluation Methods

The STEM Center designed and administered post and follow-up surveys to the teacher externs in order to assess their perceptions about the externship, its outcomes, and ways to strengthen it moving forward. Post-surveys were administered after externs completed their summer externship experience, beginning in June 2018. The post-survey asked about their extern experience and their plans for applying what they gained from the experience in the upcoming school year. Follow-up surveys were administered from December 2018 to March 2019 after teacher externs had the opportunity to share and apply what they learned from the externship experience. Of the 281 total teacher externs, 236 responded to the post-survey and 193 responded to the follow-up survey, resulting in response rates of 87% and 71%, respectively. (See **Table 9.**) Key findings from these surveys are provided in the following sections.

**Table 9. Number and Percentage of Teacher Extern Survey Responses by TEX<sup>2</sup> Project**

TEX <sup>2</sup> Projects	Post-Survey (N=236)		Follow-Up Survey (N=193)	
	Number	Percentage	Number	Percentage
Connally ISD	18	8%	10	5%
Crowley ISD	5	2%	7	4%
ESC Region 2	8	3%	10	5%
ESC Region 8	15	6%	13	7%
ESC Region 16	16	7%	18	9%
ESC Region 19	6	3%	15	8%
ESC Region 20	19	8%	23	12%
Harlingen Consolidation ISD	5	2%	2	1%
Hays Consolidation ISD	14	6%	7	4%
Judson ISD	9	4%	5	3%
Leadership Prep School	15	6%	0	0%
NASA Texas SEES at UT Austin	19	8%	0	0%
North Central Texas College	19	8%	24	12%
Rice University	5	2%	0	0%
Roscoe ISD	13	6%	15	8%
United ISD	10	4%	8	4%
UTMB	16	7%	9	5%
UTPB	8	3%	9	5%
Wayside Schools	4	2%	7	4%
Youth Code Jam	12	5%	11	6%



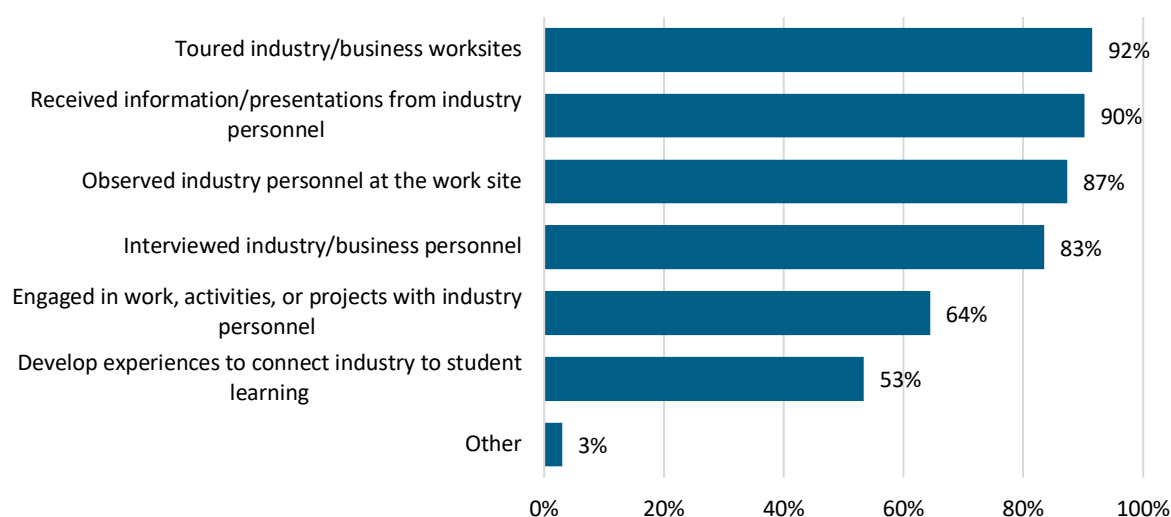
## Teacher Extern Post-Survey Findings

### Extern Engagement

A total of 236 teacher externs responded to the online Teacher Extern Post-Survey, resulting in an 87% response rate, with respondents from each TEX<sup>2</sup> project. The teachers participated in externships in a variety of industries, including business/multi-faceted industries (47%), education (28%), computer (23%), construction (22%), energy (22%), aerospace (18%), health/medical (18%), municipal infrastructure (10%), telecommunications (7%), and other specified industries (e.g., agriculture/environment, culinary/food, manufacturing/fabrication, welding).

As shown in **Figure 8**, almost all externs received information and/or presentations from industry personnel (90%) and toured industry/business worksites (92%). Most externs were able to observe industry personnel at the worksite (87%) and interviewed industry/business personnel (83%), while more than half of the externs engaged in work, activities, or projects with industry personnel (64%) and worked with industry personnel to develop lessons/experiences to connect industry to student learning (53%). Six respondents (3%) reported that they engaged in other activities, which included three externs who engaged in entrepreneurship, two externs who worked with students, and one extern who networked with industry partners.

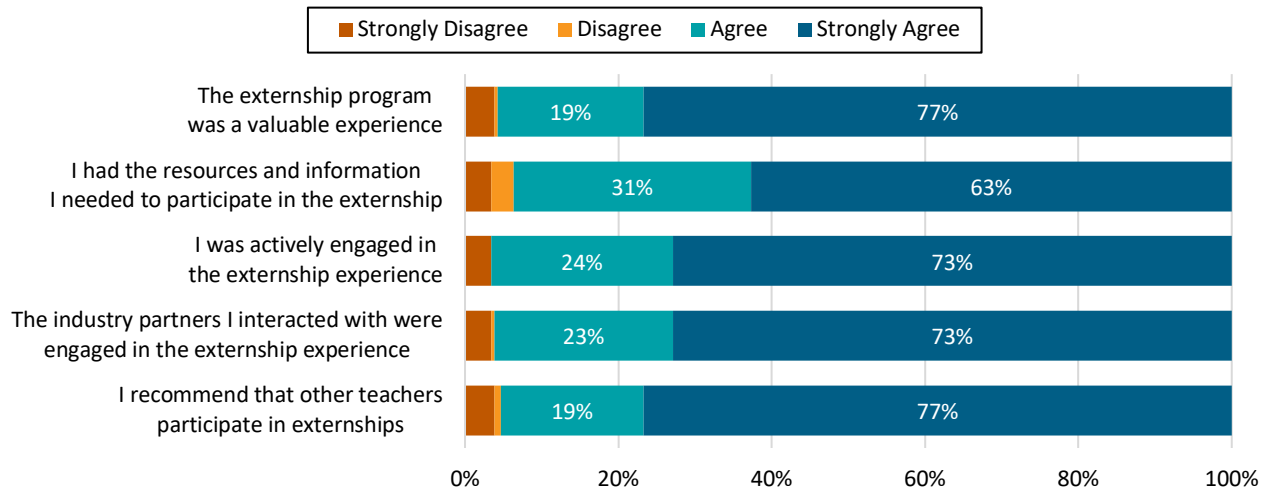
**Figure 8. Percentage of Teacher Externs Who Engaged in the Following Activities (N=236)**



### Extern Satisfaction and Outcomes

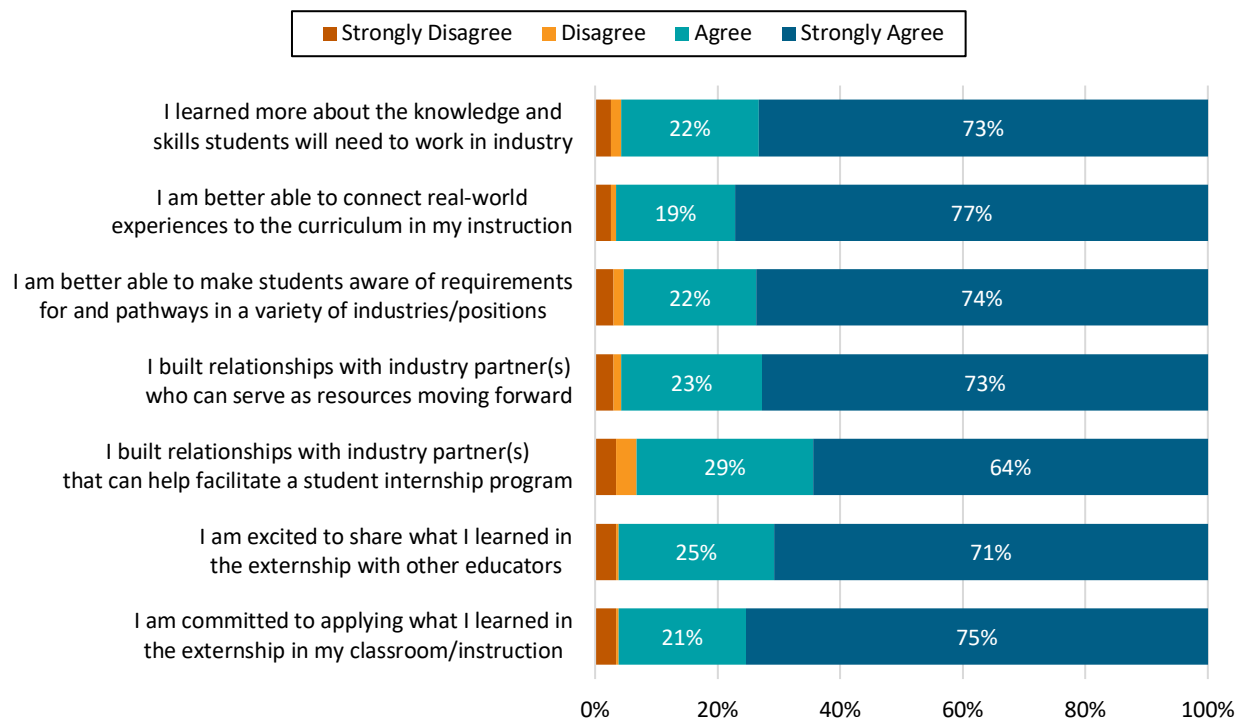
Overall, teacher externs were satisfied with and had a positive experience in the TEX<sup>2</sup> program. As shown in **Figure 9**, almost all externs agreed or strongly agreed that they valued the experience (96%), had the necessary resources (94%), were actively engaged (97%), and that their industry partners were actively engaged (96%).

**Figure 9. Percentage of Teacher Externs' Responses to Satisfaction Items (N=236)**



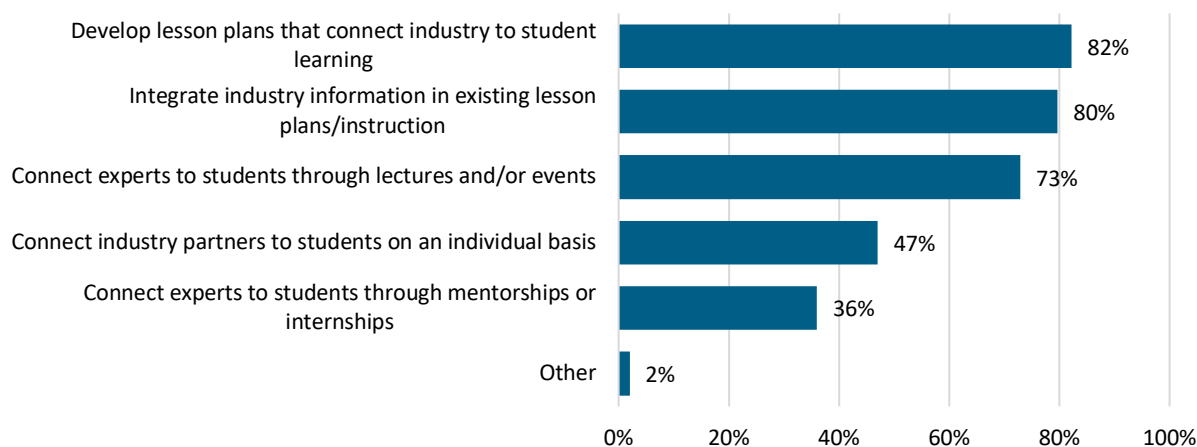
Almost all (95-96%) externs indicated that they learned about the knowledge and skills students would need to work in industry, and they would be better able to connect real world experiences to their curriculum and make students aware of requirements and pathways for various positions (see **Figure 10**). Nearly all externs built relationships with industry partners who could serve as resources (96%) and could help facilitate student internships (93%). In addition, 96% of the externs were excited to share what they learned with other educators and to apply what they learned to their classroom.

**Figure 10. Percentage of Teacher Externs' Responses to Learning and Application Items (N=235-236)**



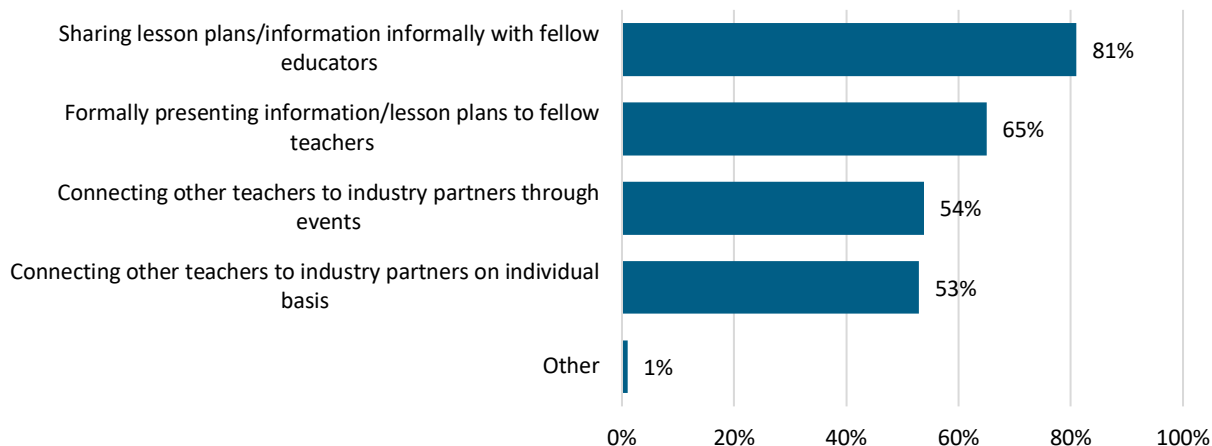
The teacher externs reported that they will implement what they learned in a variety of ways (see **Figure 11**). Most externs indicated that they will develop lesson plans that connect industry to student learning (82%), integrate industry information in existing lesson plans/instruction (80%), and connect experts to students through lectures and/or career day events (73%). Some reported that they would connect industry partners to students on an individual basis when possible (47%) and through mentorship or internships (36%). Four teachers responded that they would implement what they learned in other ways (2%), including two who were planning field trips to industry sites, one who will connect students to the local community, and one who planned to help students through collaboration and support.

**Figure 11. Percentage of Teacher Externs Reporting How They will Implement What They Learned (N=236)**



Externs were also asked how they planned to share what they learned with at least five other teachers. As shown in **Figure 12**, most externs (81%) reported that they would share lesson plans or information with their fellow educators. More than half of the externs reported that they would formally present information or lesson plans to fellow teachers (65%), connect teachers to industry partners through guest lectures and other events (54%), and connect teachers to industry partners on an individual basis as cases arise (53%). Two externs (1%) reported that they had other plans for sharing what they learned, including being an ambassador for an industry program and starting a civic-minded club at a school.

**Figure 12. Percentage of Teacher Externs Reporting How They will Share what They Learned with Others (N=236)**



On the following open-ended survey items, teacher externs provided additional information on the outcomes resulting from their experience and how they plan to implement what they learned in their classrooms. Key themes and representative quotes for each item are provided below. The sum of percentages for each item may exceed 100% as some responses fit into multiple themes.

**What was most useful or valuable about your externship experience this summer? (N=230)**

- Learning about industry and careers** (34%): "Hearing first-hand what gaps students have entering the workforce," "I enjoyed visiting industries that I had very little knowledge about because it exposed me to various pathways and careers my students might be able to pursue in the future," and "The most useful experience was the opportunity to learn what is new in the industry to better prepare health science students to the career."
 

"Networking with industry professionals and learning what was required in today's work environment were the most value aspect of the externship."  
- Teacher Extern
- Connecting with industry partners** (26%): "The most useful component of my externship was the hands-on interaction with industry partners" and "The time I spent with the NASA scientists, engineers, and other professionals was invaluable."
- Learning what employers look for** (20%): "We learned exactly what employers need/expect" and "Finding out what businesses look for and value in their employees."
- Applying the real-world into the classroom** (14%): "My experience is allowing me to understand how I can elevate STEM efforts at work with applicable industries and tie it in within the lesson" and "Both industries that I participated in created an impact on how and what I will be teaching."
- Learning the importance of professional skills** (11%): "I think the most valuable knowledge was how much soft skills and teamwork skills are needed in the workplace" and "Not only was math, reading, [and] science used, but also soft skills, such as knowing how to communicate [and] write."
- Better able to prepare students for the workforce** (7%): "I am able to give my students more choices for their future" and "How I can help my students meet goals to get them college ready or ready for a job skill."
- Getting technical experience** (7%): "The experience and skills I have attempted to develop in welding" and "I learned a new software that I can teach my students!"
- Seeing content applied in the real-world** (6%): "Actually seeing the work that I teach about being done in the context of the individual business was very helpful" and "It was good to see the application of math in the real world."
- Sharing resources and information** (5%): "The most useful part of the externship was when industry partners showed us copies of their applications and relevant tests" and "I was able to learn about the local opportunities available to my students."
- Learning the importance of problem-solving skills** (3%): "Employees need to be able to problem solve and not expect explicit instructions for their jobs" and "I learned how important individualized problem solving is in industry."
- Other** (less than 3% each): "The course put us in our students' shoes, where we did something that we have never done before," "Insight," "The work place experience I had was invaluable," and "The entire experience was invaluable."
 

"Being able to hear what industry professionals are looking for in employees and what I can do as a teacher to help prepare my students to fill those jobs."  
- Teacher Extern

Please describe what you plan to implement in your classroom based on your externship experience.  
(N=230)

#### Changes to teaching:

- **Create new lesson, lab** (25%): "I created a lesson plan with a hands-on activity that was inspired by my experience. I also plan to design lessons over all that will help my students develop better communication, organizational, and creativity skills" and "I plan to create an entire lesson developed around the criteria recommended by the industry partners and how my students can achieve those goals in their personal lives as well as in their educational careers."
- **Make connections to real-world** (21%): "I will work to better connect content to real-world applications" and "I plan to implement real-world lessons that allow students to research how oil and gas [are] extracted and the many uses of oil and gas, as well as the various employment opportunities that this field provides."
- **Share information** (17%): "I plan to show students pictures/videos of the places visited" and "I plan on sharing information from the presentations I saw."
- **Increase student collaboration** (9%): "One of the main things is group work. All of the places we went to were really big on people being able to work together" and "More collaborative activities or projects that require working with teams, encourage creativity and critical thinking."
- **Problem solving** (7%): "I am planning more problem-solving lessons that are open-ended without explicit instructions" and "Many more critical thinking and problem-solving related lessons."
- **Project-based learning** (7%): "I plan to include the knowledge, skills, and contacts I gained through my externship into my curriculum through project-based learning activities" and "My students will be completing a PBL lesson that includes personal exploration and self-assessment, as well as job research, a written report, an oral presentation, and weekly stand-ups."
- **Integrate technology** (4%): "I plan on implementing the software that the industry professionals use in the classroom to help the students manage their task/assignments" and "Technology integrated lessons."

"I plan to include real world scenarios into my lesson plans."  
- Teacher Extern

#### Job and career preparation:

- **Career exploration** (17%): "I plan to implement the experience in the context of career investigations" and "I will have my students brainstorm and find an area of interest to research, work with a partner or small group, and create a presentation that tells an audience about the career, duties, education or degree required, salary, etc."
- **Focus on professional, soft skills** (12%): "I have already begun connecting my externship experience with my classes regarding industry soft skills (being on time, having required materials, producing a valuable product, etc.)" and "I plan to stress the soft skills to the students and encourage them to strengthen themselves in these areas with an explanation of this externship and the fact that each industry partner stressed the importance of these skills for success."

- **Focus on technical, procedural skills** (11%): “Career expectations such as punctuality, knowledge of Microsoft office, 3D modeling software, company processes and procedures, and the engineering design process” and “I’m going to implement specific skills like reading a tape measure and introduce blueprints.”
- **What employers look for** (8%): “I plan to show students pictures/videos of the places visited, and introduce them to which skills the industries are most interested” and “I plan to teach my students what the industry is looking for in the way of skills, knowledge, and schooling that it will take to be an engineer.”

“I plan on emphasizing how the soft skills that employers are looking for are used all the time in the classroom and making sure that my students understand WHY we do what we do in the classroom. I also plan on bringing in a few guest speakers from the different industries to speak to my different classes to share with them the opportunities and to reinforce what I was talking about above with soft skills.”

- Teacher Extern

#### Direct connection to industry:

- **Guest speakers** (17%): “We plan to have guest speakers come in and discuss with the students during the project. The speakers were chosen based on expertise for students. We were hoping students can take what the speakers have imparted and apply that to their projects” and “I’d like to invite some of the professionals I was able to meet today to our classroom so the students can learn from them directly.”
- **Field trips** (5%): “I have made plans to take my honors senior Economics students to the Port of Corpus Christi to experience the actual process of imports and exports from paperwork requirements to leaving ships” and “I plan to take a field trip with students to the San Antonio River Authority and have them learn about natural resources conservation.”
- **Internships for students** (2%): “I have already had students contact the businesses for internship opportunities” and “I also plan to tour the businesses with my students and set up an opportunity for them to intern and/or volunteer to learn additional skills.”

#### Extern Challenges and Recommendations

Key themes and representative quotes are provided below for the following open-ended survey items that asked externs to describe challenges they anticipated and additional resources they needed to transfer their experience to the classroom, as well as to provide recommendations from improving the program. The sum of percentages per item may exceed 100% as some responses fit into multiple themes.

#### What do you anticipate will be the greatest challenge to transferring the externship experience to the classroom? (N=230)

- **Aligning content to curriculum or TEKS** (21%): “Most of the partners had very little direct connection with my content area” and “Finding ways to integrate into the curriculum with the TEKS and objectives of the course.”
- **Lack of time** (19%): “Time” and “Trying to find the time to plan great lessons, cover the standards, and implement the real-life application project.”
- **Presenting information, helping students understand** (18%): “Some information will be harder to relate to middle school students who are just beginning to look forward to college and career readiness” and “Being able to fully relay all of the information gained through the externship in a way that is informative and inspiring.”

- **Student buy-in** (16%): “My students’ willingness to listen and learn” and “Some of my students will be closed-minded to the idea that they can actually make a high paying career right here in our own city in industry.”
- **Making connections to real world** (12%): “Implementing the real-world experience into the classroom” and “The greatest challenge will be being consistent and making ongoing connections between our lessons and real-world experiences.”
- **Resources or technology** (9%): “Ensuring that students have the necessary resources (computers, internet access, etc.) to complete some of the activities” and “The tours of the industries. The challenge will be budgeting for transportation.”
- **Logistical/scheduling constraints** (9%): “The greatest challenge will be combining classes for the guest speakers, since we are on a block schedule and classes meet on different days” and “Getting students to take field trips to the sites.”
- **Lesson planning** (8%): “Incorporating the different industries’ needs into my lessons in a meaningful way” and “Turning what I learned in the work environment into relatable lessons.”
- **None** (7%): “I don’t really see a challenge,” “I only see opportunity, no challenges,” and “None.”
- **Understanding, remembering information** (5%): “Remembering all the wonderful things we learned. We learned so much in such a short time” and “I fear that my knowledge of what I saw and experienced is far less than the actual math applied in certain areas.”
- **Maintaining relationship with industry partner** (3%): “I think it might be difficult to find more than one creative way to stay connected with the companies” and “I anticipate that keeping those local connections will be difficult in that life gets busy during the school year.”
- **Other** (<3% per theme): (e.g., administration buy-in, changing pedagogy) “With the state expectation of college ready, there might be some struggle to remind the upper level that skilled labor is still a much needed industry” and “The greatest challenge will be letting the students do open-ended problems. They will struggle in the beginning with how to accomplish the task without teacher instructions. I will struggle with not telling them explicitly how to solve the problem.”

“My greatest challenge is going to be timing and lack of equipment. Being that I am a STAAR tested subject, we are tested at a fast pace which doesn’t leave much time to really delve into the externship as I think it needs. Also, as a middle school teacher, we just do not have the resources needed for the students to gain the hands on experience.”

- Teacher Participant

**What additional resources or supports do you need to apply what you learned in the classroom?**  
(N=219)

- **None** (34%): “I have everything I need” and “None.”
- **Resources or technology** (24%): “I will need technology resources and support to implement NEPRIS technology that connects industry leaders to the classroom through technology” and “It would be extremely helpful to have more hands-on materials to enhance the activity as we go through the entire implementation of the lesson plan.”
- **Continued collaboration with industry partners** (21%): “Having a guest speaker from industry in the classroom would be great” and “I think being able to have my students have a tour or shadow different workplaces.”
- **Support from administration** (7%): “Buy in from other teachers/administrators” and “To implement or use the information that I have learned here, I am going to need administrators to cooperate with

“The externship provided me with plenty of resources to apply what I learned in my classroom.”

- Teacher Extern



me. The school administration and counselors are going to need externships too.”

- **Lesson plan support** (7%): “Maybe an example lesson plan” and “Would love PBL training in order to write strong lessons that hit my objectives but also provide opportunities to develop critical thinking skills.”
- **Time** (6%): “Time with other teachers who had the experience to create lessons” and “Planning time.”
- **More, new contacts with industry** (6%): “More variety of speakers” and “Maybe more contacts in different fields that many of our students are interested in (i.e., mechanic, oilfield, etc.).”
- **TEKS or content alignment assistance** (4%): “More contact information that ties directly in with my TEK, so my admin will support my endeavors” and “Being able to see [an] industry more related to my content area.”
- **Funding** (4%): “Money for transportation to externship sites for my students” and “I would like to be able to find the funding to take a group of students to one or more of the industries I shadowed.”
- **Other** (<3% per theme): “We need additional training to keep up with emerging technologies” and “A follow-up day would be a nice indicator to show support of this great endeavor. It would allow those of us to share success stories and failures of the lessons created. It would also allow the group to share how to incorporate other items into the lessons that were presented.”

**We welcome any additional comments about your externship experience.** (N=147)

- **Positive feedback, enjoyed and valued** (69%): “This was probably the most enjoyable experience I’ve had in my teaching experience with professional development” and “Loved this program, please continue. I feel this is an important learning experience for all teachers. I truly feel it was a teacher changing experience. Students will definitely benefit from teachers experience and knowledge. As teachers we have to meet the needs of various careers and this externship provides this resource for teachers to benefit.”
- **Learned** (29%): “I learned very valuable information that makes it easy for me to talk with my students about the welding/manufacturing industry and all the applications available for students will these skills” and “It was very fast paced with LOTS of great information. I think this is a huge benefit to students.”
- **New exposure to industry** (16%): “This externship opportunity is an effective mechanism to remove teachers from the standard classroom and create productive exposure to industrial culture and performance” and “Awesome on-the-job experience. I loved getting to be a student and explore an industry outside of education, WHILE being educated. Thank you for the opportunity!”
- **Valued connection with industry** (16%): “I am extremely pleased with the community partners we had the opportunity to interact with. It is important for teachers to see the skills that our students need when they enter the workforce and being able to spend time with businesses allows for that to occur” and “All of the partners were incredibly welcoming and helpful and offered a lot of good information that I will be able to bring back to my classroom.”
- **Suggestions for improvement** (16%): “Some of the activities seemed to be a little last minute and the purpose of the activities were not as clearly defined as it could have been” and “Some of my best and more informative interviews only lasted one hour. I found myself looking for opportunities with longer hours to meet the requirement rather than quality. Maybe the criteria should read a minimum of 40 hours OR 10 businesses.”

“Being an extern was one of the most eye-opening experiences I have had. Not only did it change the way I develop and teach my lessons with a science focus, but also it increased my love for the teaching career.”

- Teacher Extern



- **Would recommend to others** (10%): “It was a wonderful experience, and I highly recommend it to all educators” and “This was a great experience, and I will recommend teachers to participate in this opportunity next year.”
- **None** (7%): “None” and “N/A”
- **Would like to do again** (7%): “It was an amazing experience. I want to do this again next summer” and “I would love to participate in any future externships available. The experience was incredible!”
- **Excited to implement in classroom** (5%): “I’m excited to take what I learned to the classroom. This was an invaluable experience!” and “I enjoyed the externship experience overall and look forward to implementing the things that I have learned.”
- **More business partners** (3%): “Maybe instead of only visiting with one partner, teachers can rotate and visit with 2-3 in order to get a more diverse view of career opportunities” and “I wish I could have spent time with all the business partners. If we spent 1 day at each location, we would have a better sense of what they had to offer. Then on the 5th day [we could] choose one to explore deeper. All in all, it was an amazing experience!”
- **Valued connection with peers** (1%): “This experience was outstanding! I learned a lot about giving students challenges beyond what is normally expected of them. I also appreciate the opportunity to connect with peers” and “The business and educational networking of this program is priceless!”

## Teacher Extern Follow-up Survey Findings

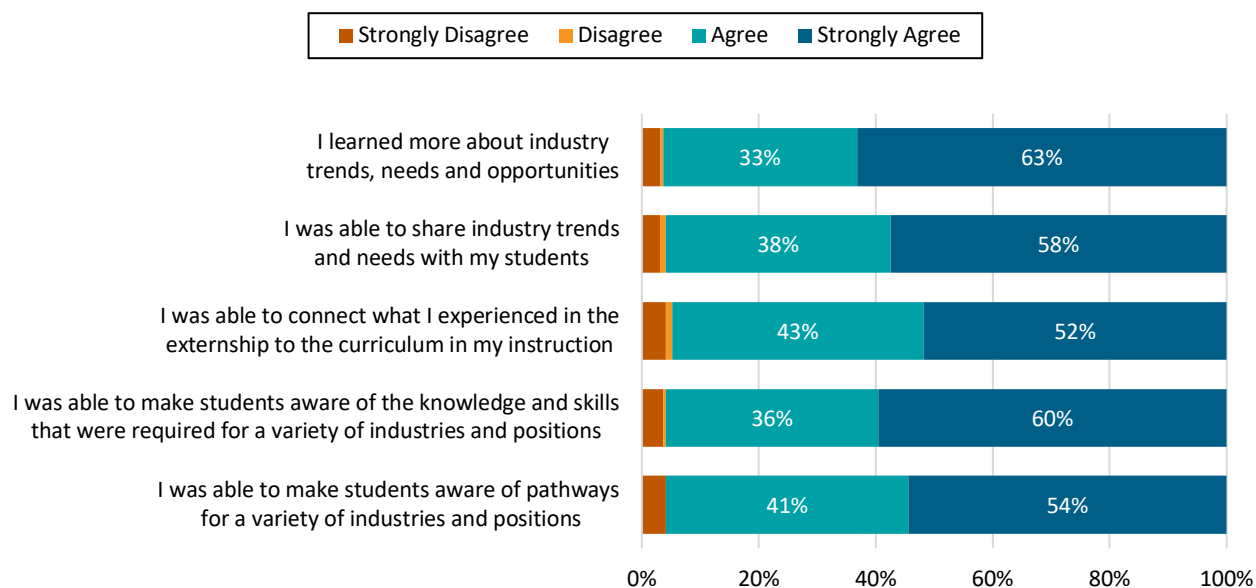
### Extern Engagement

A total of 193 teacher externs responded to the online Teacher Extern Follow-Up Survey, with a 71% response rate. Of the 20 TEX<sup>2</sup> projects, 85% had at least one teacher extern respond to the survey. Externs responding to the survey participated in externships in a variety of industries, including business/multi-faceted industries (52%), energy (35%), construction (26%), computer (26%), education (25%), aerospace (18%), municipal infrastructure (15%), health/medical (12%), agriculture/environment (8%), telecommunications (6%), and other (e.g., welding, science, engineering).

### Extern Application and Outcomes

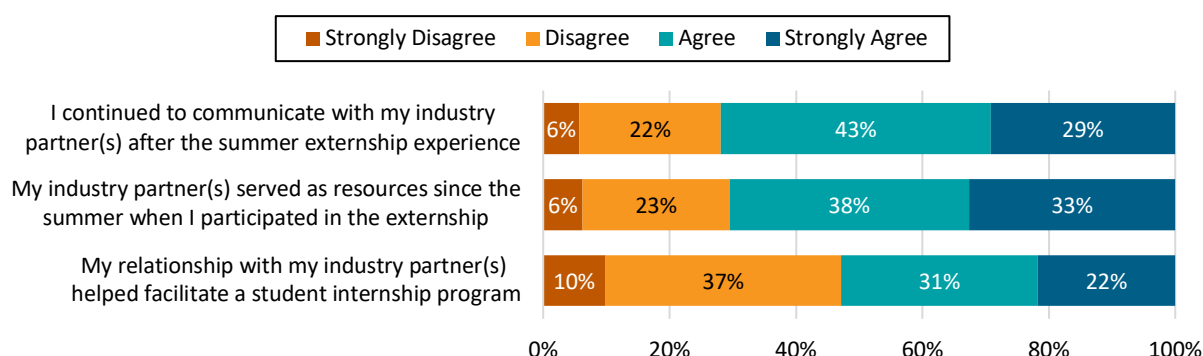
Almost all teacher externs learned and were able to apply what they learned from the externships. More specifically, nearly all (95-96%) of the teacher externs learned about industry trends and opportunities, shared industry needs with students, connected externship experiences to instruction, made students aware of the knowledge and skills required for industries, and made students aware of pathways for a variety of industries and positions (see **Figure 13**).

**Figure 13. Percentage of Teacher Externs' Responses to Learning and Application Items (N=193)**



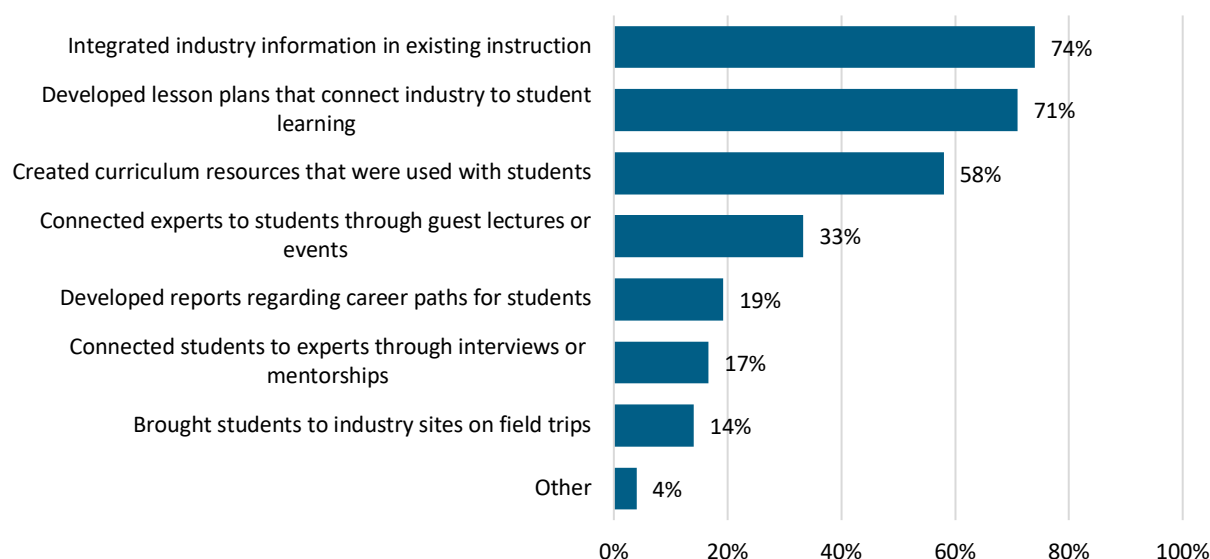
Additionally, many externs continued to communicate with industry partners (72%) and were able to use relationships with industry partners as resources (71%) after the summer externship experience (see **Figure 14**). More than half (53%) of the externs reported that their relationship with industry partners helped facilitate a student internship program.

**Figure 14. Percentage of Teacher Externs' Responses to Outcome Items (N=192-193)**



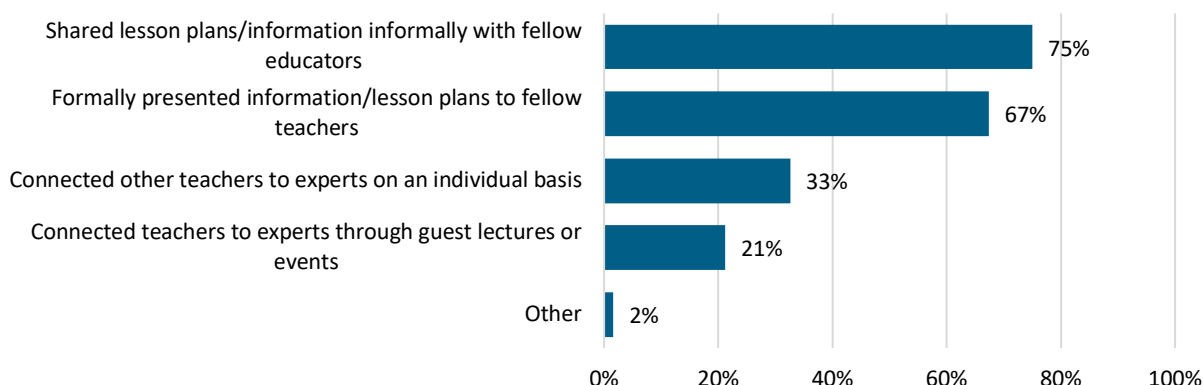
Teacher externs implemented what they learned from the externship experiences in a variety of ways (see **Figure 15**). Many externs integrated industry information in existing lesson plans or instruction (74%), developed lesson plans that connect industry to student learning (71%), and created curriculum materials, videos, or classroom resources that were used with students (58%). Some externs developed reports of research findings regarding career paths for students (19%), connected students to experts through guest lectures/events (33%) and informational interviews, mentorships or internship experiences (17%), and brought students to industry sites on field trips (14%). Seven externs (4%) reported that they implemented what they learned through different means, including three externs who provided students with materials from industry partners (e.g., industry tests, blueprints, informational materials for parents), two externs who invited students to attend industry-related events (e.g., career fairs, health fairs), one extern who acquired and utilized new equipment for labs, and one extern who provided no additional information.

**Figure 15. Percentage of Teacher Externs Reporting How They Applied What They Learned (N=192)**



As **Figure 16** shows, externs shared lessons plans and information informally (75%) and formally (67%) with other educators. Some externs connected other teachers with industry experts on an individual basis (33%) and others did so through guest lectures or special events (21%). Three externs (2%) reported sharing with teachers in other ways including, creating professional development opportunities around the externship experience, connecting parents to industry partners, and writing journal articles.

**Figure 16. Percentage of Teacher Externs Reporting How They Shared with Other Teachers (N=184)**



Teacher externs provided additional information on how they implemented what they learned in the classroom, initial outcomes that were observed, and how they shared what they learned with other educators through the following open-ended survey items. Key themes and representative quotes for each item are provided below. The sum of percentages for each item may exceed 100% as some responses fit into multiple themes.

**Please briefly describe what you implemented in the classroom.** (N=177)

#### **Changes to teaching:**

- **Created new lesson, lab** (28%): “Created a multi-week project involving the use of an Automated Storage and Retrieval System (ASRS). Motivated by my experience with the logistics department at Safran, students were challenged to create a scaled robot that could gather and place ‘work’ in various storage bins” and “I created lesson plans that allowed students to solve a real-world problem and create a pitch deck for their solution. It focused on soft skills, communication, and presentation skills.”
- **Made connections to real-world** (25%): “As we covered our chemistry unit, I was able to connect the chemical reactions that occur during the welding process. I was also able to bring in oil/gas production during our earth science unit. We discussed earthquakes that have been increasingly occurring in Oklahoma and debated whether or not fracking could be a cause” and “I have used the examples that I have seen in the workplace in my classroom, as real life examples.”
- **Shared information** (16%): “I described my experience at C-FAN to my students and showed them videos of the engines during the engine testing process” and “I showed my students the Food Bank pictures and talked about what we did there. One of the clubs at my school was doing a food drive. I talked to them about where the food was going and the processes and my experiences there.”
- **Increased focus on problem solving** (6%): “I have implemented individual problem-solving projects in my classroom to help build that skill” and “I began using the design process used in the industry to promote problem solving and organized development.”
- **Project-based learning** (5%): “I have a new PBL for mobile devices and equipment to support mobile repair in the classroom” and “I was able to implement some content for PBL.”
- **Increased student collaboration** (4%): “How to talk to others and collaborate in groups” and “I have focused on group projects and developing student communication skills, as these are important skills across the board in the workplace.”
- **Other** (<3% per theme): “I integrated new technology apps in my classroom that I learned about with my externship with Discovery Education,” “Teaching life science,” and “Discussion.”

### Career preparation/information:

- **Career exploration** (25%): "In my AVID classroom, I was able to create assignments that required students to research different industries and the required level of education needed to acquire that job" and "Showcased different industries and helped students research careers in those fields."
- **Focus on technical, procedural skills** (12%): "Safety procedures and safety data sheets when using power tools" and "I have implemented how to use and improve measurements with tape measures and other measuring devices."
- **Focus on professional, soft skills** (10%): "After visiting with several business owners and directors of human resources, it was obvious that students lack soft skills. In my AVID class, I developed a unit revolving around handshakes, eye contact, appropriate interview attire, and responses."
- **What employers look for** (8%): "I was able to share with my students what different industries are looking for in future employees" and "We talked about how the wind energy and oil industry work and then discussed skills that would be necessary to pursue those jobs."

"I was able to show my students how soft skills are needed in almost every industry that they will be going in to. I also was able to provoke discussion on how they could practice these skills."

- Teacher Extern

### Direct connection to industry:

- **Guest speakers** (11%): "An expert came into the classroom! A professional videographer was able to speak to my students" and "I used NEPRIS to have a guest speaker about textiles to connect to curriculum about materials science."
- **Field trips** (5%): "I took a field trip to two of the three industry partners – the Port of Corpus Christi during my Economics topic of international trade, and I took my STEM team (Destination Imagination) to the pre-casting yard for the Harbor Bridge construction Project" and "My students were able to go to Bell for a field trip. We were able to meet with experts and tour the facility."
- **Internships, connections for students** (2%): "Student internships, job shadow days, [and] industry standards applied to lessons" and "Probably the most useful connection made has been getting students involved in the AHEC programs that are offered."

### What outcomes have resulted from your classroom implementation of what you gained in the externship experience? (N=177)

- **Student understanding of industry, job opportunities** (24%): "My students now have a better understanding of other industries outside of the ones that they feel are the 'big names' (nursing, teaching, medicine etc.)" and "Students have become more aware of industry jobs available in San Antonio."
- **Student connection of learning to real world** (21%): "They recognize how the skills they learn in school could be helpful to them in different career fields."
- **Student interest, engagement in class** (17%): "Students were more engaged in the process and enjoyed experiencing the job tasks that industry leaders do on a regular basis" and "Students became more invested in the lessons with the extra context beyond school."
- **Student understanding of job requirements** (12%): "I have had students inquire more on the jobs that we discussed in class. They get a better understanding of what these jobs are looking for specifically" and "We have had more fruitful discussions about employer expectations."

- **Student interest in career** (12%): “The poster generated interest in welding and validation for students pursuing careers in the field” and “Students are looking into ways to join the medical field when they don't see a four-year degree in their future.”
- **Teacher knowledge** (12%): “Through this externship, I have gained so much new knowledge to use with my students on future life plans/careers. Being able to talk with students about other types of career paths has been a wonderful experience” and “I am better able to inform my students as to what is going on in their community.”
- **Student technical skills** (9%): “Students are better acquainted with measuring techniques” and “Kids loved it and had experience with construction tools.”
- **Experiences, opportunities for students outside classroom** (8%): “My students have enjoyed going on the field trips to extend what we are learning in class. They love to move beyond just the knowledge level and prepare before and after the field trip with analysis and other questions to ask our host partners” and “Students have been able to have first-hand experiences in the field.”
- **Shared information in general** (7%): “I have shared my experiences with my students and how there are MANY opportunities for them to not only learn a trade, but to be successful in that trade.”
- **Student professional skills** (5%): “Soft skills were stressed by the industry partners that I interacted with. I have stressed these with my students, who are now greeting others and shaking hands. There has been a big boost to my students' confidence, through doing these things, and many are now interested in attending college to be able to provide for themselves and their families better.”
- **Student collaboration** (4%): “Many students were able to collaborate more effectively with the modified teaming model” and “Students have grown in their abilities to work with others to reach a common goal and have learned to support each other.”
- **Student problem solving, thinking** (4%): “Students have learned that theory is vital to learning skills in order to think out of the box, particularly in cases where the skill was not necessarily taught but is aligned to objectives and or standards” and “My students seem to be more responsible with their technology and are getting a little bit better each time we complete a ‘problem solving’ project.”
- **Student confidence** (3%): “Student confidence in repairing and diagnosing mobile devices have increased” and “My kids have measured projects by looking at a scale model and then building the actual project. It has built confidence ,and they have taken pride in their projects.”
- **Teacher credibility** (3%): “The externship has brought me more credibility as a teacher and has made real-world connections easier to apply in instruction. Students seem to be more receptive when I talk about the industry applications of what we are currently learning.”
- **Other** (<3% per theme): “The unit on waves in my physics class gave my students a greater understanding of properties and uses of different types of waves,” “Most lessons have worked out really well,” and “Not much. The district limited my ability to do PBL and student-centered learning.”

“Student engagement has been very high when we have used the STEM and technology applications. My students have seemed more inclined to pursue science and technology classes when we are signing up for upcoming school schedules.”

- Teacher Extern

**Please provide a brief description of what/where you shared what you learned with other educators.**  
(N=174)

#### **What was shared**

- **Described experience** (36%): “I shared the timeline of the project, my hands-on experiences with the molding of the cement, visiting sites, and speaking with engineers” and “I shared my experiences at the different partnerships I went to this summer.”

- **Lesson plans, implementation ideas** (29%): “I was able to share my lesson plans, as well as invite other teachers and classes when we had video conferencing with professionals.”
- **Information, resources about industry** (26%): “My externship discussions have given me an opportunity to enhance faculty knowledge of the diversity of employment opportunities at the companies” and “We shared information about the sites and people we spoke with.”
- **Benefits, opportunities to connect with industry** (10%): “I discussed the benefits of reaching out to local/regional professionals. I have also communicated with our CTE admin about using online resources (Nepris) as well as centering PD around bringing in local professionals.”
- **Content learned** (9%): “Shared the current trends and vintage methodology of wet chemical film developing and printing techniques” and “I made a poster of photos and information from what we learned about welding from our summer externship.”
- **What employers look for** (9%): “I shared that there were common skills students need in any type of business situation like problem solving, taking initiative, and working hard.”
- **Connected others with industry partner** (8%): “During staff development, my group and I presented our findings [to] other teachers and gave them information for them to use and to contact the facilities if they wanted presenters to come and present to their classes.”
- **Most important, impactful information** (6%): “I shared my personal gains from each industry” and “I shared the interesting aspects of the tours.”
- **Importance of professional skills** (3%): “I shared the overwhelming response that students lack basic manners and soft skills” and “I presented a PowerPoint presentation, along with a list of all the soft skills, to my special ed. department so everyone can be working with and encouraging our students to develop these skills, which will help them in the real world/job market.”

“I have shared the experiences, stories, and insights with my principal, fellow math and science teachers, and even school board members and business owners.”

- Teacher Extern

#### Where or how it was shared

- **Formal presentation** (23%): “I presented a PowerPoint I created about my experience.”
- **Informal conversations with teachers** (23%): “I spoke with fellow educators about my externship and the industry partners that we visited” and “I shared what I was doing in class with my peers as a discussion and showed them how engaged my students were.”
- **PLC, department, team meeting** (16%): “During our weekly Science PLC meeting, I was able to share with the Science Department the poster that I created about welding and how science is a big part of the process of welding.”
- **School-wide, staff, faculty, meeting** (11%): “I presented to the entire school as well as to several members of our central office.”
- **Professional development meeting** (11%): “During professional development, my team and I presented photographs from and first-hand experience from the externship to the entire faculty.”
- **District or region level meeting** (7%): “My district holds a district-wide professional development during teacher in-service every year. I presented my experience to the district during these sessions” and “I presented it at a curriculum creation meeting to all middle school educators in CTE/STEM.”
- **Conference** (7%): “I presented what I learned at the Panhandle Math and Science Conference” and “I was able to present at the Texas STEM Conference in January along with a panel of other educators from our TEX<sup>2</sup> externship.”
- **Other** (<3% per theme): (e.g., wrote blog/article, administration) “I wrote a teacher blog post about what I learned” and “I have shared the experiences, stories, and insights with my principal.”



**What outcomes have resulted from your sharing with other educators what you learned in the externship experience? (N=173)**

- **Others using lessons, implementing information (interested in or currently doing)** (30%): “They have been able to make more connections in their lessons and for their students” and “Teachers are interested in using the lesson I created.”
- **Others interested in participating in externship** (23%): “Many of them have told me that they want to participate in an externship program like the one that I experienced.”
- **Others interested in contacting, connecting with industry partner** (18%): “Some were motivated to go find other industry partners to assist in their program of study” and “Those teachers that I've shared with have also invited guest speakers from related industries to their classroom.”
- **Improved others' knowledge** (14%): “Other educators did not realize the robotics industry was in our back yard.”
- **Others interested in learning more** (6%): “They now come to me more with questions on how to incorporate the real world into their classroom.”
- **Collaborations among teachers** (6%): “We created a network who constantly meet and design cross curriculum lessons in addition to connecting elementary, middle school, and high school to prepare students at all levels” and “Possible cross-curricular activities with FFA, Ag, etc.”
- **Student outcomes** (5%): “I think that sharing my experience from my externship helps students see that anything we do in class is connected to future work” and “Student interest.”
- **Good discussions** (5%): “Presenting at the STEM conference opened multiple discussions within my externship group and fellow teachers at my school about ways to incorporate professionals and laborers to strengthen our curriculum and guide students as they make choices about their future.”
- **Internship, career opportunities for students** (5%): “There was more interest in sending students on job shadowing this year” and “Senior teachers are preparing students with an industrial 10-hour OSHA certification while working on their senior project.”
- **None, not sure** (4%): “Not sure” and “I am unaware of outcomes from sharing my externship. Fellow teachers have not incorporated the knowledge into their lesson plans as far as I am aware.”
- **Other** (<3% per theme): (e.g., recognition, has become important resource for others, personal reflection, improved technology use) “I have become the go to person when it comes to making connections to industry leaders,” “It was a successful lesson and the teachers told me to thank you,” and “I have been able to reflect on my experience.”

“Teachers and administrators have learned what is needed for students to compete in any industry.”

- Teacher Extern

## Extern Challenges and Recommendations

Teachers were asked in open-ended items to describe challenges they faced in transferring their experience to the classroom and to provide recommendations from improving the externship program. Key themes and representative quotes for each item are provided below. The sum of percentages per item may exceed 100% as some responses fit into multiple themes.

**What was the greatest challenge to transferring the externship experience to the classroom? Please describe how you addressed this challenge. (N=173)**

### Challenge

- **Aligning content of externships to classroom (curriculum, TEKS, subject)** (25%): “My content wasn't directly relevant to the externship, so I had to think outside the box on how to implement it in my



classroom” and “Trying to align it to the state mandated standards and STAAR tested curriculum.”

- **Lack of time** (17%): “Time has been the greatest challenge. Each year I will be able to incorporate more of what I have learned during my externship into my classroom” and “Time is the always the biggest challenge. We had to complete some pieces outside of the classroom.”
- **Presenting information, helping students understand** (14%): “The hardest thing was trying to organize all the information in order for it to make sense to the students” and “The greatest challenge was taking what I heard from my industry partners and ‘translating’ it to math...so that I could communicate clearly and effectively what I had learned with my students.”
- **Lesson planning, implementation** (12%): “Translating my experience into concrete lessons rather than lectures” and “It was just a shift in mindset. As a teacher, so much of our lesson planning comes from the state mandated TEKS, however being able to apply real world knowledge is what I feel our students benefit from the most.”
- **None** (11%): “None, as I teach an industry/university-based curriculum” and “I do not think there were significant challenges.”
- **Student buy-in, relevance** (10%): “Getting the students to be as excited without visiting the industry site” and “The age of my students makes some experiences too far in the future for them to apply the relevance to themselves. I have addressed this by focusing on their next steps for them to follow instead of just showing the end result.”
- **Resources or technology** (8%): “Money,” “Resources available in my classroom that limited implementation,” and “The greatest challenge was time and resources! I hope we get more funding to be able to get out of the building to gain more field experiences!”
- **Understanding information** (5%): “The greatest challenge was on myself, learning how to code - so, I could teach the students.”
- **Logistical constraints (besides time)** (5%): “The biggest challenge was preparing the video from all the film footage I took” and “Not having some of the sources close that they could visit in person. Instead I had the students go onto the works websites and do a virtual tour and look up information that was listed on the sites.”
- **Making connections to real world** (4%): “Taking the tasks that people did in the City of Kyle and transferring it to a mathematical classroom. I used skills that the city employees needed and have been teaching the students those skills.”
- **Other** (<3% per theme): (e.g., maintaining relationship with industry partner, administration buy-in) “I wish I would be able to connect with other industry leaders and get them to connect with my students” and “Administrative restrictions.”

#### How challenge was addressed

- **Created activities that incorporated externship experience** (14%): “I created assignments that compared industry from the past to the industry of today [to make it relevant for Social Studies]. That gave me an opportunity to make connections to local business” and “Having class discussions about my externship experiences and how my students feel they relate to their lives. I created activities that closely simulated the externship experience.”
- **Reinforced ideas for students** (5%): “[I got students to really believe me] by being consistent and offering more explanation and updates on current projects from my industry partner.”
- **Sought involvement, help from industry partner** (5%): “By reaching out to the contacts I met during the experience, they have given me more information and offered to be a guest speaker in my classroom” and “There are still questions about the industries that the students have. I hope to solve

“I overcame the challenge [of relevance of content] by having the self-confidence of knowing that what we are teaching will guide them to be successful.”

- Teacher Extern

this by having leaders from these industries coming to visit with students this next semester.”

- **Changed instruction or mindset** (4%): “I had to adjust my teaching style to focus on what soft skills industries are looking for.”
- **Collaborated with other extern or colleagues** (3%): “I partnered with another extern to develop curriculum” and “I collaborated with other teachers to determine what type of questions to include in my reflections lesson that would provide the best outcome of my project.”
- **Made use of available materials, resources** (3%): “Utilizing and finding the materials to complete the research process. We used the same outline for the research, but we changed the materials and experiment” and “My greatest challenge was getting students to directly observe and practice learned skills from the NCTC Externship in welding. I was able to address this challenge by showing YouTube videos that explained basic welding tools and safety.”
- **Other** (<3% per theme): (e.g., asked questions or researched more information, adjusted schedule or used outside class time, received support from administration) “I stayed up to date with the job market and technology in the field,” “Changed my class schedule [to address time challenge],” and “I was able to get the support of the school and they also paid a little bit of money on their own for the experience [to address financial challenge].”

#### What recommendations do you have to strengthen teacher externship programs in the future? (N=161)

- **Positive feedback, enjoyed and valued** (29%): “This was an amazing opportunity and experience. I am extremely grateful that I was able to participate in it” and “I think it was a great experience. It was very humbling and eye opening.”
- **None** (17%): “None” and “None at this time.”
- **Changes to schedule, structure** (14%): “The externship can be improved by making it all fit in a one or two week period. Accumulating 40 hours one hour at a time over the course of the entire summer was really stressful and inconvenient” and “I recommend one program in two weeks instead of two programs in two weeks. I thoroughly enjoyed both programs but needed more time in developing lesson plans.”
- **More or different industry partners** (14%): “Increase options for teachers to obtain externship hours and industry option” and “More variety in where these externships are offered.”
- **Expand to more teachers** (10%): “I would love for externships to be available to all educators. I believe English teachers would have loved having the opportunity, and this would create a cross curriculum,” “Extend the opportunity for more teachers and a more diverse community organization base,” and “Counselors should be included in this program.”
- **Improve communication** (8%): “I recommend more detailed communication” and “Communication needs to be streamlined. It was challenging getting information from various people to update surveys and turn in artifacts before their deadlines.”
- **Learned** (7%): “The externship was well planned out and was packed with so much learning. I came away from it with a lot of information that industry leaders are looking for in an employee.”
- **Lesson plan, application support** (6%): “I would have liked to have a day in which to create a lesson plan based on one of the industries using the Algebra TEKS and then share those with the others in the externship” and “There needs to be time to create a project or lesson that can be directly implemented into the classroom with the other teachers that participated.”
- **More hands-on, interactive experience** (6%): “Make them more interactive,” “More hands-on activities,” and “More time in the field and less in the classroom.”

“It was a great program. Our cohort took full advantage of the resources given and were able to connect with so many businesses in our area.”  
- Teacher Extern

- **Better prepare industry partners** (5%): “I enjoyed it immensely and learned so much about the wind energy industry, but I felt like a burden in the law office. I didn’t want my mentors to feel like they had to take care of me and conduct daily work” and “Give guest speakers objectives on what should be presented. For example: degree, requirements, job opportunities. Several guests were presenting to introduce their institutions rather than about the careers.”
- **Valued connection with industry** (4%): “I enjoyed the networking and getting to know the inner workings of so many industries in the community” and “Continue to develop and foster networks among local/regional professionals.”
- **Funding, resources to implement in classroom** (4%): “I wish we could have an allotment of grant money to fund some trips for students or speakers to come to campuses” and “Provide the externs with a budget along with their stipend to replicate what was done at the externship.”
- **Continued connection with industry** (4%): “Assist with staying connected to the professional and company in which we job shadowed” and “Build in communication after the site visits.”
- **Better align experience to teachers’ content, better match with industry** (3%): “Attempt to match teachers better with their community partners so that the connections that can be made with the classroom teaching and learning are more effective.”
- **Other** (<3% per theme): (e.g., would like to do again, increase student involvement, valued connections with peers, more opportunities to share experience) “If students could attend a day long externship along with the teachers to gain the same valuable experiences we did.”

## Industry Partner Evaluation Methods

The STEM Center designed and administered post and follow-up surveys to industry partners to assess their perceptions about the externship program, its outcomes, and recommendations to strengthen it moving forward. The post-survey was administered after the summer externship ended, beginning in July 2018. The post-survey asked industry partners about their externship experience and how the program impacted their companies. Follow-up surveys were administered between December 2018 and March 2019 after externs had time to apply what they learned and to build on their connections with the industry partners. The follow-up survey asked partners about their involvement with externs after the summer externship and additional outcomes from the program. Of the 107 total industry representatives, 50 responded to the post-survey and 44 responded to the Follow-up Survey, with response rates of 47% and 41%, respectively (see **Table 10.**) Key findings from these surveys are below.

**Table 10. Number of Industry Partner Survey Responses by TEX<sup>2</sup> Project**

TEX2 Projects	Post-Survey (N=50)		Follow-Up Survey (N=44)	
	Number	Percentage	Number	Percentage
Connally ISD	1	2%	9	22%
Crowley ISD	4	8%	7	17%
ESC Region 2	3	6%	3	7%
ESC Region 8	2	4%	0	0%
ESC Region 16	3	6%	0	0%
ESC Region 19	1	2%	3	7%
ESC Region 20	5	10%	0	0%
Harlingen Consolidation ISD	0	0%	0	0%
Hays Consolidation ISD	8	16%	5	12%
Judson ISD	0	0%	1	2%
Leadership Prep School	0	0%	6	15%
NASA Texas SEES at UT Austin	0	0%	3	7%
North Central Texas College	1	2%	1	2%
Rice University	0	0%	0	0%
Roscoe ISD	2	4%	0	0%
United ISD	3	6%	0	0%
UTMB	9	18%	0	0%
UTPB	3	6%	0	0%
Wayside Schools	5	10%	0	0%
Youth Code Jam	0	0%	3	7%

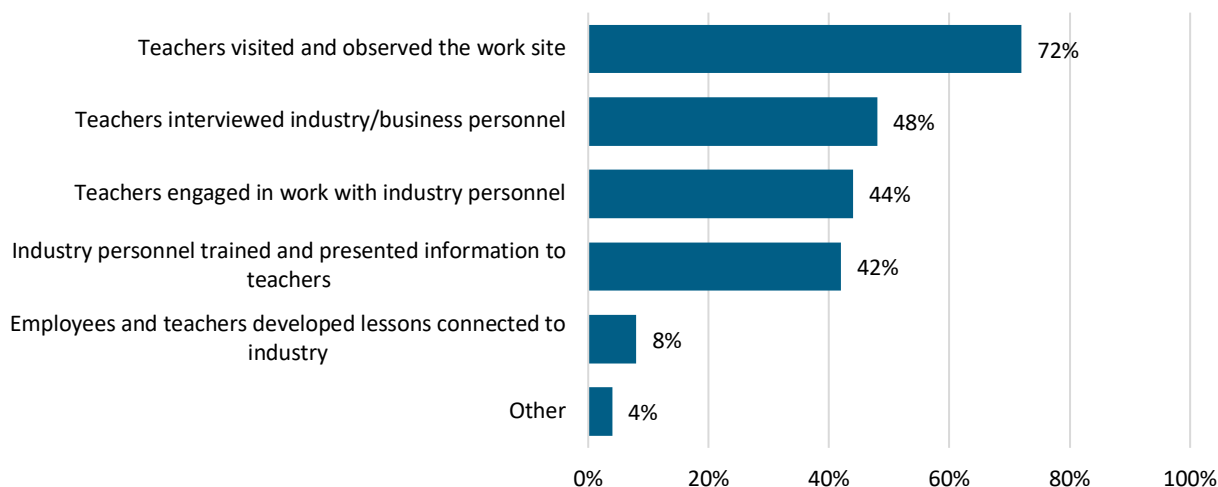
## Industry Partner Post-Survey Findings

### Partner Engagement

The 50 industry partners who responded to the online Industry Partner Post-Survey represented 46 different companies, which is about two-thirds (64%) of the 107 total companies participating in the program. Of the 20 TEX<sup>2</sup> projects, 70% had at least one industry partner take the survey. The partner survey respondents represented a variety of industries, including health/medical (22%), education (18%), energy (14%), business/multi-faceted industries (12%), computer (12%), aerospace (8%), manufacturing/fabrication (8%), construction (6%), municipal infrastructure (6%), and other (e.g., agriculture/environment, science, engineering).

When asked what externship opportunities their company provided (See **Figure 17**), most industry partners reported that they offered teachers the opportunity to visit and observe the work site (72%). Nearly half of the partners were interviewed by teachers (48%); had teachers engaged in work, activities, or projects with industry personnel (44%); and trained and/or presented information to teachers (42%). A few partners worked with teacher externs to develop lessons, activities, or experiences connected to industry (8%). Two industry partners reported that they offered other externship opportunities (4%), stating, “teachers got the opportunity to hear from an architectural firm, civil engineering firm, OSHA safety class, geotech company, [and a] concrete company” and “provided speakers for school visits.”

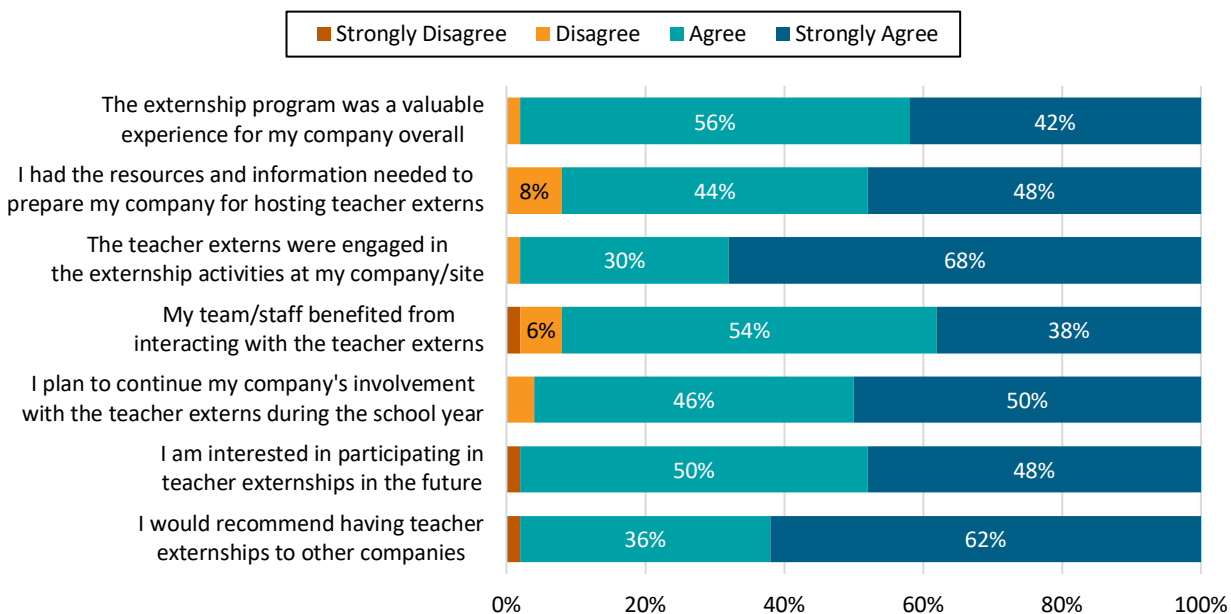
**Figure 17. Percentage of Industry Partners Offering Types of Externship Opportunities (N=50)**



### Partner Satisfaction and Outcomes

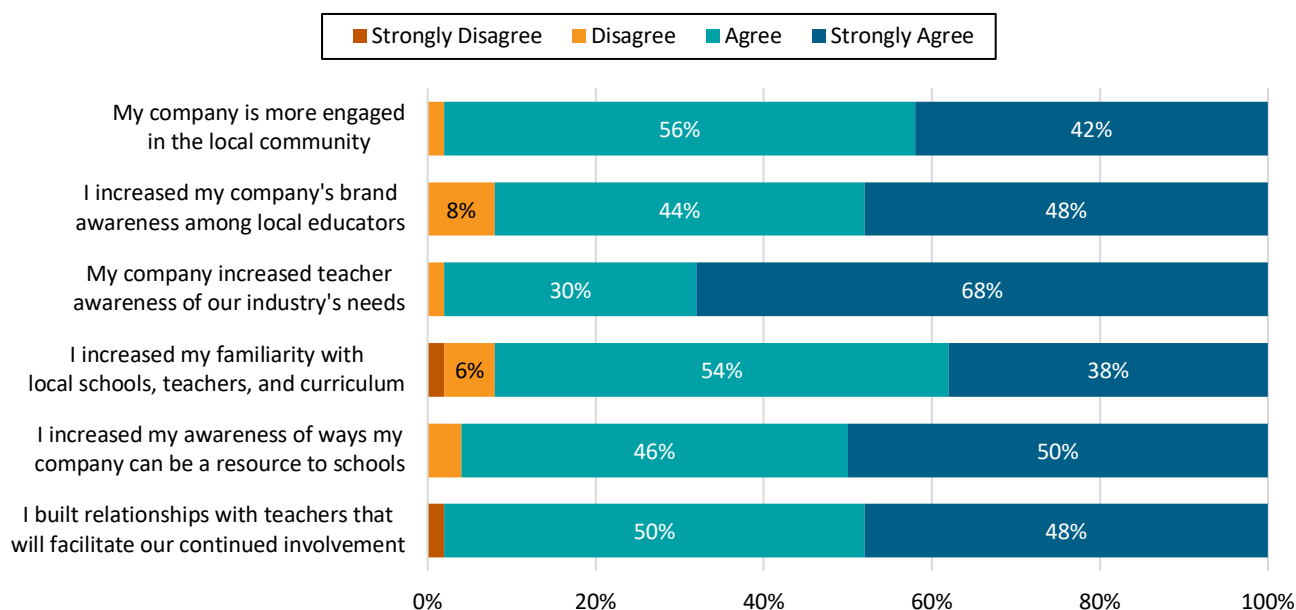
As shown in **Figure 18**, industry partners were satisfied with their experience in the TEX<sup>2</sup> program. Nearly all participants agreed or strongly agreed that the externship program was valuable (98%), they had the resources and information necessary (92%), teacher externs were engaged in the externship activities (98%), their staff/team benefited from interacting with teacher externs (92%), they plan to continue their company’s involvement (96%), they are interested in participating in teacher externships in the future (98%), and they would recommend having teacher externships to other companies (98%).

**Figure 18. Percentage of Industry Partners' Responses to Satisfaction Items (N=50)**



When asked about the impacts of the program on them and their company, almost all industry partners agreed or strongly agreed that their company is more engaged in the local community (98%), they increased their company's brand awareness among educators (92%), their company increased teacher awareness of industry needs (98%), they increased familiarity with local schools, teachers and curricula (92%), they increased awareness of ways their company can be a resource for schools (96%), and they built relationships with teachers to facilitate continued involvement (98%). (See **Figure 19.**)

**Figure 19. Percentage of Industry Partners' Responses to Outcome Items (N=50)**



Industry partners were asked additional open-ended questions about how their company benefitted from the program and what involvement they anticipated having with externs and schools after the summer externship. Key themes and representative quotes are provided below for each item. The sum of percentages per item may exceed 100% as some responses fit into multiple themes.

#### How was the teacher externship beneficial to your company? (N=36)

- **Community outreach or industry exposure** (42%): “It rounded out my company’s image with businesses and let them see we are involved with the local communities” and “This program is a continuation of all of our STEM outreach activities and helps us to reach out, spread the word, make connections, and increase our brand awareness.”
- **Relationships with schools** (39%): “It allowed us to understand what curriculum being taught now is applicable to a student’s future in our industry” and “The NWS has been wanting to reach more schools/students about STEM. This gave us the perfect opportunity to expand that education avenue.”
- **Student inspiration or preparation** (11%): “NASA engineers came to the realization that participating in the externship not only helps educators but also is important to the next generation of kids” and “We hoped to inspire students to come work in the oil and gas industry.”
- **Teacher knowledge** (11%): “Was better able to understand things from a teacher's perspective” and “It showed what the teachers knew about the industry I work in and what I could do to help them better prepare students to enter this industry.”
- **Workflow** (6%): “Having extra staff to complete tasks” and “It aided in us figuring out a more manageable workflow in the office.”
- **Not beneficial** (3%): “I don't think it benefitted my organization, directly. Some of the teachers were more conversational and engaged than others. A few of the teachers seemed to simply be going through the motions, as if the externship was something required for their job performance reviews.”

“It enabled us to connect with the community.”  
- Industry Partner

#### How, if at all, do you plan to continue your company’s involvement with the teacher externs and local schools? (For example, serving as a guest speaker, participating in a career day, etc.) (N=35)

- **Guest speaker** (51%): “I plan on visiting their classroom and speaking about the externship experience and what healthcare/chiropractic is and how they can attain work in this industry” and “We will provide guest speakers.”
- **Career day** (20%): “We expect to attend career fairs.”
- **Host field trips, open houses, etc.** (20%): “Providing educational programming” and “Attending parent/teacher night events, inviting teachers/students/parents to our free educational workshops.”
- **Available as needed** (20%): “We have not made plans at this time, but we did offer Wayside a way to keep in touch with our CSR team to provide any support in the future” and “We will provide resources and experts for teachers as needed.”
- **Host teacher externs** (20%): “I would like to continue to host teachers to help them understand what we are looking for in students entering the workforce” and “We are available if the district decides to do the program again.”

“We will be happy to support speaker or career day activities.”  
- Industry Partner

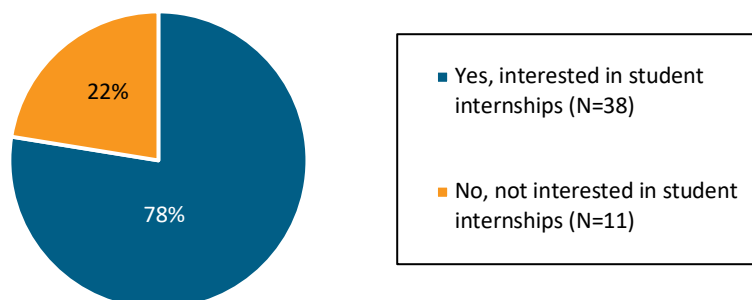


- **Host teacher trainings** (9%): “Our company will be providing OSHA training to both teachers and students” and “I’m willing to host teachers for information sessions on our organization’s vision, mission, and plans for the future.”
- **Make connections** (6%): “Providing educational programming, guest speakers, contact resources” and “I’m also willing to help the externship coordinators connect with any of the tenant companies located at our site.”
- **Other** (<3% per theme): “Only if the externs are truly committed to being part of the program, not signing up, taking somebody else’s spot and then being a no-show,” “Been invited to be on an advisory board at one of the schools,” and “Not sure.”

## Student Internship Opportunities

Over three quarters (78%) of industry partners reported that they were interested in hosting student internship opportunities in the future (see **Figure 20**). Industry partners who indicated they were interested in student internships were asked additional questions about the commitment they would want from student interns and what concerns they had about student internships. Key themes and representative quotes for these open-ended items are presented below. The sum of percentages for each item may exceed 100% as some responses fit into multiple themes.

**Figure 20. Percentage of Industry Partners Interested in Student Internships (N=49)**



**What type of commitment would you want from student interns? (For example, number of hours, age or grade-levels, prior subject knowledge, etc.) (N=30)**

- **Age or grade-level:**
  - Grades 11-12 or above (57%): “Likely would need to be 11th or 12th grade a minimum.”
  - Grades 9-12 (37%): “We would prefer high school students (9th - 12th grade).”
  - College (10%): “College undergraduate and graduate level students are preferable.”
- **Number of hours:**
  - Hours unspecified (50%): “I would want them to commit to a certain number of hours per week.”
  - Less than 8 hours per week (20%): “2-3 hours a week.”
  - 8 or more hours. per week (17%): “At least one full day or two.”
  - 20+ hrs. per week (7%): “25 hours/week.”
- **Prior subject matter knowledge**
  - STEM subjects (33%): “Subject matter knowledge in STEM content.”
  - Business, government, or public administration subjects (17%): “Would like to have students [who] want to go into businesses or marketing.”
  - CS subjects (20%): “Junior or Senior students learning computer science.”

“Then need to be legally able to work in our environment. I think age 17+ but am not sure.”  
- Industry Partner

- **Willing to learn and commit** (20%): “All students interested in learning new skills and practicing their leadership skills” and “True interest in learning the material and industry exposure. We need to create enthusiasm for the industry locally.”
- **General hours, grade level, and/or subject matter knowledge** (10%): “All” and “Number of hours, grade levels, [and] subjects of interest.”
- **Feedback** (3%): “Due to our student program commitment, it was difficult hosting a teacher extern all day. It would have been best to have teams for the externs such as an AM/PM or even half day. My morning was busy with emails and other events that occurred as emergencies throughout the day that I felt that the extern did not receive the quality experiences that she deserved.”

#### What concerns would you have about hosting student interns? (N=30)

- **None** (30%): “None” and “None. I was a student volunteer with the NWS when I was in college and it really helped to give me clarity as to what I wanted to do with my degree.”
- **Age or grade-level** (20%): “We are [a] large manufacturing company so I would just like to make sure the students coming are mature enough to stay safe” and “Cannot host under 21.”
- **Liability, legal compliance** (20%): “We'd have to make sure that any legal liability is addressed and that our legal department is comfortable with the internship. This has been an obstacle in the past.”
- **Logistics** (17%): “For students that do not drive, we would be concerned about them getting to and from the Museum” and “It is hard to take that many people at one time.”
- **Student commitment, cleanliness** (13%): “My main concern would be commitment, dedication to completing training, and benefit for the student at the end of it all” and “Cleanliness of work area.”
- **NA** (10%): “N/A” and “Not applicable.”

### Partner Challenges and Recommendations

Industry partners were asked to describe challenges they faced during the externship and to provide recommendations to strengthen the program in the future. Key themes and representative quotes are provided below for these open-ended survey items. The sum of percentages per item may exceed 100% as some responses fit into multiple themes.

#### What, if any, barriers or challenges did you encounter with your externship participation? (N=35)

- **None or NA** (46%): “No barriers encountered” and “None.”
- **Uncertainty or poor dissemination of information** (15%): “Didn't really know what to expect” and “Would like to see a better or more timely response with district contact.”
- **Unprepared or unprofessional externs** (11%): “Extern was not professionally dressed and students were very aware” and “We had limited slots for those who were going to participate and after they were filled only about 20-25% actually showed when others who could have signed up were turned down.”
- **Timing or length of externship** (11%): “Finding an event date that worked for the majority of participants” and “It would help to not have the course during the summer. The heat was hard for the teachers to be out in for an extended period of time.”
- **Time commitment** (11%): “Finding NASA engineers who have time to shadow educators throughout the day” and “The only barrier occurred due to the whole day instead of half of a day. Additionally, it would have been nice to have known an agenda, etc., that the extern needed to accomplish.”

“I found this all so rewarding without any challenges.”  
- Industry Partner

- **Patient hesitancy** (3%): “Some patient interaction was limited if they were new patients and didn’t want an outside person in the room during exam or procedures.”

**What training, resources, and/or supports would you recommend industry/business partners be given to facilitate teacher externships in the future? (N=28)**

- **None or positive feedback** (36%): “I believe the industry partner meeting itself was an excellent training and resource. The templates that were also given were extremely helpful. These resources should remain as a part of the process,” “No issues here,” and “None.”
- **Guides or examples** (25%): “A guide of what the expected outcome from the externship is” and “Example agendas from other externship programs or a list of high-level objectives and questions.”
- **More information sharing** (21%): “A summary of what the local organizers hope to achieve from the business visits would be helpful. Are the teachers trying to learn about particular companies, establish relationships with businesses for future student engagement, or are they trying to understand the workforce needs of local organizations? In other words, what would be most helpful to them?” and “Maybe a history of the business prior and require some general research of the industry prior to coming in to observe.”
- **Increased extern or industry partner commitment** (11%): “Fully committed teachers that will actually show up for what they signed up for” and “Typically what is involved to host an extern, i.e. preparation, time commitment, and what would be the expectations of the host.”
- **More hands-on experiences** (11%): “It would be fun to provide more hands-on experiences for externs so they could more fully experience what it's like to work here” and “Petroleum Museum is a great resource.”

“It is well organized. I do not see additional support required.”  
- Industry Partner

**What recommendations do you have to strengthen teacher externship programs moving forward? (N=28)**

- **None** (21%): “No recommendations” and “None.”
- **Better understanding of needs and expectations** (21%): “Provide both parties with clear expectations on what is to be accomplished from the program” and “I would recommend them filling out a survey to understand their needs of the externship.”
- **More externs or more committed externs** (18%): “More educators” and “[It] would be great if more teachers were interested.”
- **More planning and preparation** (14%): “Help promote the program to get more industry involvement” and “Annual cadence, planning, and understanding the goals sooner.”
- **Continue the program** (7%): “Continue with the program” and “Keep it going.”
- **Expand beyond summer** (7%): “Consider offering these programs during spring break and December break” and “I'd really like to be a resource during the school year as well. I think being able to see the result of the externship to the NWS would really benefit our participation in the future.”
- **Extern-Industry partner relationships** (7%): “Continue to foster relationships between the extern and the host faculty member” and “I would like to spend more time with the teachers.”
- **Other** (4%): “This was shared with teacher extern.”

“Just make sure the teacher assignments are relevant.”  
- Industry Partner

**We welcome any additional comments about the externship. (N=16)**

- **Positive feedback** (81%): “[The extern] was very professional during the externship and she had no issues participating in business discussions” and “We have been so impressed with this program and look forward to hopefully participating again in the future!”
- **Continue and grow program** (25%): “I encourage this program to continue with more teachers and businesses” and “It is always a wonderful experience to participate in this each year. I am hopeful that we will see this program become larger as it is sorely needed. Bring students into our industry as well.”

“This is a great program and will be beneficial to many individuals.”

- Industry Partner

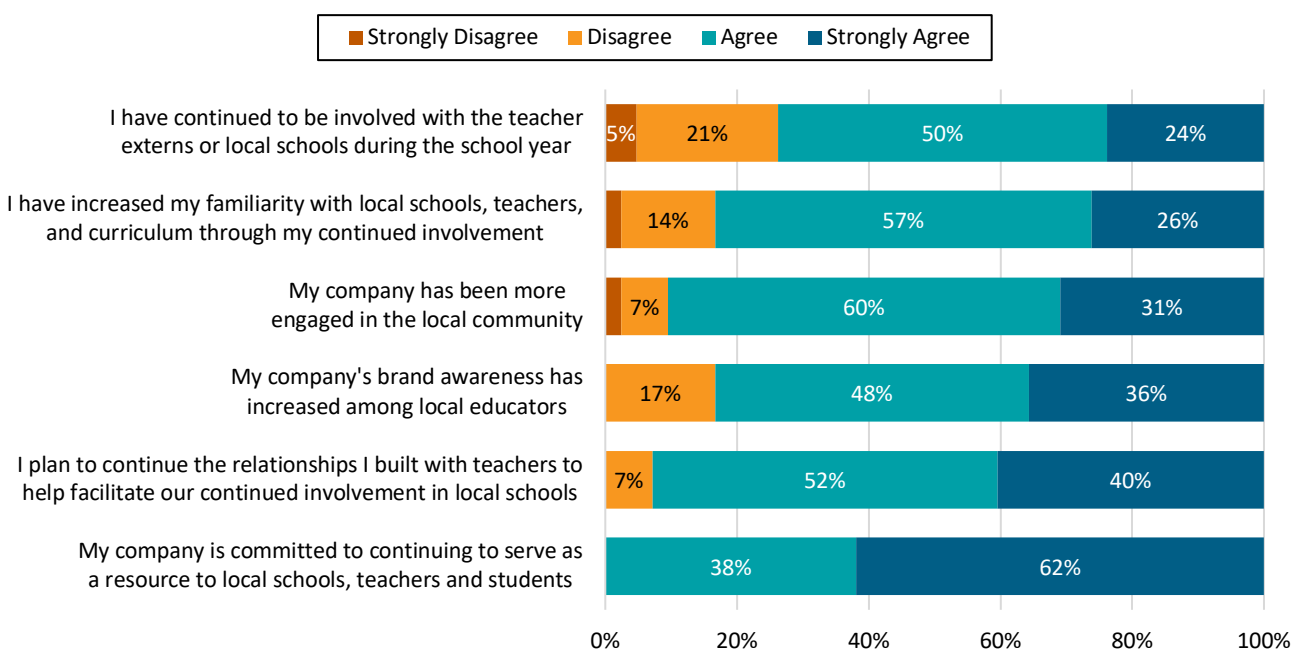
## Industry Partner Follow-up Survey Findings

### Partner Engagement and Outcomes

A total of 44 industry partners responded to the online Industry Partner Follow-Up Survey. Of the 20 TEX<sup>2</sup> projects, 50% had at least one industry partner respond to the survey. The partner respondents represented a variety of industries, including education (14%), aerospace (11%), business/multi-faceted industries (9%), municipal infrastructure (9%), health/medical (9%), manufacturing/fabrication (9%), computer (9%), media (7%), construction (7%), energy (2%), and other (e.g., food/nutrition, criminal justice, agricultural/environmental).

As shown in **Figure 21**, about three-quarters (74%) of the industry partners agreed or strongly agreed that they continued to be involved with the teacher externs or local schools during the school year. Regarding program outcomes, most partners indicated that they increased their familiarity with local schools, teachers, and curriculum through their continued involvement (83%); increased their company's brand awareness among local educators (83%); and increased their companies' engagement in the local community (90%). Almost all partners plan to continue the relationships they built with teachers to help facilitate continued involvement in local schools (93%). In addition, all industry partners are committed to continuing to serve as a resource for schools, teachers and students

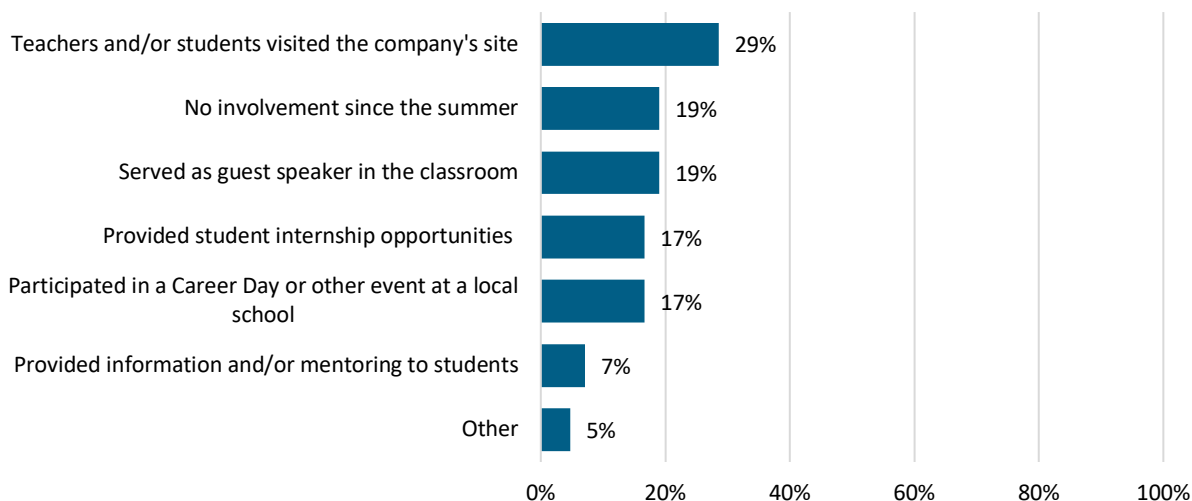
**Figure 21. Percentage of Industry Partners' Responses on Outcome Items (N=42)**



Industry partners continued to stay involved with teacher externs and local schools after the summer externship experience in a variety of ways (see **Figure 22**). Almost one-third of the industry partners allowed teachers and/or students to visit the company's site (29%), while almost one-fifth of the partners served as guest speakers in the classroom (19%), provided student internship opportunities (17%), and participated in a Career Day or other event at a local school (17%). A similar proportion of industry partners (19%) reported no involvement with teacher externs since the summer. In addition, a few industry partners (7%) were able to provide information and/or mentoring directly to students. Two industry partners (5%) reported that they continued involvement in other ways, including inviting teacher

externs to share solutions with industry partners and other judges and providing industry reference for an advisory board.

**Figure 22. Percentage of Industry Partners Offering Types of Continued Involvement Opportunities since the Summer Externship Experience (N=42)**



Industry partners were asked additional open-ended questions about their involvement with schools after the summer experience. Key themes and representative quotes are provided below for these items. The sum of percentages may exceed 100% per item as some responses fit into multiple themes.

**Please briefly describe your involvement in local schools during the school year. (N=19)**

- **Supported workshops, showcases, and science fairs** (47%): “Participation in local science fairs. Having schools and teachers visit our institution” and “Supported STEM nights and science fairs.”
- **Provided/facilitated tours or on-site visit** (47%): “Since the extern program I have served as a guest speaker in classrooms, have had teachers and student visit our facility, provided information and mentoring to students, and provided student internship opportunities” and “Have provided plant tours for teachers and students.”
- **Served as guest speaker or panelist** (26%): “Have served as guest speakers, have had students come on site to our facilities and also we have participated in various career days, science days, and expos since the summer” and “I have participated in many panels with students and faculty.”
- **Provided student internship opportunities** (21%): “We have a complete partnership with Connally ISD, we have paid internships, involved in advisory board, externships, student tours, Career Days, family briefings, and student briefings.”
- **Other** (5% per theme): “Training in-class sessions,” “We work with students on how to write articles and publish their own magazine pages, including editorial, photography as well as advertising sales,” and “Professional Development promoting OSHA training for 11-12 grade level students”, etc.

**How have you and/or your company benefitted from participating in the TEX<sup>2</sup> program? (N=35)**

- **Increased visibility in the community** (29%): “Provided some more brand awareness for the company,” “Giving us more visibility in the community and with the school districts,” and “We always benefit from sharing what we do with our community.”



- **Helped preparing future workforce** (14%): “Communication to the schools on what we need from our young workforce. Set expectations on skills and knowledge in a professional work environment and how we serve our community members.”
- **Increased industry awareness of education** (14%): “Became more aware of limitations for some students and the challenges teachers face when engaging and providing opportunities for their students,” “I have learned more about what they teach in the K-12 program at Crowley ISD,” and “Yes. Story ideas and familiarity with local educators and the challenges they face.”
- **None, not sure** (14%): “I believe so but no data to support this feeling.”
- **Connected education to industry** (9%): “It was a great opportunity to get the teachers and students involved in the entrepreneur industry as well as working on city challenges” and “Made students aware of how subjects being taught such as math, science, and technology are use in the real world.”
- **Other** (3% per theme): “Other divisions in different locales now want to take a look at the program in their area,” “Definitively, it has put our school, teachers, and students as a leader in our community and someone that other schools try to emulate,” and “There have been referrals from teachers to other educators to be involved with the CivTechSA program,” etc.

“The benefits to us are the enhanced possibility of gaining future nursing students and as a result, future nurses.”

- Industry Partner

**Please share any other outcomes or success stories that have resulted from your participation in the TEX<sup>2</sup> program. (N=15)**

- **Increased public awareness of the company or organization** (20%): “Public awareness on many other services” and “Having educators as advocates for our organizations is a bonus.”
- **Great experience** (13%): “Career Day has been great” and “My team was very happy to have the externs here and we would be glad to have a group back this year.”
- **Increased collaboration between industry and education** (13%): “Last year (in the Spring) we hosted a group of teachers from East Central High School. A few months after the session, the school reached out to me wanting opportunities to host Medical Assistant rotations for their certification class. We opened the doors to our facilities and last year we successfully completed Medical Assistant rotations for 22 of East Central High school students. Hoping to partner with other entities to continue these types of collaborations.”
- **Other** (7% per theme): “None,” “Great relationships,” “We hired 2 of the students that worked with us as externs. One I met while teaching a class at Lehman High and the other is a Senior at Hays High,” “College graduates, successful careers,” “I was appointed by the Governor to be on a PTech advisory council,” “We have published several students work in our local community magazine,” and “We are having a full-blown science fair with Youth Code Jam and the teachers from the externship with judges to see the progress of the projects they have been working on.”

“We are closely tied to what they are teaching in the classroom and are able to provide added information on some of the challenges the student will face in the workforce.”

- Industry Partner

## Partner Challenges and Recommendations

Key themes and representative quotes are provided below for open-ended survey items asking industry partners to describe challenges they faced in their continued involvement with externs and to provide recommendations to strengthen the program in the future. The sum of percentages may exceed 100% per item as some responses fit into multiple themes.

### What, if any, barriers or challenges did you encounter with continuing your involvement with the teacher externs and/or local schools after the summer? (N=32)

- **None or N/A** (59%): “I encountered no barriers” and “I have not encountered any barriers or challenges.”
- **Time** (16%): “Having time to support or help other teachers while they are trying to continue with a scope and sequence of curriculum that may or not allow them to diverge too much far away than their plans” and “The barriers are primarily time and commitments.”
- **No further contact or connection** (13%): “They did not contact us with any requests for help or more information” and “No one has contacted us; we will be happy to find a way to involve/offer teacher externships at our organization.”
- **Other** (3% per theme): “A challenge would be the City being understaffed and finding quality time to be with the student one on one,” “Would love to see more teachers involved with Externship program,” and “Scheduling”, etc.

### What recommendations do you have to strengthen teacher externship programs in the future? (N=26)

- **Positive feedback** (19%): “I thought this went very well and we enjoyed the time the teacher spent in our office” and “I am impressed with program and administrator.”
- **None or N/A** (19%): “None at this time.”
- **Continued contact or connection** (15%): “Keep up the program, keep in touch.”
- **More time and frequency to interact** (15%): “More frequency and face to face encounters with students and faculty” and “More time to meet, instruct, etc.”
- **Promote more and better participation** (15%): “More teachers to get involved” and “Teachers should integrate into the teams with more direct participation, rather than simply observing.”
- **Encourage teachers to take the initiative** (8%): “The teachers need to take the initiative with the companies. We felt like we had to drive the relationship and we've received no exposure to the students' parents or other teachers” and “I find myself being the one selling the services that we offer rather than the school districts proactively reaching out to us with opportunities for development and partnership.”
- **Other** (4% per theme): “Clearly define the desired outcome of the externship,” “I will suggest to publicize the program around schools of the area ahead of time and use news media to advertise,” and “Clear communication and pre-planning on who we host to prepare. No last minute surprises”, etc.

“The meeting in Austin where industry partners got to participate was extremely beneficial and I recommend keeping that aspect of the program. Other than that, continued contact with the local program is something that we still seek. I still would like to see the tangibles that were created after the externs completed the program.”

- Industry Partner

## Summary and Recommendations

Across the board, teacher externs and industry partners reported that the TEX<sup>2</sup> program was beneficial and achieved its intended outcomes of providing real-world industry experiences for teachers and increasing teachers' knowledge about industry trends, needs, and opportunities in order to enhance their instruction and to bring relevance to student learning. This program successfully built upon the pilot program serving over three times as many teachers and working with over twice as many industry partners.

Teacher externs were very satisfied with the program and valued their experiences. They learned about a variety of industries, built relationships with industry partners, and explored ways to bring their summer experiences back to the classroom in order to prepare their students for future careers. Teacher externs created new lessons and activities for their students based on the content and professional skills they learned about, were better equipped to relate classroom learning to real-world industries and skills, shared their experiences with other educators in their schools and districts, and many utilized the connections they made to bring industry partners to their classrooms (whether in person or virtually).

Industry partners were also very satisfied with their experiences in the TEX<sup>2</sup> program. Industry partners benefited from outreach and exposure in their community, building relationships with local schools, and helping prepare the future workforce through their connections and discussions with teachers. Many industry partners were motivated to continue their relationships with schools through guest speaks, field trips, supporting career days, and internship experiences for students. Some industry partners hoped for more guidance from the program and a better understanding of expectations to help make the experience most beneficial for externs.

Since the 20 externship projects were given autonomy to implement the externships in their area, the structure of externships and teachers' experiences varied across the projects. Projects varied in their length, the number of industry partners externs interacted with, and the primary activities in which externs engaged. For instance, some projects had externs engage in hands-on work with the same industry partner for 40 hours over one week, while other had externs complete 40 hours of meeting with and/or interviewing a number of different industry partners of their choosing. Some of the externs who had the opportunity to interview a wide variety of industry partners enjoyed that structure, while others wished they had a more in-depth experience with one partner. At the same time, some externs who worked with one industry partner had a rich hands-on experience, while others felt that 40 hours with one partner was too much and wished they were exposed to a variety of industries. Ongoing support for more continued connection between teacher externs and industry partner throughout the year was also expressed by both externs and partners. Overall, the feedback received on a variety of program structures suggests that perhaps a combination exposure to and networking with a variety of industry partners as well as opportunities for extended, in-depth and hands-on experiences with structures in place for maintain connections in the future might be most beneficial.

Another notable finding that emerged was need to support teacher externs in making connections between the industries they experience and the content or curriculum they teach in their classrooms. Externs commented that having more time and support to plan lessons and ways to implement ideas from their experiences in the classroom would have been helpful. In future externship programs, dedicated time to collaborate with other externs and guidance on how to incorporate aspects from industry into their existing curriculum or required standards seems essential for creating a successful experience for

teacher externs. A number of externs also mentioned that the content they taught (often required by their districts and the state) was not very related to the industries they visited. Many did their best to incorporate transferable professional skills into their classrooms or bring in some real-world examples when possible, but some externs seemed to struggle to make these connections and wished that they had been matched with industries more appropriate to their classrooms. In the future, being more mindful and intentional about pairing externs with industries that will be most relevant to their students could help maximize the benefits of externship programs for students. Teacher externs could also be better supported to see how they can make connections between industries that are not directly related to their content or curriculum.

Although the TEX<sup>2</sup> program is not continuing for the 2019-2020 academic year, it is recommended that an expanded externship program be offered in the future, as it was clear that industry partners wanted more externs to participate and many externs indicated that they wanted to see other teachers, school counselors, and school administrators benefit from all this program has to offer – and even participate again themselves. In the meantime, individual schools, districts and ESCs can utilize the TEX<sup>2</sup> program framework, tools, and resources created by the STEM Center, as well as the teacher-created artifacts to help connect their teachers, and ultimately students, to industry.

It is also recommended that future educator externship programs employ a collective impact model, similar to the TEX<sup>2</sup> program in which the UT STEM Center served as a backbone organization supporting all of the grantees with infrastructure, resources, technical assistance, and a collaborative network. Instead of grantees having to create their own tools and processes, they were able to leverage the resources provided by UT and learn a substantial amount from each other's experiences. This collaborative learning community was facilitated at all levels, including Project Directors, industry partners, and teachers. The success of the TEX<sup>2</sup> program suggests that future investments in regional educator externships can be maximized by deploying a similar collective impact model that connects projects through a larger network of stakeholders and resources.